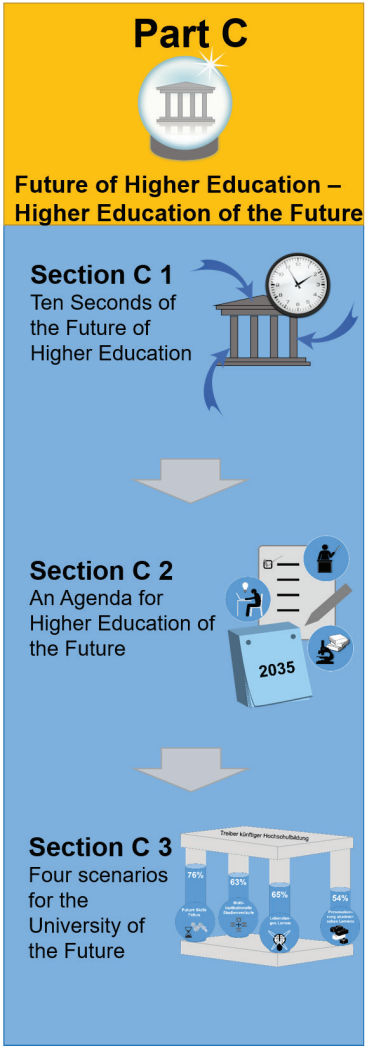
Part C

Future of Higher Education – Higher Education of the Future

#in-a-nutshell

The University of the future will have to change its organisational structure and procedures. Drivers and pressures will result in a new profile of higher education in a society in which academic education is the normal biographical experience for the majority of an age cohort. The *NextSkills* Studies make a point to view future higher education from a students' perspective and envisioned future learning experiences. The megatrend towards an educational society ("Bildungsgesellschaft") is accelerated by a second megatrend for society as a whole, that of digitisation. We have identified a total of ten key drivers that will lead to changes in the design, programme and strategies of higher education institutions and thus determine the future of the University (Chapter C 1 Ten Seconds of the Future of Higher Education). Building on this, we describe how learning and teaching can be shaped in the University of the future (in Chapter C 2 Rethinking Learning, Teaching and Research: An Agenda for Higher Education). The *NextSkills* Studies 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 in our studies. The dimensions of future learning in higher education will comprise (1) structural aspects, i.e. academic learning as episodical process between biographical phases professional and private episodes throughout life, learning as institutional patchwork instead of the current

widest-spread 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. Chapter C 3 Four Scenarios for the University of the Future concludes by formulating four scenarios for the university of the future as gravitation centres of future 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.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University of
the Future
Treiber künftiger Hochschulbildung
76%
63%
65%
54%

Ten Seconds of the Future of Higher Education

C 1

Seconds, also called semitone or a half step or a half tone, is the smallest musical interval commonly used in Western tonal music. When sounded harmonically it is considered the most dissonant. Something obviously is tense, wants to dissolve, strives for another state. Dissonances in music have a dynamic force, they appear as an unstable state, are not a calm anchor. Not a moment of dwelling – they want to move on. They seem to necessitate one further step, pointing music in one direction. And yet they are the smallest unity of great pieces of music, of all pieces of music. The University of the Future is confronted with the question of whether it can understand the dissonances currently emerging as moments of development from which it can compose a new architecture, understanding them as development potentials.

What are those seconds – those developments which on the one hand present problems, difficulties, challenges, lead to dissonance and on the other hand simultaneously provoke and enable developments? Making them necessary? What are the ten seconds that determine the future of higher education? [38]

The future of higher education stretches out like a horizon. Luhmann (1976) describes that in all social systems expectations are shaped that are decisive for how the system, including higher education, orients itself in its operations towards the future. It is therefore important for the future of the University to also take into account its internal situation and the expectations of its different stakeholders. Niklas Luhmann (ibid.) hereby distinguishes two aspects, namely *present futures* – i.e. projections, for instance in the form of utopias – and *future presents* in the form

38 Throughout our text we used the term *higher education* and refer to its institution as *higher education institution*. However, for this chapter on its future we have decided to synonymously use *University* as a term and refer to the *University of the Future*. The main reason is to be comparable with other foresight studies and scenarios which often use the term *University of the Future* rather than *higher education institution of the future*.

of technological orientations, causal or stochastic connections of future events. The present work is intended as a contribution to the *future presents* of higher education.

It is a multitude of different developments of a social, economic, political and technological nature that lead both to a transformation climate and a need for transformation. Some aspects stand out like landmarks visible from afar and form occasions for smaller and larger crises and thus new developments. Ten points are chosen and analysed below with the aim of mapping out to what extent they exert transformation pressure on higher education institutions.

C 1.1 First Second: Digitisation – Higher Education in a Digital World

Digitisation is such a powerful development – also for higher education institutions – that it would certainly be worth devoting an entire book to the influence of digitisation on higher education. Various publications bear witness to this. However, the current discussion about higher education strategies shows that digital transformation is not an aim in itself. It is becoming apparent that fewer and fewer institutions are adopting a *digital* strategy while and more and more are moving towards understanding digitisation as a means of strategically rethinking or sharpening their own profile. Schünemann and Budde (2018) pointed out that the result is often a strategy for *higher education in a digital world*, but not a strategy for digitisation.

At the same time, digital education is the *burning issue* of the current debate about the University of the future. It is the subject of countless conversations, discussions, concept papers and scientific studies. Both in educational policy and in the current debate on higher education, as well as in educational research efforts and many other discussion contexts. The discussion about digital education has seen a boom, also critically examines terminologies and, more recently, focuses more on the educational process as such. One refers less and less to digital education, but rather to education in the future society, education in a digital society or under conditions of digitisation. In higher education institutions, the question arises: How do we deal with the new possibilities? These are offered in different dimensions. Thus, digitisation leads to processes of dissolution of boundaries in academic education and its organisation, influencing all areas of higher education.

The knowledge required for academic studies is becoming increasingly freely available in digital form and can also be accessed decoupled from a specific academic institution and its actors. The bond of knowledge access and institutional affiliation is dissolving increasingly. For example, *patchwork studies* with different academic

courses at different institutions are theoretically conceivable and are increasingly being implemented.

- Processes of knowledge transfer lose their spatial and temporal ties and studies can be organised regardless of seminar rooms and face-to-face classes.
- Today, the generating of new knowledge through research processes is no longer conceivable without digital media and processes supported by them. Digital media are also increasingly being used for the interaction between teachers and learners, both in teaching and in the organisation of studies.
- Researchers, lecturers and students are increasingly entering a global exchange via digital media and studies, teaching and research are internationalising.

The points mentioned here are only a small selection of aspects that will be influenced by digitisation in the University of the future. The fact that more and more institutions of higher education are incorporating concepts for digitisation into their strategy development processes takes this development into account and is at the same time an expression of it (Hochschulforum Digitalisierung 2016).

The increasing individualisation of academic educational processes and the diversity of demands, goals and methods of studying is only just made possible through the support of digital teaching and study tools. Digitisation acts as a facilitator for the demands fuelled by increased participation in education.

To understand the digitisation of higher education as *technisation or technologisation* would be abridged and wrong. At its core are aspects such as free access to knowledge, knowledge resources, unlimited communication possibilities and networking. The question now increasingly arises as to what educational processes must look like if they can no longer lean on the already rehearsed hierarchical divide between teachers as knowledge bearers on the one hand and students as recipients of knowledge on the other. Rather, the old ideal of the community of students and teachers with the common aim of producing innovative approaches through discourse now seems to be able to shine out again – developing and working on problem scenarios in a mutual discourse.

C 1.1.1 Accelerated Innovation Cycles – Change as the New Normal

Digitisation being such a strong influencing factor is also due to technological innovation cycles accelerating more and more. If you consider the technical development alone and imagine that the last one thousand years have shrunk to

24 hours, the development of letterpress printing would not have happened until hour 13, shortly after noon, photography about four hours ago, telephone and radio about three hours ago, the World Wide Web only half an hour ago and services such as Facebook, Twitter, WhatsApp and the iPhone itself only ten minutes ago (see Figure 23).

At the same time, the intensity of the impact of the different technologies described continues to increase. In other words, we are facing a development in which technologies are developing faster and faster and the effects that these technologies have are becoming increasingly intense and socially noticeable. In all areas of society, the impression of a "5 minutes to 12" situation emerges. With the futurologist Peter Kruse, we can speak of a paradigm shift from a linear to a non-linear, emergent system dynamic (Kruse 2009). The ability to recognise and reflect how things interrelate hereby becomes more important than defining goals and carrying out planning processes.

The change brought about by digitisation creates a feeling of permanent change in social processes and opportunities. While updating cycles have so far led to new conditions, for example in organisations or social developments, which consecutively represented the new status quo, change, transition and transformation are increasingly becoming the new normal condition. The feeling of "5 minutes to 12" now becomes a basic social underlying feeling, an *organisational norm*. In higher education institutions, too, the agenda of the involved actors, scientists and committees is increasingly geared to change and less to consistency. There's no more steady state. New changes result from current processes of change.

The impact of digitisation on the labour market is also important for higher education institutions, their curricula and the development of study programs: The speed of technological development and its consequences are not least becoming apparent by the discussion on how it affects the labour market and the working environment.

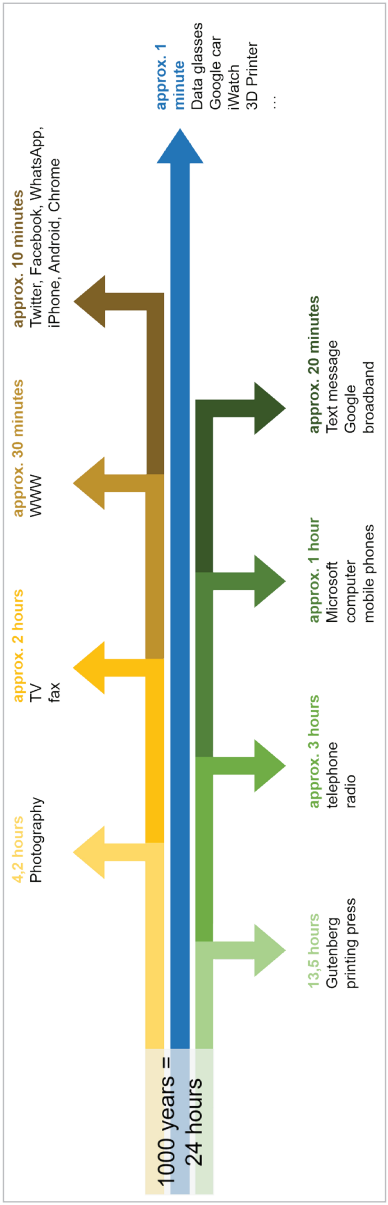


Fig. 23 Speed of digital development (inspired by Ibrahim Evsan 2015)

The message is: Technological developments consume jobs and the question no longer seems to be whether jobs will disappear, but how many. Concerning labour market effects of technologisation, robotics and artificial intelligence, it is clear that wherever manual routine activities are carried out, there is a high potential for technological transformation and wherever non-routine social skills are required, there is only a low potential for technological substitution (see Figure 24).

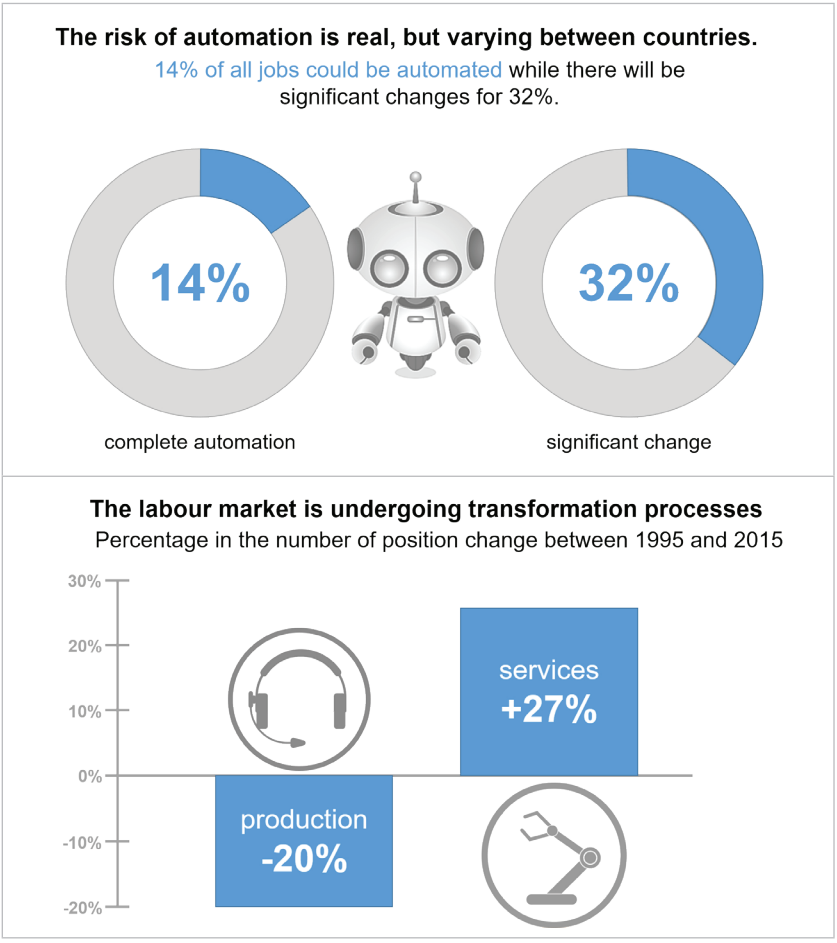


Fig. 24 Effect of digitisation on the labour market (own illustration based on data from OECD 2019)

In fact, the question of technology's substitution potential in different labour market areas is a dramatic but currently still unresolved one. If, on the one hand, clusters of activities can be substituted by computers and machine technology, on the other hand, the question arises as to when and in which stretch of time new professional profiles will emerge.

C 1.1.2 Reversing Innovation

Although digitisation implies a strong potential for disruption and causes changes in many areas of society, the implementation of digital technologies and the adaptation of processes in institutions are challenging (Hochschulforum Digitalisierung 2016). Though digital technologies have been strongly integrated in many areas by now, in many cases this has been accompanied by major upheavals. The music industry has been strongly affected by this and has developed very dynamically in recent years, almost reinventing itself. The print industry has undergone big change through the Internet. Single book chapters and individual pieces of music can today be purchased; a possibility that was previously unimaginable. However, the initial impulse for innovation in distribution or production came from outside, never from within the industries themselves – not in the printing industry nor in the music industry or in other industries. Impulses for change were always induced by technological development: It wasn't the booksellers who got together to think how they could possibly develop a new form of book distribution with granular choices at the chapter or page level and possibly even make it freely available to entirely new customer groups. But it was the Internet with its possibilities, the technology that was available that led to these developments: Innovation stimulated by external impulses.

Looking at higher education, we can ask the question which effects digitisation will ultimately have on the institutions. The processes are similar here. Only, there is only little market pressure on publicly financed higher education institutions. Nevertheless, the question is increasingly raised as to how technological possibilities and environmental changes will ultimately lead higher education institutions to further change their operating principles and reflect on the extent to which innovation will actually be possible in the institution (Schünemann & Budde 2018). And all the same it is also for higher education intuitions an external pressure to innovate which leads to the *5 to 12* feeling. Innovation in higher education via technology, for example the free provision of educational content via open online courses, the development of online courses for very large target groups (such as Massive Open Online Courses), freely available educational materials (Open Educational Resources), the modular provision of certification concepts (via so-called badges and microcredentials)

is made possible by technology and has been unconceivable in higher education until recently. All these examples of innovations have entered the institutions by external impulses. Examples are *Coursera* or *Udacity* in the USA or the MOOC platform *Future Learn*, a spin-off of the Open University UK – platforms on which open educational materials of the highest quality are offered largely free of charge and without compulsory enrolment. Students can make use of these at no charge. Interestingly, all these developments have been launched and are operated outside of higher education institutions – being the best way to guarantee the sovereignty and independence of higher education institutions. All those developments are so strongly questioning the way in which higher education has functioned to date that these platforms could not have been set up from within the universities.

Altogether, digitisation allows new distribution and information channels, new cross-platform cloud data storage that is no longer tied to institutions, new possibilities for intelligent, learning algorithms and rethinking structures and processes in higher education. In this new, often erroneously glittering world, John Nalsbitt's famous sentence "We are drowning in information but starved for knowledge" still applies – and so one may add "wisdom". Through allowing decoupling and decentralization processes, educational institutions are faced with questions how holistic educational concepts, comprising unfragmented, continuous and orienting aspects can be provided in the future, in a new and urgent way.

C 1.1.3 Digital or Traditional: What's Better for Education?

One question regularly asked when it comes to digital teaching is the one about what is better: digital or analogue higher education. There is a large number of studies and a scientific consensus on this question by now. At the core of such research has always been the question if e-learning and digital media support learning and also whether learning can be more successful or more effective with media-supported learning systems than by other means, such as conventional ones. Meta-analyses can be used to aggregate the many available studies on the effectiveness of computer use for teaching and learning. Kerres and Gorhahn (1999) refer to the following trends:

1. E-Learning is not fundamentally inferior to conventional learning. The studies mentioned could not identify any particular media system as particularly successful either.
2. The advantage of multimedia learning is not the simultaneous addressing of several sensory channels (Weidemann called this is a *naive accumulation hypothesis* in 1997), but in the different coding of information in various symbol systems.

3. The learning motivation can be shortly increased through the use of learning media. However, since this effect is short-lived, it does not justify an expensive production of multimedia content.
4. Altogether, it seems that the nature of the didactic methodological learning arrangement is much more important for learning success than the media system used.
5. For people with high Learning Competence and independent learning behaviour, media systems have advantages in comparison to conventional learning methods.

One of the most important meta-analyses in this context was carried out by Kulik and Kulik (1991) as early as in the 1990s. The authors evaluated a total of 248 comparative studies. Of these, 195 had already been summarized in earlier meta-studies and 53 were added later as current studies. Of the 248 studies, 202 showed a higher learning outcome for computer-based learning and 46 a better outcome for conventional learning. However, the results were only significant in 100 cases, in 94 percent of cases in favor of computer-based learning and in 6 percent of cases in favor of conventional teaching. Comparative studies between conventional and media-based learning should not be clearly interpreted in one direction or the other. The primacy of didactics, which seems to have the greatest influence on learning success and less the influence of the digital learning system, still applies. Thomas Russel (2001) comes to the conclusion that comparing conventional and digital learning, the so-called *no significant difference phenomenon* is valid, thus a superiority of the one to the other system cannot be determined outlastingly.

However, comparative studies between conventional and media-based learning are not uncontroversial; on the one hand, they make the explicit assumption that the learning content to be conveyed is equally suitable for conventional learning and e-learning; on the other hand, they are methodologically problematic. The main question is whether the differences are really due to the media used in each case. In particular, variables relating to the characteristics of learners themselves (learning preferences, Learning Competences, motivation, etc.) seem to have an impact on learning outcomes. Empirical teaching-learning research has been trying for some time to determine who learns best with which didactic media offers. The intention is to capture all relevant influencing factors in a teaching-learning situation and to determine their effect on the learning process. From a methodological point of view, this means that media attributes such as readability of texts, film sequences, etc. as well as didactic design variables must be related to learning variables. This intention usually leads to very complex experimental research designs. The problem is not only the abundance of factors to be captured, but also their mutual influences.

Overall, it can now be said that the hope of capturing all significant influencing factors and using statistical methods to determine their impact has been abandoned as unrealistic. Recently, these attempts have been revived by trying to record as much data as possible on learning behaviour under the heading "Learning Analytics" and to draw conclusions about the way in which learning success can be observed and how they take place by data mining procedures and learning algorithms. Here, too, empirical methods are used to relate behavioural data and variables to attributes of the learning situation such as media, materials used and variables of the learners, so that in principle there is no difference to previous experiments – however, slightly different approaches can be chosen with the multitude of available data. The *Hochschulforum Digitalisierung*, a network of German higher education institutions working in the field of digitisation of higher education teaching, concludes that the question can no longer be whether digital or analogue higher education is better or worse, but how it can be designed in the future. It is not a question of digitisation per se, but of how digital media affect the learning process, how digital media can make the study process more individual and flexible and how added value can be offered from the perspective of teachers and learners. Three propositions are at the forefront of the current discussion at higher education institutions.

1. Digitisation is not *technisation or technologisation*, but didactic, curricular and organisational innovation.
2. Collaboration is the key to the successful digitisation of higher education teaching.
3. Digitisation not only creates virtual learning spaces, but also changes existing physical learning spaces.

C 1.1.4 Open Education: A New Digital Openness

Digitisation enables a new, unprecedented openness in many aspects. The new digital openness, for example of open publishing, from which new collaborative forms of work and publication emerge, has not existed in science so far. Whereas in the past the publication of scientific texts, a specific type of text that had to meet special quality requirements, was a very exclusive working approach of one or more scientists in a closed group without presenting the results to the outside world in advance, a digital collaboration on scientific analyses and texts today is often an open procedure in which peers are already included in the production process of the text.

Other aspects of openness by digital media are the opening of learning opportunities to other target groups, the provision and use of learning materials as open

educational materials, also known as Open Educational Resources (OER). Open educational resources include all types of materials, all contents and concepts that have been developed for teaching and learning purposes and that may be used, processed and passed on with little or no restrictions (cf. Butcher 2013: 6). They constitute a modern possibility to create the necessary conditions for education in terms of the exchange of ideas, experiences and knowledge. For this purpose, the material is generally made available free of charge by the copyright owners and marked with an open license that includes a legally secure, flat-rate usage approval. According to UNESCO, open educational resources can contribute directly and indirectly to facilitating access to lifelong learning: their free and unrestricted availability would enable people on lower incomes and educational institutions with limited financial resources to benefit from OER. Through the dissemination and availability of OER in digital formats, learners could be offered opportunities for further training according to their own needs, independent of time and space (cf. UNESCO 2017: 2).

It is also possible to make available and make use of data stocks and information as open data (Open Access). As a whole, digital technology is thus changing both the research process (e-science) and the possibilities for analysing data, documentation, teaching as well as the availability of teaching materials.

When it comes to digital teaching in higher education, the question arises as to what constitutes a suitable, appropriate "blend" of digital and non-digital phases and approaches. Although this question is discussed according to the particular profiles of smaller and larger higher education institutions and the respective discipline clusters and thus very variously, two models seem to prevail – at least in German higher education – at present: Blended Learning and its form called *Flipped* or *Inverted Classroom* (see Ehlers & Kellermann 2019 for details). Discussions and decisions about the design of learning and teaching scenarios at higher education institutions usually take place at program level. In higher education systems with a high degree of autonomy, each teacher is asked to make an individual design decision on the extent to which digital media and teaching in class are interwoven to form new didactic patterns. What can be noted overall is the trend to increasingly shifting knowledge transfer to media-based learning, while classroom teaching is used for knowledge deepening, the application of knowledge, further development and analysis of knowledge in specific case constellations and problem situations.

C 1.1.5 The Race Between Technology and Education

Looking at digitisation and education as a megatrend from a historical perspective, Katz and Goldin (2009) point out that there is a connection between social

development, technology and educational development (see Figure 25). Whereas there were only few recognisable connections between technological development and educational development in the pre-industrial era, the advance of steam engines, the new means of production in the industrial revolution, gave rise to a great economic lead, which the public-school system, the educational resources and processes available were unable to match. Katz and Goldin speak here of an emerging area of social conflict, arising between strong technological development that massively affected production capacities and production resources as well as the workers in the factories and a lack of training and qualification. Only with the introduction of the universal, public school system there emerged the possibility of further developing the educational standards of society accordingly. Initially, there was a phase in the fifties and sixties of the last century in which educational opportunities were massively expanded, and in which social prosperity rose thanks to well-established technological production and economic mechanisms. Thus, increased education and training could lead to social advancement, prosperity and new ways of life. Here Katz and Goldin speak of the phase of prosperity.

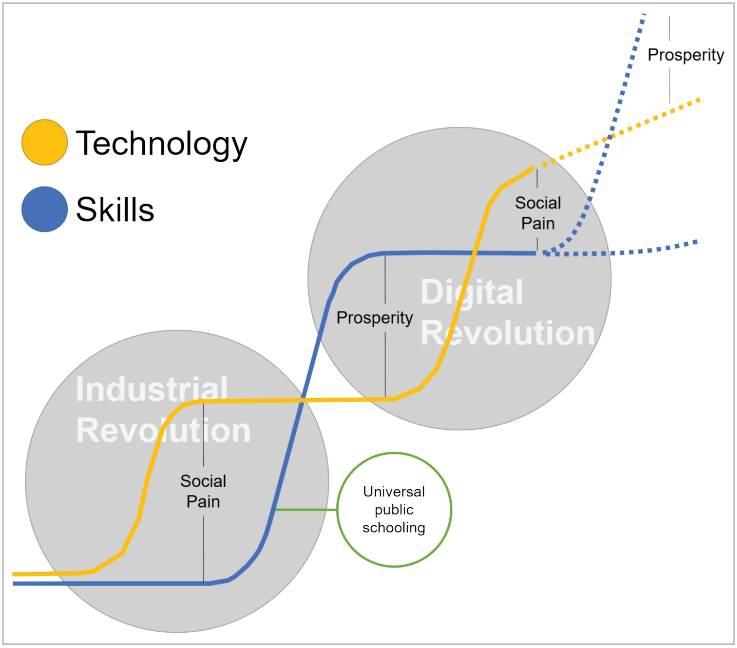


Fig. 25 Race between technology and education

With the digital revolution they once again describe a phase in which technological developments make a fast head start, without a similar educational development or educational processes and forms being discussed. This – again – is precisely where the concept of *Future Skills* comes into play and asks: What should the new education, what should the new higher education of the future actually look like in order to accompany, after the industrial revolution, the digital revolution in a way to avoid social irritation and thus to contribute to social coherence?

C 1.2 Second Second: Higher Education in a Transformative Society

From a historical perspective, media development has always led to fundamental social upheavals in all societies. Dirk Bäcker, a sociologist at the University of Witten-Herdecke, points this out in his *Media Archaeology* (2018), in which he distinguishes four media epochs. The first media epoch is the transition into oral society. Bäcker asks: Do computers complete modernity? Do they still promise freedom and participation? Or are we trapped in their web?

Dirk Bäcker sees digitisation as the most recent of four media epochs in human history, each of which has fundamentally reshaped the rules of coexistence. Digitisation means the use of electronic devices of all kinds. It is of the same profound significance for social culture as the introduction of printing, the introduction of writing and the introduction of language were before. In his book "4.0 or the gap caused through the machine " (2018, translated), the sociologist outlines how the emergence of language thirty to forty thousand years ago – in the media epoch 1.0, according to his counting – led to the emergence of social formations which, as language communities, each found their own rules for what kind of speaking was appropriate in which situation and among which actors. In the media epoch 2.0, which began with the invention of writing about eight thousand years ago, a new concept of time arose through the possibility of fixing and analysing formerly volatile speech. Bäcker on this:

> "Society explodes into time horizons. Writing means being able to read what you wrote down yesterday. Writing down what you need to read tomorrow. So that suddenly terms like past, present and future became necessary after all." Baker (2018)

With the invention of printing in the middle of the 15th century the media epoch 3.0 begins. This led to a fundamentally changed perception of the public sphere, says

Bäcker: "The modern book printing company is one in which everyone can criticize everyone at any time and you even have to endure it, because they have all read and simply "babble on". (ibid.) This new polyphony seemed chaotic and risky to many contemporaries. The philosopher Immanuel Kant, for example, makes a suggestion in his writing "An Answer to the Question: What Is Enlightenment?" (1784). He recommends that a scholar should only speak if at least one other scholar is present who can correct him or her if necessary. Soon more or less well-read citizens began to present their own newspaper readings in salons or at regulars' tables, to debate and criticize each other. This way, a much livelier and largely unregulated public sphere emerged, says Dirk Bäcker, which already points towards todays.

But what is the main difference between the current digital public sphere of the media epoch 4.0 and its predecessors? The situation in which we are today is that the regulars' table is extended into the general public sphere and one can find any arbitrary comment that crossed somebody's mind somewhere as a posting on the platforms of the web. It is a different situation because there are no longer authorities, an accepted opinion, channels in which what has to be bundled can be bundled. Have we really become much more vulnerable to falsification and distortion of the truth than was the society in times of printing with its principles of verifiability and corresponding instances of control? In this sense, fake news is not really a new phenomenon. Scandalous false reports existed as early as in the 19th century and they caused indignation. Although it has become easier to falsify documents or images, errors can now be corrected, and fraud can be detected more quickly. According to Bäcker, the decisive factor in the development of society in response to media development is that there is a history, role models, a period of time. Furthermore, crucial is that society does not give in to digitisation passively but makes use of its freedom to design the way we want to live in a digital society – within the framework conditions algorithms have already set everywhere. This margin is the leeway that the computer leaves us.

> "Not a single software," says Bäcker, "no single algorithm can tell us how business or politics or family has to function, but rather the digital devices and electronic media have to wait for someone to have an idea about something in society, how to deal with it and what it can be used for." (Bäcker 2018)

One question arises: How can higher education institutions prepare their students and graduates for the next society (Bäcker 2018)? For a society characterized by the developments previously described? What are the skills that people in such a changed transformation society need in order to help design the environment, society, social and economic systems as global citizens, to act proactively and non-reactively and to develop solutions for the problems of the future? Thus, the question is: What will the mindset of graduates have to look like in the future? Knowledge is certainly no longer enough. It is available in databases, computers, in technological and digital networks. Beyond this, problem-solving capacities, the innovation skills and competences, creativity must be enhanced in order to shape the diverse reality of evolving organisations. It is also about mindfulness, emotional intelligence, a design mindset and systems thinking, networked thinking, changing perspectives, taking the perspective of the other in order to advance. It is stories like these that characterize what students have to develop as competence, as capacity to act and shape the future. Stories like those where great inventions were being made.

C 1.3 Third Second: Demographic Change

Higher education has always been in demand, but never as openly accessible as it is today. Figure 26 shows that there has been a continuous increase in the number of students since the 1950s.

Due to the very considerable increase in the number of students in the 2000s and the decreasing scope of school-leaver cohorts, the area of academic education is of outstanding importance for the qualification of future generations of skilled employees. The trend towards higher education is a social reality that needs to be shaped (see Figure 26), despite all debates about the relationship between vocational and academic education and training. The higher education institutions face the challenge of finding answers to the corresponding social expectations and bringing them in line with their educational goals.

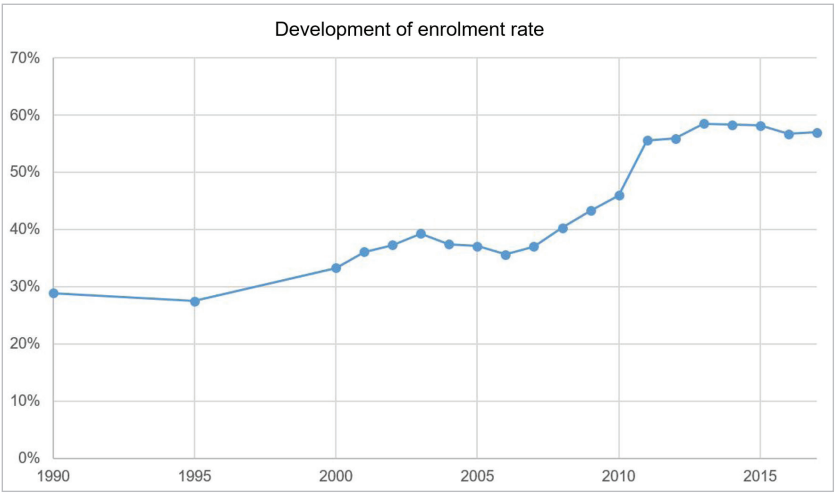


Fig. 26 Rate of first-year students 1990 to 2015 in Germany (Source: Gehrke & Kerst 2018)

In the first part of the recommendations on "Qualification of skilled workers in the light of demographic change", the German Council of Science and Humanities emphasised that the areas of vocational and academic education are equally indispensable for the qualification of future generations of skilled workers and must be kept in a functional balance. It should be prevented

> "that young people primarily make their training decisions based on prestige, recognition or acceptance and do not consider certain attractive training options for that reason alone." (Wissenschaftsrat 2014)

While the initial university education in Bologna in the 11th century was still very much oriented towards the social elites and highly selective in its access for only very privileged target groups, the needs of an industrial society triggered a real campaign of mass higher education. Attaining higher education is today becoming a normal part of biography and standard experience (OECD 2016). In Germany, too, more than 50% of an age cohort is now studying. In 2012, the proportion of people with higher education entrance qualifications rose to 53.5 per cent nationwide (see also Alesi & Teichler 2013 for trends in academization), the proportion of first-year students to 54.6 per cent and of graduates to 30 per cent (Dräger & Ziegele et al. 2014) (see Figure 27). Rising numbers are still being predicted, and the Bertelsmann

Stiftung expects the number of first-year students to reach a high plateau by 2050, well above the 2005 level (von Stuckrad et al. 2017).

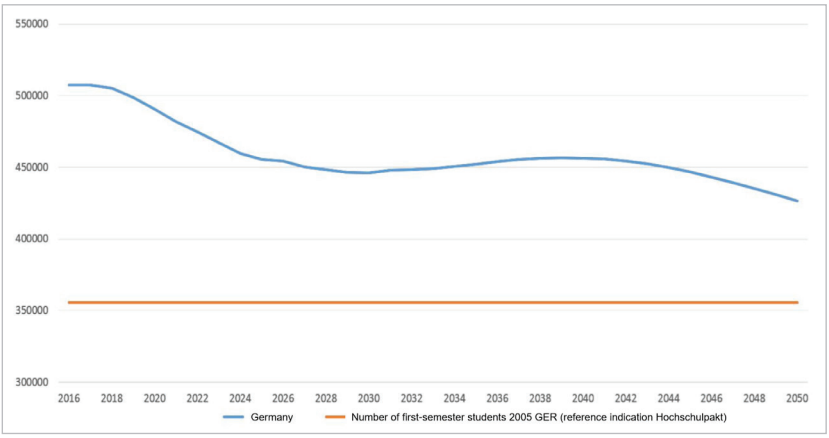


Fig. 27 Forecast of student numbers in Germany up to 2050 (Source: von Stuckrad et al. 2017)

Schofer and Meyer (2005) use statistical analyses in higher education to show that the expansion of higher education has been an accelerating process in all industrialized countries of the world ever since the middle of the 20th century but running at different speeds. Critical interventions on the "mania for academisation" (Nida-Rümelin 2016), certainly worth considering, are therefore important moments of reflection, which, however, do not and will not change the fact of the constantly increasing participation in education. A higher education participation rate well above the 50 percent mark will therefore have to be expected everywhere (see Figure 26, cf. also Teichler 2013; Baethge et al. 2015).

The proportion of employed graduates has grown disproportionately – from 13.1% in 1993 to 19.2% in 2013. In relative terms, the proportion of graduates from higher education institutions of applied sciences has risen somewhat faster than that of graduates with a university degree. The disproportionate increase in the number of academically qualified people affects all forms of employment. Between 2005 and 2012 alone, the proportion among self-employed persons and civil servants rose by 12%, in the group "Employees/Workers" even by 16% (Federal Institute for Vocational Education and Training 2013). Given the fact that academics account

for around 30% of the generations entering the labour market, this development is likely to accelerate significantly in the coming years.

The importance of participation in education as an enabling factor to participate in cultural, social and economic capital (Bourdieu 1982) continues to grow. The term educational society (Mayer 2000), which is increasingly being discussed in pedagogy and sociology, is characteristic of this. Paradoxically, it is therefore not only an important option, but increasingly represents a risk – if participation in education does not or cannot take place (Beck 1986). Option and compulsion are thus closely related.

Another major challenge facing higher education institutions today is the massification, the increasing number of students and other target groups requesting academic education. The OECD assumes that in the next 20 years the rates of academization for age cohorts with higher education entrance qualifications will rise to up to 70 per cent. Where shares are currently at just below 50 percent in Germany and somewhat higher in other countries, it can be predicted that a massive increase in student numbers will forces higher education institutions to develop new models. On the one hand, the diversity of the target groups entering higher education will keep increasing. On the other hand, simply more students will come to higher education institutions than ever before.

Figure 28 shows the diversity of students in 2012 in Germany, including non-traditional target groups in addition to more traditional students. Students who come from the most different backgrounds, with different talent concepts, who enter higher education with very different requirements, demands and support needs for their studies. Institutions that are able to cope with these different abilities, starting points and target contexts of students will be the future higher education institutions with mostly successful graduates. Institutions which have difficulties in personalizing and flexibilising study experiences in terms of providing different study speeds, orders and branches, not meeting these diversified requirements, interests and needs will be overwhelmed by the demand for diversification triggered by the mass rush. When looking back, one can see that higher education has already undergone a strong development. With the establishment of the first university campus in Bologna 1088, a very exclusive study model was born in which few selected, privileged students were able to acquire a very broad academic knowledge.

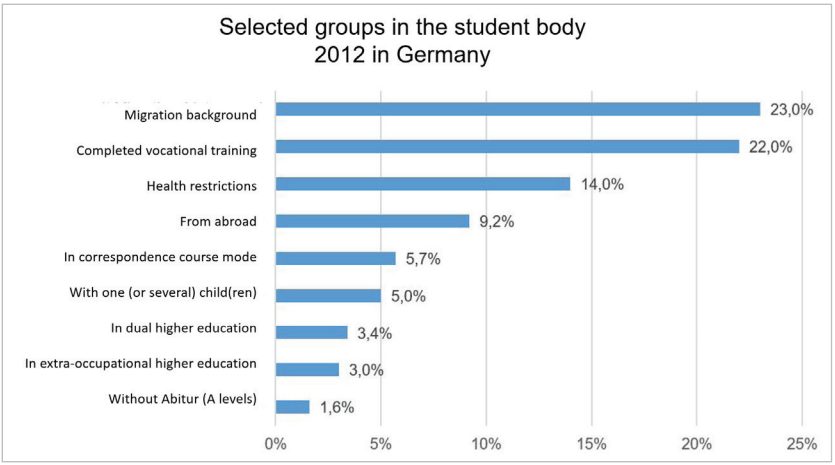


Fig. 28 Diversity of students in Germany (illustration based on Dräger 2014)

The *Studium Generale* and studying Philosophy were the predominant models at that time, due to the fact that philosophy was regarded as the mother of all sciences and that the logical way of thinking conveyed and trained there formed the basis for all other natural sciences. With the onset of industrialization and the social revolution that followed, the education system also evolved. At first, only production techniques developed, which led to a largely unskilled workforce having to carry out low-level activities in highly fragmented production processes, sometimes under very inhumane and undeserving conditions. The evolving economy and the associated prosperity led to an expansion of education, culminating in the 60s and 70s of the last century and leading to a massification of academic educational offers. The expansion of education comprised various contexts and objectives, including the promotion of previously disadvantaged target groups, such as girls. The aim was to encourage more and more young people to seek better school education and academic training. The focus here was on training qualification profiles that were suitable for jobs in an expanding industry, so that the evolving standardised occupational profiles could also be handled with standardised study programs.

We can see that with the increasing massification in academic education, further diversification is becoming apparent. In the light of a changing paradigm from a predominantly *preparatory*, up-front higher education model to an episodical *lifelong learning* model, this will lead to individualization and will demand more personalization of academic learning processes. This new demand for individual

study pathways in higher education will be expressed in new combinations of study processes: multi-campus study programs, patchwork courses with branching off ramifications, and multi-episodic phases of academic qualification permeating one's biography lifelong. Postmodern structures in higher education evolve.

On these educational voyages it will become more necessary than ever before to improve permeability of both educational pathways – vocational and academic. Here a completed vocational training should be considered as a higher education entrance qualification. In addition, the academic training should be enriched with practical elements and the vocational training with theoretical consolidation. Moreover, nationwide standard agreements for mutual recognition must be developed in order to be able to certify competences and study achievements on both sides.

C 1.4 Fourth Second: Flexibilisation of Work and Education

The modernisation of the labour market results in processes of flexibilisation, de-structuralization and decoupling. Technologization creates new jobs, existing professional profiles disappear and the development speed of requirements and change in occupational profiles increases steadily. These increases and changes are especially strong in technical professions, in finance and in globally networked fields of activity, while they are weaker in many artisanal and locally based fields of activity – but increasingly noticeable, even there. Three developments can be observed:

1. The labour market is evolving from a *professions-oriented system of work* to a *technical system of work* (Lisop 1997). This is a parting from the professions routed in qualification and suitable pedagogical approaches. The rigid occupational schemes are increasingly dissolving. The technical system of work is gaining in importance. Transformation processes within an occupational field are increasingly becoming more intense, pervasive and rapid.
2. A development from *lifetime employment* to *lifetime employability* can be observed (Beck, Giddens, Lash 1996). This means that the aim of vocational education and training in general, but above all of higher education, should be less a specific vocational competence of a certain occupational profile only but should enable individuals to lifelong employment. Here, it shows that the competences mentioned above play a central role as key points intended to ensure the capacity to act within one's own behavioural dispositions.

3. From a *profession-oriented employee* to becoming one's own labour entrepreneur within an organisation or company (Voß, Pongratz 1998). Beck (1986) also mentions a new culture of *taken-for-grantedness*.

As a consequence, an unpredictably rapid devaluation of rigid qualifications can be observed, a decoupling of work and qualification, a dissolution of boundaries between qualifications and *qualification*. Furthermore, we can observe the globalisation of learning contents, an increased *time lack* between structural changes in the labour market and respective reactions in the education system, and last but not least a differentiation in functions of continuing education in order to actually be able to react to different contexts.

In addition to this flexibilisation and modernisation of the working environment, a trend towards flexibilisation can also be observed in the field of education. There are essentially four developments:

1. A flexibilisation of degrees, paralleled by recognition of non-formal education: The European and national qualifications frameworks assume that by a better classification of qualifications along the entire education chain, seamless transitions between open education segments on this chain are enabled. The recognition of prior academic learning for further academic study plays an increasingly important role, which is guaranteed by the Bologna Process. Likewise, the recognition of informal and non-formal education will become more and more important in the future, with the importance of official certificates decreasing at the same time.
2. A flexibilisation of curricula and learning organisation through modularisation: more and more study programmes have to be specifically adapted to the needs of students, which can only be achieved through greater modularisation and greater variety of choice as well as further options within the study curricula.
3. A flexibilisation of contents: This can be achieved by focusing less on knowledge and facts and more on competences as an overarching behavioural disposition for action in any specific disciplinary and professional context and also by focussing more on key qualifications.
4. Flexibilisation on the level of didactic methodology: The emphasis on self-organised learning, self-regulated learning and research-based learning must prospectively lead to the necessary flexibilisation of study contexts and processes, thus enabling an improved learning performance, also due to self-organised learning.

When science and industry cooperate, both sides usually benefit – but it is necessary to design this cooperation carefully. Various concepts can be conceived, ranging

from loosely coupled partnerships, by which students have the opportunity to gain their first practical experience within the framework of internships, to structurally highly integrated models, such as that of the Baden-Wuerttemberg Cooperative State University (DHBW). It is important to understand the practical study experiences as an opportunity to reflect on the development of competences, as is the case, for example, with the concept for designing practical study periods at the DHBW.[39]

But how can employability be rethought – beyond the purely additive "practical impregnation" of students, in which practical experience is simply added on top of theoretical learning? How can a comprehensive concept of employability be developed into a broad concept of reference for higher education processes, including competence enhancement, identity building as well as social and human capital, instead of deriving qualification goals from the current status quo of occupational profiles?

Study programmes usually set clearly defined and irrevocably prescribed qualification goals, which equally and simultaneously apply to all participating students and from which the contents and methods of the modules are derived during studies. Existing professional profiles are frequently used as a normative paradigm for course contents. This creates the pragmatic illusion that one can derive the prospectively relevant contents from those recently or formerly relevant. This problem is compounded by the widespread view that employability is attributable to university performance and not to the productive performance of individual graduates. In his analysis of employability concepts, Harvey (2010) criticises the common practice of employability rankings in higher education. He argues that employability in university rankings is not seen as a performance attributed to graduates, but as an indicator of the educational performance of higher education institutions. Employability is thus regarded as a quality aspect of higher education institutions, which can lead to misleading and contradictory information (Sumanasiri et al. 2015).

The concept of employability is highly developed by now. Employability in a comprehensive sense encompasses three dimensions: Career identity, adaptability and social and human capital (Fugate et al. 2004):

- Identity (for Fugate et al. particularly related to "career identity") comprises cognitive-affective representations with regard to expectations and goals of one's own professional development. To this dimension, Fugate et al. (2004) also

39 More information on the DHBW at http://www.dhbw.de. A guideline for the design of practical study periods is also available on the DHBW website: http://www.dhbw.de/fileadmin/user_upload/Dokumente/Broschueren_Handbuch_Betriebe/DHBW_Leitlinien_Praxisphasen.pdf (in German)

assign work-related personality traits, values and norms as well as behaviour patterns and experiences of a person.
- According to Fugate et al. (2004), adaptability means the will and self-efficacy to enhance knowledge, skills and capacities in order to meet the changing demands of the labour market.
- Social and human capital includes the social network as well as individual characteristics such as education, age, gender, work experience, background, etc.

Two consequences result from the analysis of current career and employability research: For a start, there is a consensus in recent career research in understanding careers and job histories as a so-called "boundaryless career" (Arthur and Rousseau 1996), which in principle is basically perceived as flexible, permeable and versatile. Secondly, the focus of employability development is on the self-directed and self-organised individual, who is responsible for her/his own career, i.e. plays a key role in planning and shaping professional life (Greenhaus et al. 2011; Hirschi 2012). Higher education institutions play the role of an accompanying and stimulating institution here in which experiences are made and reflected upon that serve the individual's personal development in the sense mentioned above. The aim of the academic study programmes, curricula and teaching concepts is therefore to contribute to the development of employability by taking into account aspects of identity and personality development, by developing a comprehensive understanding of competences and, last but not least, by focusing on the development of social and human capital.

Based on professional profiles, courses and programs are oriented towards further contents which promoting long-term employability: Development and reflection of individual educational goals, interests and needs, *Future Skills,* the fundamental capacity to act and overarching capacities.

Employability can be effectively promoted through active and practical forms of learning. This is demonstrated not least by the dual study programs, where drop-out rates of only seven percent are far below those of other study programmes (Kupfer 2013). This successful model should be expanded. In addition, internships should be compulsory in all degree programmes. Furthermore, higher education institutions must develop a broader understanding of employability, which should at least be supplemented by a perspective of *global citizenship*. The emphasis on conscious and responsible conduct as citizens of a globalised society who are actively involved in shaping social challenges, such as climate change, social potentials of migration, global political and finance issues, will be of particular importance for higher education in the future.

C 1.5 Fifth Second: Open Education & the Shared Knowledge Economy

Higher education institutions are expert-oriented knowledge and education organisations with the self-conception of structurally coupling knowledge production and knowledge transfer. Today this self-conception is more and more questioned by freely available digital knowledge resources. In particular, the provision of open educational resources challenges the approach taken by higher education institutions so far. While the institutions mostly see themselves as the sole producers, administrators and procurers of scientific progress, more and more new models are emerging to make knowledge, scientific results, data, publications and learning materials openly available. Based on models of the Sharing Economy such as *Uber* or *Airbnb* and the possibility to provide scaled individualised products and processes to larger target groups via digital media, the question also arises of how a Shared Knowledge Economy can look like. When the concept of open educational resources was developed by UNESCO at the 2001 Paris Conference on Education, digitisation was still at the very beginning from today's perspective. By now, both video-based and text-based materials are available for almost all topics, specifically tailored to learning in different educational segments (school, higher education, advanced training). Digitisation allows the decoupling of different teaching and learning services of higher education institutions such as

1. a function of brokerage and knowledge production: to create, select and provide teaching materials and curricula,
2. the teaching function: this includes teaching, learning and tutoring services, and
3. the quality management function, accreditation and certification of knowledge and competences.

More and more examples, especially in the private higher education sector, provide evidence that a decoupling and recombination of these different functions is conceivable and possible. A study by Earnest & Young (2018) on the future of higher education shows scenarios of rethinking higher education in which an alliance of university services is proposed between different institutions. Each institution is specialised on their services and together they compose an entire education service process. The first MOOC (Massive Open Online Course) was developed in 2011 by Sebastian Thrun, a Hamburg (Germany) native who works as a professor at Stanford. Thrun, a professor of business informatics, decided at the time to make his introductory course in business informatics, which had 28 students enrolled at Stanford, openly and freely available online for anyone interested. The very ex-

clusive, selectively chosen target group, very (also financially) privileged Stanford University students who attended Thrun's course, did not perform as well as could have been expected. A total of 160,000 participants from all over the world had enrolled in Thrun's course. Of the 160,000 participants, 23,000 decided to take the final test at the end. The final test was highly standardised using computer-based feedback. In the final ranking the best Stanford student was ranked number 412. And even more remarkable, one of the first 20 students was a little girl from Lahore, Pakistan, named Khadija Niazi, who had attended the course at the age of eleven and did better than any high-privileged Stanford student. From the point of view of educational efficiency and equity, this first MOOC prompts questions that need to be considered as part of the digital *shared knowledge economy,* especially from an ethical point of view. Should we support a situation in which less talented students are granted access to highly privileged educational opportunities but in which the most talented learners do not have that access, if digital media would allow that?

This means that in addition to the question of new models and new alliances for a shared knowledge economy, additional questions are raised by the possibility of making teaching materials, teaching services and also testing services freely available. On the one hand, the issue of educational justice by showing that existing educational system access practices are granting access to those who have a privileged access by association (kinship, relationship) or resources (social or financial capital according to Bourdieu) and not those who are most qualified for it. On the other hand, there is the question of educational efficiency when it is no longer concepts of efficiency but concepts of belonging deciding on individuals' educational opportunities in societies. At the same time, this raises the question of social justice – educational equity and educational efficiency are closely interwoven.

C 1.6 Sixth Second: In-Loops and Out-Loops in Lifelong Higher Education

The above-mentioned diversification and massification of higher education reinforce a long-term looming trend towards the necessity of lifelong learning. Learning will no longer take place in the exclusive model of qualification in the beginning of a career phase, but learning will increasingly have to be a lifelong academic activity, as career requirements develop ever faster and career phases also present themselves as lifelong evolving professional episodes, passing 10 to 15 different stations and only then ending up in retirement or pension. While lifelong learning has been postulated in education policy since the 1960s with the aim, among other things, of

obtaining well-trained employees in times of faster innovation and product cycles, the demand to create educational opportunities for lifelong academic learning is now increasingly brought to the attention of higher education institutions.

So far, higher education institutions have mainly concentrated on qualification at the beginning of one's career, between high school graduation and career entry. Also, higher education institutions do not perceive it as their prime objective to prepare individuals for the constant personal development of an episodic career biography. Rather, curricula are designed according to previously analysed bundles of activities, in the space of professional profiles for which qualifications and training are provided. All in all, the paradigm of lifelong learning forces higher education institutions to develop both their content and curricula portfolio as well as their educational structures from a preparatory model of higher education to a consequently accompanying academic educational model. Students will be graduates and graduates will be students – over and over again, and their career paths will bring them in and out of higher education again and again. A model of in-loops and out-loops will constantly be required.

C 1.7 Seventh Second: Higher Education in the VUCA World

VUCA is an acronym for the English terms *volatility*, *uncertainty*, *complexity* and *ambiguity*. In the *NextSkills* Delphi Study, almost nine out of ten (89.2%) of the respondents stated that the biggest challenge for higher education institutions to prepare their students for is to provide them with continuous learning strategies in order to successfully adapt to changing work environments ($M = 4.17$, $SD = 0.81$, $A_{Adaption(strongly\ agree)} = 37.0\%$, $A_{Adaption(agree)} = 52.2\%$)[40]. The focus must shift from teaching to learning and – as a consequence thereof – from teacher-focused to student-focused approaches in which students are not seen as mere *recipients*, but rather as individual, productive learners who take responsibility for their own development.

40 In the Delphi questionnaire, experts were asked to assess the following statement: "The greatest challenge students need to be prepared for through Higher Education Institutions is the continuous need for adaption through learning in changing work environments." To this end, respondents were asked to give their assessment on a 5-step Likert scale with values from 1 for "strongly disagree" to 5 for "strongly agree". $A_{Adaption}$*(strongly agree) expresses* the portion of the sample that indicates *strong* agreement with the statement, while $A_{Adaption(agree)}$ indicates the proportion that agrees.

"Indeed, and as they [the students] are increasingly actors in their own development, they will need the capacity to steer their own learning and professional experiences." (Experts response in Delphi Study)

The study also addressed the significance of dealing with uncertainty as an educational goal and new guiding principle for higher education. Respondents assessed the handling of uncertainty and ambiguity as one of the most important skills in future work contexts.[41] As can be seen from Figure 29, the expert sample also largely agreed with a corresponding statement (M = 3.73, SD = 1.10, $AUncertainty_{(strongly\ agree)}$ = 26.7 %, $AUncertainty_{(agree)}$ = 40.0 %). Experts stressed that this ability – in addition to other *Future Skills* – would become increasingly important and that supporting students in dealing with uncertainty in higher education institutions is not obvious in higher education.

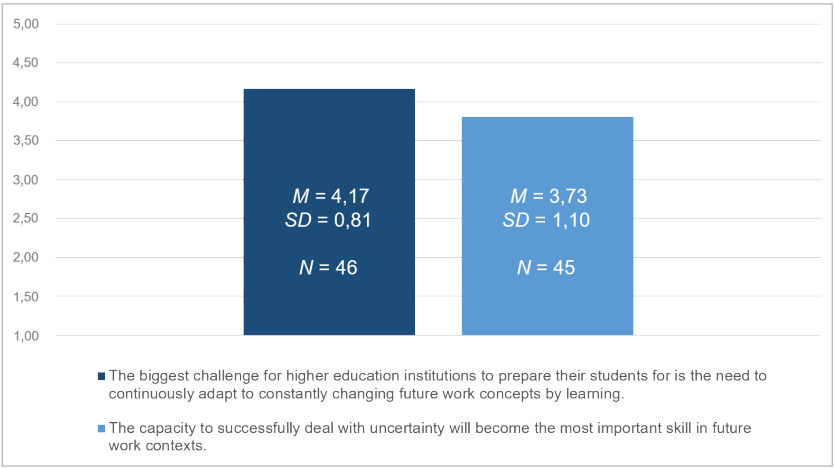


Fig. 29 Individual learning literacy and skill development

Both the ability to continuously adapt to the constantly changing environment by learning and the ability to successfully deal with uncertainties are two key

41 Respondents to the Delphi questionnaire were asked to rate the following statement: "The ability to deal with uncertainty is the most important skill in current and future work environments".

challenges – from the perspective of the respondents both for higher education Institutions and for students.

Figure 30 shows that for the vast majority of more than nine out of ten respondents the ability to adapt continuously through learning is already highly relevant today or will even gain relevance within the next five years (see Figure 30). For a good third of respondents, this trend will become relevant at least in the short run (within the next five years).

Fig. 30 Time of adoption for *Future Skill* learning literacy (N = 46)

More than 60 percent of respondents assume that in current and future working environments the ability to deal successfully with uncertainty is already an important concern. Almost one third of respondents estimate that this ability will become more relevant over the next five years (see Figure 31).

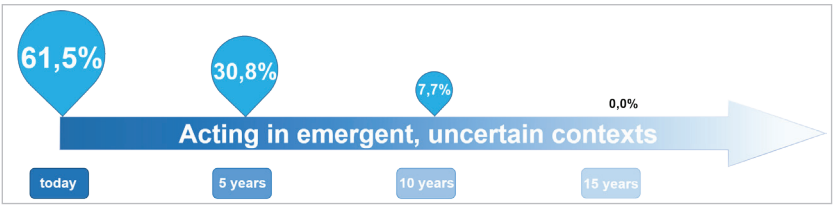


Fig. 31 Time of adoption for the capacity to act in emergent, uncertain contexts (N = 45)

The models, educational concepts and learning theories that we need in order to enhance such creative capacities are in existence for a long time. In educational science, this is usually termed as competences. Competences are described as principally unlimited dispositions to act in a self-organised and successful way in unknown complex future situations – as John Erpenbeck, a Berlin scientist, and

famous competence researcher, defines them. The point here is not to turn away from knowledge, information and data dichotomously, but to process and treat knowledge, information and data at higher level. Let us conceptualise and picture the interdependences between knowledge, capacities, actions, competences and professionalism – as done in Figure 32.

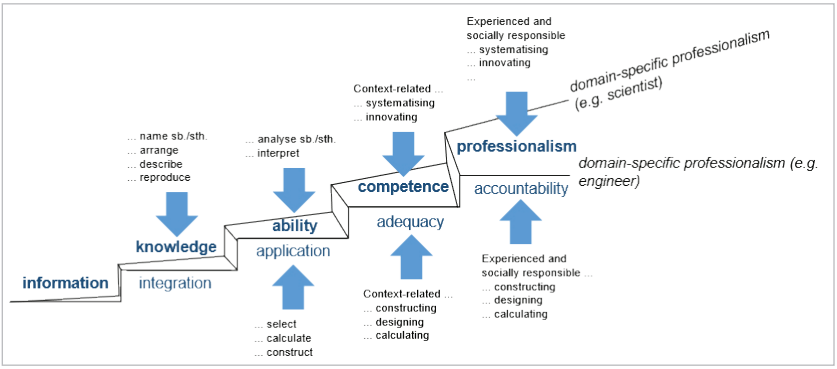


Fig. 32 Interrelation between knowledge, action and professionalism (illustration according to Wildt 2006)

Figure 32 shows that only when new *information* is connected to existing cognitive structures we can talk about emerging *knowledge*. Only when this *knowledge* is *applied*, do we speak of *capacities* and only when *volition* is added, i.e. the *capacity* to do something is linked to the *volition* (the will) and the *motivation*, only then do we speak of a *disposition to act autonomously*. And if this action is happening *adequately* to the problem context and context-specific, we speak of *competences*. If *competences* are coupled with *responsibility* in a final step, according to Johannes Wildt (2006), we can talk about *professionalism*, the highest level of one's capacity to act. The educational concepts on developing this kind of capacity to act are well-known.

One of them, an established model among many others, is the model of the reflective practitioner. In this model that Donald Schön developed with Chris Argyris in 2006, it is assumed that it is possible to *learn* reflective skills. Schön, who has worked in teacher training, found that it is not possible at all to prepare teachers for their everyday practical work situations – simply because it is basically uncertain what will happen if they cross the doorstep to their classroom. However, according to Schön, it is possible to train their capacity to develop ad-hoc action

strategies, to evaluate them, to reflect on them and to find out whether they are successful for one's own purpose. To possibly rethink them and try them out again, to evaluate them and not only to react, but to think ahead and test action strategies one more time, in order to then evaluate them ad-hoc and translate them into actions. The resulting learning is termed double loop learning effect, causing the enhancement of reflection capacities during an ongoing process. Schön calls this reflection-in-action. Starting to reflect on this process in retrospect, on the process of reflection-in-action (see Figure 33), one comes to develop her/his own individual theories of action – which is development of professional habitus par excellence.

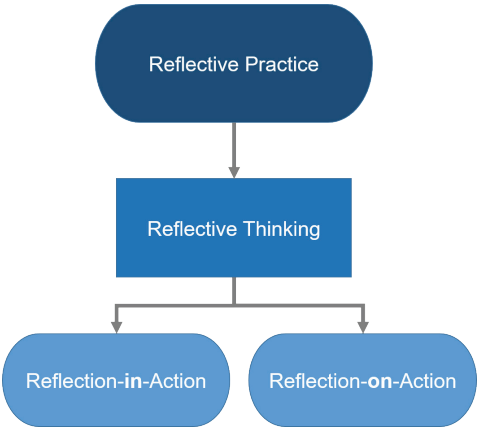


Fig. 33 The Reflective Practitioner (own illustration, based on Schön 2006)

Thus, one comes from an individual implicitly existing strategy which is assumed to be suitable all the way to an individual theory of action, via an *ad-hoc* developed strategy while acting, thereby developing professionalism, appropriateness, responsibility, volition and motivation for a professional context. It is, so to speak, a state of *perpetual beta* which Donald Schön describes, that is, a state of action in which professional action in a specific, situational context is permanently refined with an attitude of constant reflection.

C 1.8 Eighth Second: From Control to Culture – Towards Empowering Learners

We know that competence-oriented teaching and learning works especially well in environments structured according to socio-constructivist principles. They are based on didactic models that go beyond pure factual knowledge and problem solving and permeate the field of creative self-developed and self-determined innovation. Learning in such an empowering way can be supported through specific teaching strategies, geared towards competence-oriented learning. Broadly speaking, it is possible to differentiate between three different teaching strategies (Baumgartner 2004) (see Figure 34).

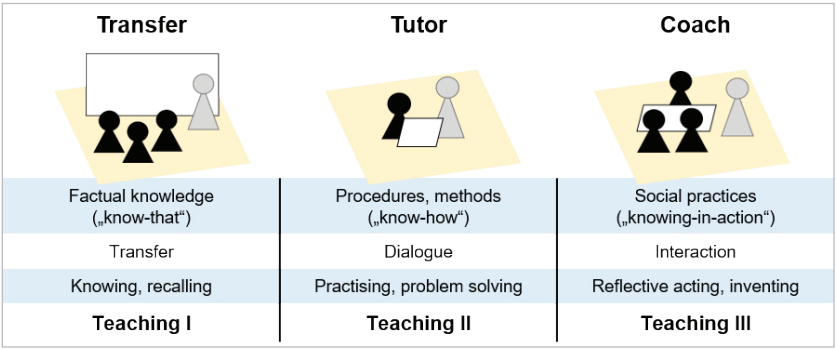


Fig. 34 Teaching strategies (Ehlers 2010; illustration according to Baumgartner 2004)

Mode 1 (transfer) is a mode of teaching where students are told what they need to know by teachers. It is the model of the omniscient teacher. Learning takes place in this mode as memorising and recalling. Much takes place in a process of imparting and it is mostly about factual knowledge, represented through the knowledge dimension know that. Mode 2 (tutor) goes beyond the domain of knowledge transfer into problem solving. The typical learning scenario for this is problem-based learning, in which students are presented with problem cases that they want to solve independently as case studies or problem-solving projects in dialogue with the teacher on eye level. The teacher changes her/his role from a sage on the stage to a guide by the side, to become a companion, an expert on eye-level with the student and/or a dialogue partner in a partnership. The learning activity is transformed into practicing the procedures of problem solving, of making

procedures known, of procedural knowledge, of know-how, whereby the process of teaching can in particular be described as a dialogical process. The third mode of teaching is characterised as coaching or social constructivist learning. In this model, the focus is on practicing and rehearsing social practices. Teachers here no longer have the role of imparting factual knowledge or presenting problems, but rather of guiding students to find and defined their own problems to solve and/ or generating learners' own undertakings which are then brought into a project work and solving space. It's all about realistic interaction between partners – about learners interacting with other learners, students networking, connecting with experts and other persons and resources. There is special emphasis on the social practice of growing into a certain field of professionalism, as described in the approach of the Community of Practice by Lave and Wenger (1991). The first teaching models tend to follow a control logic, whereas in the latter they tend to pursue a logic of enabling and empowerment. It refrains from the illusion that teaching directly leads to learning, that there is a direct function between teaching and teaching processes and learning and learning processes. There is also a growing attitude of respect and self-responsibility towards the learner, acting on the belief that learning is a self-determined process in which teaching can only be a supporting contextual framework condition.

C 1.9 Ninth Second: Informal Learning in Higher Education

Higher education Institutions usually concentrate on formal teaching and study scenarios when designing their teaching-learning approaches. This involves, as an example, using digital media to support knowledge transfer. The entire area of informal teaching is mostly neglected. It is an implicitly chosen strategy of institutions which neglects much of the biographical life reality of students. That neglects that informal learning is a vast area where the largest part of learning takes place. It would be an illusion to believe that studying only consists of the learning processes that are relevant according to the program regulations or curricula. Also, it is an illusion to believe that in higher education only formal learning takes place. A large part of the teaching and learning processes actually take place as self-initiated learning activity of the students outside the formal learning settings. According to the European Commission (2001), formal learning usually takes place in an educational or training institution (in terms of learning objectives, learning time or learning support), is structured and leads to certification. Formal learning is goal-oriented from the learner's point of view. Formal learning is learning that is

seemingly relevant in the course of higher education studies and leads to a certificate. However, the many occasions for informal learning that take place in everyday life, at work, in the family or during leisure time are even more often arising from students' intrinsic motivation. However, they often remain detached from what is considered officially relevant to the curricula. This kind of learning is not structured (in terms of learning objectives, learning time or learning support) and will usually not be certified. Informal learning can be purposeful, but in most cases, it is not intentional, or it is even incidental. Studies show that informal learning takes up a large part of the study process, starting with consultation with fellow students on learning and study strategies, learning and study materials, advising on personal learning projects and the selection of learning occasions, and obtaining informal learning support when needed. Digital technology is playing an increasingly important role here because is supports personalised provision of material.

A critical look reveals, however, that higher education Institutions' digital study activities are still often primarily aimed at supporting teaching and formal learning. This means that the target groups of those activities are often first and foremost the teachers, while students are only indirectly targeted. Although the framework of academic education is institutional, studies constitute a learning process that cannot be attributed solely to the influence of teaching. The students' perspective is often neglected. The processes of students' informal learning are often not sufficiently incorporated into the overall study design. Research shows that social software choices such as social networking sites are used by a large number of young people (Busemann & Gescheidle 2011) not only for private purposes, but also during their studies, as a representative survey by Hochschulinformationssystem GmbH (Kleinmann et al. 2008: 6) has demonstrated. According to the survey, almost half of German students already used social communities such as StudiVZ or Facebook in 2008 to exchange information on matters related to their studies. By 2013, 95 percent of 14 to 29-year-olds were signed up in Facebook, while VZ networks had become close to insignificant.

On the other hand, many social software application scenarios encounter competence- and acceptance difficulties among students (Schulmeister 2008; Jones et al. 2010). Likewise, higher education institutions and their staff are reluctant to include them in their e-learning programmes. A study by the German Rectors' Conference (HRK) on this topic revealed that currently there is no sign of an extensive transfer to higher education yet (HRK 2010: 35; see also Conol 2008). And all this, although the potential of social software, especially in the area of informal learning, is not contradicted and hardly debated in literature. Already two e-learning contributions in the Anglo-Saxon and German-speaking regions, published shortly after the establishment of the term *web 2.0,* referred to technical innovation in the field of

education and pointed to the fundamental role, social software can play to support learning (Downes 2005; Kerres 2006). Subsequently, corresponding approaches were continuously enhanced (Ehlers 2013). According to unanimous opinion, the greatest potential of social software is in the area of informal learning (Weigel et al. 2009). According to Stiftung Warentest, many learners are already autonomously managing their knowledge with the aid of social software (2001).

Individualised competence enhancement outside of formal learning settings can be significantly promoted by tools such as wikis, blogs, e-portfolios and social software (Himpsl & Baumgartner 2009: 511). John Erpenbeck and Werner Sauter (2007) state as a main point regarding social software and competence-oriented learning that it is the power of social software tools to convey values and competences, while traditional e-learning instruments are often poorly suited for this purpose (Erpenbeck & Sauter 2007 in Ehlers 2010). In fact, studies show that although the use of social software by students is often privately motivated, the informal exchange that takes place also promotes scientific cooperation (Kumar, Liu & Black 2012).

Today it is clear that lifelong learning will contain an ever-increasing proportion of informal learning. Informal learning plays an essential role as a concept. It usually happens on the learner's own initiative, as a self-directed learning process, but also in social contexts. It is obvious that informal learning takes up an important part of the whole learning process of an individual, the largest part of it. It takes place as self-regulated learning, in which learners set their own learning goals and reflect on what they want to achieve in terms of capacity to act by learning, choose their own learning materials and learning methods and can also monitor their own learning progress. Informal learning, however, goes beyond self-regulated learning and can also be found in incidental learning, i.e. the process of initiating learning processes in the area of socialisation, of cooperation, from incidental and informing learning through to in-depth learning.

Approaches such as situated learning play an important role in informal learning concepts, for example in the concept of *Community of Practice,* as developed by Lave and Wenger in 1991. Looking at academic studies from the perspective of Communities of Practice, students are actors in a Community of Practice that is grouped thematically around a specific domain and for which a community/group develops a specific common practice, i.e. learning and studying in a specific occupational field. In 2003, Arnold transferred the model of Community of Practice to distance learning and further differentiated it mostly by defining special moments of joint development, joint learning, which are grouped around three dimensions (Arnold 2003):

- Finishing one's studies: This is about planning one's studies, attending seminars, working on tasks, passing exams, etc.
- Mutual study support: This is about asking questions, giving answers, sharing lecture notes, organising learning groups, sharing experiences, etc.
- Communication and cooperation structures: This is about using digital media in order to maintain communication.

Students today organise their studies by WhatsApp groups or common digital virtual groups, sharing learning materials, arranging learning and working settings for specific learning outputs to be prepared, and supporting each other. Students are thus keeping up with each other in a very close self-imposed, self-organised way, they have a very good subjective feeling for assigning tasks in group work, who needs what kind of support and how much time is needed in the course of studies, for which learning tasks and learning achievements. The entire area of this informal learning is currently only marginally exploited in higher education. Therefore, Köhler et al. (2016) are developing a model for this purpose which is oriented towards the life cycle of a study programme and extending to lifelong learning. By this, they show how social software can promote processes in academic education. Good practice examples from Germany:

- The project "MyPaed – the personal study environment" at TU Darmstadt on the topic "personal learning environment".
- "KISDspaces" of the "Köln International School of Design" on the topic "Blog systems".
- "CollabUni" of Hildesheim University on the topic "Social Network"
- "E^3-Portfolio Platform Problem Solving Competence" of Augsburg University on the topic of "E-portfolios"
- "TUgether" of TU Braunschweig on the topic "personalised student portals".
- "Open distributed campus" of FU Berlin as a variation of a personalised student portal

These examples show how higher education Institutions can try to promote informal learning by digital media. Overall, higher education Institutions must prospectively gain a broader understanding of their role in shaping learning environments in a changing media and learning world in which open learning spaces gain in importance both in terms of temporal and social dimension. Digital media can be used to support informal learning within the framework of formal learning processes. The aim is to support studies as a section within an individual learning biography, while simultaneously taking into account specific social learning contexts (also in-

cluding formal social learning contexts). Framework conditions at higher education Institutions that sufficiently support students' self-regulated individualised and collaborative learning can only be created from this perspective. The virtual spaces created by digitisation offer sufficient potential for this, also due to their openness.

In the future, it will be important on top of this that new forms of studying and new study paths are supported by digital media. The results of the Delphi Study published here (Ehlers & Kellermann 2019) illustrate this. In the future, studies will take place as a multiepisodic process of lifelong learning. In addition, they will be organised as a process increasingly taking place at different university campuses, in which courses are not only provided and perceived as a curriculum at one but are integrated into the courses of different institutions. Studies will become highly flexible, individualised and personalised, among other things by the use of digital media, promoting individualised self-regulating learning. This will increasingly lead to learning contexts being de-formalised and enriched by informal parts. This leads to an increasing blending of informal and formal learning contexts. Higher education Institutions are requested to integrate the informal learning achievements and learning outcomes into formal studies. This will become all the more important as informal rather than formal learning plays a major role in the later occupational phase as well. The so-called "spending outcome paradox" taken up by Jay Cross (2003), which was never empirically proven but is conceptually largely accepted, shows that while 80 percent of the costs are incurred by formal learning setting, only 20 percent of learning takes place in corresponding contexts. In contrast, 80 per cent of learning takes place in informal contexts, whereas only 20 per cent of the costs are spent on it.

C 1.10 Tenth Second: Badges & Microcredentials

Microcredentials, badges, nanodegrees and MicroMasters are currently extremely fashionable and on everyone's lips. What's this about? The aim is to modularise larger study sections into smaller study units and to document students' learning experiences, knowledge or their performance in examinations and assessments, also for smaller study sections and modules. These can then be used to create an educational portfolio or competence biography in a much more granular way than a full degree and much closer to what has actually been learnt. An important ingredient in this regard is the question how higher education Institutions can design assessments for prior knowledge and competences from the academic and non-academic field in order to recognise them in a learner's study path. The underlying

idea and concept of academic education, made possible through microcredentials and microqualifications, is to enable a lifelong documentation of informal and formal (academic) education, in which informal and formal elements, modules and learning experiences are interwoven with accredited or non-accredited, certified or uncertified modules into an academic educational biography. The CEOs of big companies like *Ernst & Young, Google or Siemens* already announced in 2013 that higher education certificates such as the Bachelor's or Master's degree no longer have a predictive power in their organisations when it comes to employee selection, but that much more value is placed on the personality, the experiences and the projects that the candidates, the applicants, bring along and have made (Ehlers 2018). The aim is to document and bring on board real experiences and competences and to demonstrate evidence-based competences on the basis of actual experiences and activities. For many human resources managers in private and public organisations, these areas of experience- and evidence-based competence evidence are becoming more important than the official higher education certificates. Likewise, the study by Ehlers (2018) showed that some organisations express that degree certificates increasingly merely represent an entrance step, as they are regarded as a legal condition for entering a professional sphere, but not a rich and full information about the actual competence and performance of the respective candidates actually is.

A corresponding organisational change in organisational structures, strongly value-based and increasingly aiming at cooperation, networking and flat hierarchies in an agile environment, goes hand in hand with this and leads to personnel selection procedures increasingly relying on small granular evidence-based experience portfolios. Microcredentials as proof of performance are currently emerging in various countries in Europe and on a global level. At higher education Institutions, they increasingly emerge in order not to only certify large study sections of 180 ECTS for a Bachelor's degree or 300 ECTS for a Master's degree, but to certify more competences below this formal level. Certificates for *short courses* are becoming increasingly important. Students are collecting microcredentials in an evidence-based, validated format and can then present them to a potential employer in an application process.

Platforms for such alternative forms of certification are rapidly developing. Microcredentials, informal learning, digitisation, competence orientation and flexibilisation in the education sector as well as de-standardisation in the labour market cause challenges to higher education. Ehlers (2018) on this:

> "Although alternative credentialing is just emerging, tools, platforms and concepts are already starting to emerge and develop. In technology, GitHub has become the standard platform for showcasing code to potential employers. In finance, students are using EquitySim to demonstrate trading and portfolio management skills to

> investment banks. Across a wide range of dynamic sectors of the economy, students are uploading papers, presentations and problem sets to Portfolium to demonstrate capabilities. And skill passports on Viridis, or digital credentials from Credly are allowing employers to find exactly the competencies they're seeking." (Ehlers 2018)

C 1.11 Summary and Conclusion

"The future of higher education stretches like a horizon" – it is this quote from Niklas Luhmann (1976) that we have started this chapter with. Luhmann describes that in all social systems expectations are existing that are decisive for how the system, including the higher education, positions itself in its operations towards the future. The developments analysed and described in this chapter influence these expectations. They shape the situation within the institutions as well as the expectations of its stakeholders.

Looking at German higher education, everything seems to be in good order. At first glance, everything seems to be working well: Although the number of students in Germany has risen by one million to 2.8 million within just one and a half decades (Gehrke & Kerst 2018), the higher education Institutions have not collapsed. And the implementation of the Bologna Process, with Bachelor's and Master's degrees, is practically finalised. But there is a catch in the system: German higher education Institutions are lagging behind in terms of digitisation and internationalisation. And also teaching leaves much to be desired in many places, as the partly high dropout rates indicate. In some subjects, every second student drops out, the programmes often lacking practical relevance; furthermore, international mobility is at a standstill.

The megatrend of social development towards an educational society with all its manifestations is reinforced by a second megatrend for society as a whole, that of digitisation (see Figure 35). Both developments – digitisation and a drift towards an educational society – contain a number of cause-effect relationships whose effects have a strong influence on the development of the University of the Future.

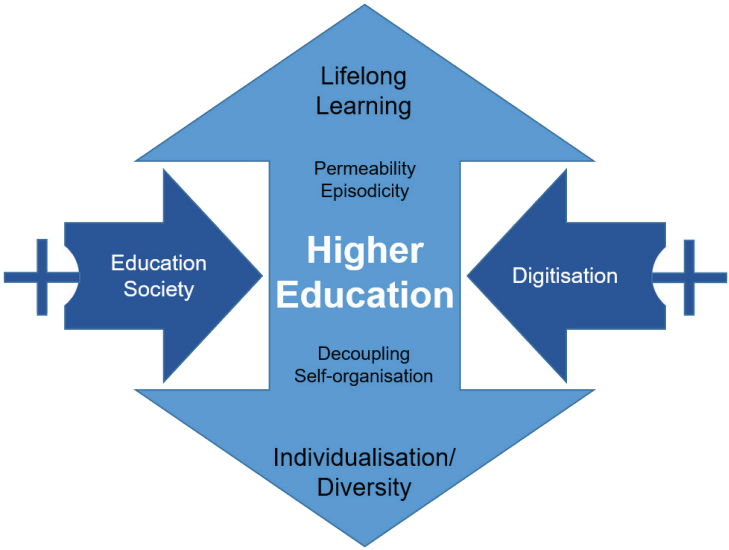


Fig. 35 Pressure factors impacting higher education institutions

Both the increased participation in academic education and the increasing digitisation of higher education have a mutually reinforcing effect on the organisation and design of studies, teaching and research. Unbundling of services and a new level of diversity are the results. They create a move towards individualisation and lifelong of higher education.

Diversity is the recent catchword of higher education. It is based on a context where academic education is becoming more and more important for social participation in society, where educational processes become more and more individual (i.e. tailored to the respective needs of the individual person and biography), and thus more diversified and adapted to the respective circumstances in form and content (i.e. less oriented to standard educational opportunities). This new diversity and heterogeneity pose the great challenge for higher education Institutions in the years ahead. The classic clientele of science- and academically oriented students will become a minority at higher education Institutions. The Bologna Process evokes that higher education is more geared to labour market professions, which is the reason for more and more students to study – to have a clear occupational profile afterwards.

Higher education Institutions will have to adapt to the new diversity, otherwise they will neither be able to meet changing societal demands, nor will they understand their students. Currently, one can get the impression that that there are no major problems in higher education: the dropout rates in Germany, at around 25 percent, are rather low on OECD average on the whole. However, it is not only a question of getting as many students as possible through the well-tried study concepts, but also of asking which new skills and competences students bring into their studies and how their interests could contribute to enriching teaching.

In dealing with a higher level of diversity, it becomes important for higher education Institutions to promote students' processes of self-monitoring in order to reconcile the potentially very different objectives of a study cohort. While in one case it is still a matter of completing undergraduate studies, in other cases it is an extra-occupational or a dual study model. There might be an interest in refresher courses or in an in-depth well-founded study unit in a special subject. These different needs and interests must become combinable by intelligent and modularised study models. Students display a stronger attitude towards choice and take the opportunity to study from a wide variety of circumstances and starting points in their life career. Most drop-outs take place during the first semesters, for example, oft not resulting from performance challenges, but from the fact that students change their mind during the first phase of their studies, perhaps want to study a different subject, choose a different academic institution or want to quit studies altogether, with the option of resuming them at a later date. In order to do justify such educational pathways, the concept of academic studies must be rethought: by designing smaller academic qualification units, by linking them in intelligent ways and by simultaneously not losing sight of the big qualification threads. Certification and assessment of a large comprehensive full degree, studying at one institution only, at the same university from A to Z, will be a thing of the past soon – or at least become equally important as the new academic mobility.

A third development are emerging decoupling processes of previously tied services in higher education. On the one hand, it is becoming clear that the idea to package qualifications and competences required for a profession in clear and long-lasting valid curricula is proving to be increasingly absurd. IN the future we have to recognise the move from a vocational system which is oriented to occupational definitions to a flexible system of work in which occupational definitions no longer include rigid requirements but are constantly evolving. Lisop and Beck speak of a farewell to the "professional construct as a foundation for qualification and pedagogy " (Lisop 1997; Beck 1986). The University of the Future can no longer conceive academic qualifications as a rigid 'package of narrowly defined professional qualifications'. An economy and society which is highly developed and functionally

diversified in its democratic processes, production, research, development and services requires a rapid change of qualifications. As a consequence, higher education Institutions are called upon to focus more on comprehensive competences and less on precisely fitting qualifications.

In the field of study organisation, too, decoupling processes are emerging: for example, the decoupling of learning and degree certification. In the future, academic studies will not be carried out exclusively with the aim of obtaining a degree. Rather, there will be an increasing demand for advanced academic education, for academic deep learning of professionally relevant topics. Also, the motive of higher education as enjoyment and fulfilment in day-to-day life, as a means of sense-making, will become more important. In an increasingly digitised market for academic educational offers, academic qualifications will no longer be (or can be) supervised by one single institution to their full extent. Rather, students will increasingly seek and compile their own educational opportunities and institutions in accordance with their own preferences. In this way, academic study is also decoupling from a 'one-campus mentality' towards a potentially decoupled 'many-campus mentality'.

Another decoupling process is a loosening of time structures in which studies take place: In the future, academic qualification will no longer be claimed as a 'qualification in stock' directly after graduation from a secondary school, but in episodic pathways, principally unlimited throughout the entire life span. The market for academic advanced education, in which this education segment is currently located, will evolve from a niche market (today) to a standard offering of future higher education institutions.

According to Karl Valentin, prediction is a difficult issue – especially about the future. This also applies to the future of higher education. Nevertheless, it is a topic that consistently inspires conferences and workshops, mostly not so much in order to think about what will change, but what *should* change above all.

One thing becomes clear without exception, however extensive and controversial the discussions may be: higher education as an institution in society has not come to an end. We don't have to say goodbye. It is being criticised and concepts such as 'rethinking education' and digitisation play alternating roles between accompanying and driving forces. Unmistakably, the Bologna Process is criticised: a strong *school-like* nature of new study programmes is already apparent. Some critics perceive these reforms as the definitive end of the Humboldtian ideal and its understanding of education and thus the "end of a way of life" (Seibt 2007). Other aspects mentioned are the increasing separation of research and teaching and the replacement of internal control (interest in content) by external control (leading to assessment-oriented study interests under time pressure). The struggle in educational policy for the right path to reform education, schools and higher

education is also reflected in educational policy paradoxes: realising that education is becoming increasingly important leads to the conclusion that a shortened twelve-year 'Abitur' (A levels) must prospectively be sufficient and that study periods must also be shortened. The desire for more educational justice and more higher education graduates is paralleled with the introduction of tuition fees. A greater scientific expertise was expected of the higher education Institutions' orientation towards third-party funding programs. Higher education currently seems to be left alone, surrounded by reformers.

But history teaches us that progress does (should) not lead back to the old status, but that a new status, which lies in linking tradition and new possibilities, should be aspired to. What could this look like for today's and tomorrow's higher education Institutions? My proposition is that a number of key trends and developments can be identified – among them a strongly increased participation in education as well as digitisation – which will lead to profound changes in the conception of next higher education.

The University will be able to assert itself as the most important social institution in Europe (Rüegg 1993). It will have to change its organisational structure and working methods if it is to take account of the changed framework conditions of a society in which academic education is the normal biographical experience for the majority of an age cohort.

Rethinking Learning, Teaching and Research: An Agenda for Higher Education of the Future

C 2

There's one thing that the university of the future will most notably have to do: it will have to be more responsive to the diversity of future target groups of students. And it will become more digital. More different in its structures and more different in the associated learning scenarios of students, teaching scenarios of professors and lecturers – and finally also in its research approaches. The self-conception of the higher education Institutions is changing – and will continue to do so! In the final chapter of the book we have identified four scenarios for profiles of the university of the future based on data from the international *NextSkills* Delphi. However, this chapter deals with the internal questions of higher education development: teaching, learning and doing research in the future and the question of how studies will evolve.

So, what does an agenda for the University of the future look like? Dealing with this topic inevitably leads to imagining new ways of teaching and learning; the way in which we will study in the future. On the one hand, the focus is on pedagogical aspects of teaching and learning, such as the advancement of examination and assessment practices, peer learning and peer validation approaches, the implementation of academic learning and teaching as a learning community, and an increased focus on *Future Skills*. In addition to these more pedagogical and study-related aspects, however, there are others.

An agenda for the university of the future must take into account the structure of the higher education Institution, its internal arrangement and the way studies are organised as well. What is changing structurally? Higher education Institutions will have to undergo fundamental changes in the way they organise their studies. More students, new target groups and an unprecedented diversity of target groups, who need to be valued and supported in personalised study settings, are approaching higher education Institutions. Furthermore, the higher education Institutions' function of social integration and the social dimension of studying in an academic educational society are becoming increasingly important. Linked to this, the con-

cept of lifelong learning is gaining in importance in higher education and brings about change in teaching and organisation as a result of a domino effect. There is, for example, the concept of microcredentials, alternative certification systems that enable learners to organise their own portfolio of qualifications and competences digitally and in a more self-determined way and call for higher education Institutions to professionalise their systems of recognition and credit. Digitisation promotes the flexibilisation of space and time structures and greater transparency in all study-related information systems over the entire study life cycle. In a digital world we are experiencing a decreasing importance of knowledge transfer and an increasing need for guidance, support and coaching in an ever more diverse world of higher education. In addition, the decoupling of processes of teaching, testing and certification of competences plays an increasingly important role. It is hereby noteworthy that the experts interviewed for the international *NextSkills* Delphi expect the organisational and structural changes to gain relevance much later than the change processes related to academic teaching and learning designs.

Based on the changed framework conditions in an educational society and the pressure for change that affects academic qualification processes, new demands on higher education Institutions for a modern, further developed higher education model arise from this. The following aspects indicate the development corridor in which higher education Institutions are currently located. The university of the future will have to adjust its profile points to this agenda.

In the following, all those concepts are described that have proven to be significant in the *NextSkills* project.[42] They are divided into three chapters, starting with a thought experiment sketching the evolution of higher education Institutions (Chapter C 2.1 Higher Education of the Future: A Thought Experiment). This is followed by an overview of teaching and learning (Chapter C 2.2 Rethinking Learning: Future Learning Concepts), organisational and structural aspects of the university of the future (Chapter C 2.3 Rethinking Higher Education: Towards an Evolved Organisation) and a summary chapter (Chapter C 2.4 Summary: The Dawn of the Future of Higher Education).

42 The concepts described below are the summarised result of an analysis from the *NextSkills* project (www.*NextSkills*.org). Included are the more than 100 concepts for Curriculum 4.0 with which Higher Education Institutions applied for the "Curriculum 4.0" program. This was established in 2017 by the Carl Zeiss Foundation and the Stifterverband with the aim of honouring curricular reform projects that demonstrate new approaches to dealing with digital media.

C 2.1 Higher Education of the Future: A Thought Experiment

If the current higher education model is transferred to a postmodern future, which structures will gain in importance? If one takes the changed framework conditions in an educational society and the pressure affecting academic qualification processes as a basis, new demands on higher education institutions for a modern, further developed higher education model arise from this. The following aspects (Table 3) are the outcome of a thought experiment and display the development corridor in which higher education institutions are currently situated. The university of the future will have to position itself to these key points.

Table 3 Projecting higher education into the future

Dimension	Current higher education model	Future higher education model (postmodern)
from... (possible development path)... to		
Degrees	The aim is to achieve a clearly defined comprehensive study degree, with the degree designations being awarded by the higher education institution on a statutory, sovereign basis.	The programme consists of small study units, which can also come from different (higher education) institutions. There will be more short courses, certification courses, refresher courses. This results in patchwork studies that can then be combined into larger final degrees or certificates, such as a final degree, and certified by a higher education institution.
Recognition of prior learning (RPL), knowledge & experience	Recognition is possible, but there is little actual recognition practice.	A lot of RPL recognition practice, higher education institutions develop professional processes for competence measurement and the recognition of previous performance and experience.
Certification	Teaching/ transfer (tutoring, courses), examinations and certification are linked within the framework of an institution.	Teaching/ transfer (tutoring, courses), examinations and certification (final examination) are decoupled and can be offered by various institutions.

Dimension	Current higher education model	Future higher education model (postmodern)
Study pathways/timing	The course of studies is clearly defined by study and examination regulations and is mostly predetermined. Studies are structured according to time units (ECTS). Clear differentiation between part-time and full-time structure.	The course of studies is flexible and determined by a wide range of electives. Studies are structured on the basis of content criteria. More flexible, individual time structure, more extra occupational and lifelong models.
Curriculum	Clearly defined qualification goals are set in the degree course, which apply equally to all students and from which the contents and methods of the modules are derived during the course of study. Professional profiles are used as a normative paradigm for course material.	The study content is increasingly oriented towards long-term employability and individual educational goals, interests and needs. The focus is on more fundamental action competences and the capacity to deal with comprehensive skills.
	Methods and contents are oriented towards faculties and disciplines in a canonic way.	The curriculum is oriented towards central issues of an area of practice. The problem orientation calls for a more interdisciplinary focus.
	Little digital import of curricula	Strong digital cooperation and digital import and export between academic institutions
Science and research structure/institution structure	Higher education institutions are structured in disciplinary units, the faculties; they are decisive in terms of content and structure of studies.	Higher education institutions are strongly organised by interdisciplinary and transdisciplinary cooperation forms. Studies are strongly organised on the basis of comprehensive issues as well as interdisciplinary and transdisciplinary work units.

Dimension	Current higher education model	Future higher education model (postmodern)
Learning model	Learning principally follows the idea of a knowledge divide which needs to be compensated for. Teaching is expert-oriented. Teachers organise knowledge transfer.	Learning follows the idea of students and teachers forming a learning community (renaissance of the *Universitas* ideal)
	Exam-oriented learning: Learning is oriented towards examinations. Study follows the idea that it is about overcoming the obstacle of certification. Many exams for a detailed module structure.	The learning experience is central, feeding on one's own interests and self-developed issues. Examinations take place on a larger scale on overarching topics and competences. The focus is on overarching competences from larger contexts.
Examinations	Many exams are module-oriented and often designed to reproduce knowledge.	Examinations are competence-oriented, multimodal, take place at larger intervals and units, and cover larger areas.
Organisational framework	Institutional Structure: A higher education institution acts as study place and provider	Institutional diversity: Several academic institutions are involved. Students organise study frameworks and flexible study processes adapted to their needs
Reputation	The institution's reputation determines the value of the degree on the labour market.	Students tend to document their skills and experience in assessments, including qualitative elements such as portfolios. The value of the degree is based above all on the practical relevance of the studies, the experience gained and documented and the demonstrated capacity to act.
Permeability	There are clear thresholds between academic and non-academic programmes in school, vocational training and higher education. The permeability does not continuously exist.	Permeable continuum between fields of education such as school, vocational training and higher education as well as between the respective compatible levels of education of national and qualifications frameworks

C 2.2 Rethinking Learning: Future Learning Concepts

Higher education institutions will continue to evolve both organisationally as well as pedagogically and didactically in relation to the learning models of higher education. To start with, we will describe which pedagogical-didactical approaches emerge as suitable.

C 2.2.1 Digital, Networked and Informal

Studying in the future will be more digital: networked, digital and informal. It will make extensive use of the possibilities offered by digital learning environments and, in addition to formal learning opportunities, will also make use of the full range of informal learning opportunities – across institutions and fully networked. Digital learning environments consist of a whole range of developments, trends and perspectives that promote a change from teaching to learning. A new perspective on networked and open learning environments essentially links five characteristics:

1. That learning takes place all along, everywhere and in many different contexts, not only in the classroom;
2. that learners take the role of organisers;
3. that learning takes place throughout one's life, is multi-episodic and not (only) tied to educational institutions;
4. that learning takes place in *Communities of Practice* (Wenger 1998): Learners join communities, both formal and informal;
5. that learning often takes place informally and non-formally, at home, at work and in leisure time and is no longer teacher and institution-centred.

In this understanding, digitally supported learning no longer means using a digital learning platform but creating a new kind of learning platform with the help of the available social software: Not using *one* Learning Management System (LMS) as an island for material in the wide *ocean* of the net but creating a gateway to the web. The e-tutor (teacher) only intervenes as a guide and curator by providing small learning contents (microcontents) in a portal which will open the door to self-directed learning for achieving the set learning goals. These are negotiated with the learners and documented at the beginning, e.g. via blog entry or podcast. This means that the learning environment is no longer made up of a single application, but of several individually composed and interacting tools. In this context, the term *Personal Learning Environment* (PLE) was coined. In a PLE, the learner's

individual reflection takes place in weblogs or podcasts and as collaborative work in wikis. Thus, learning is no longer only transferring and consuming content and knowledge, but also (co-)producing them in an independent way.

In the long term, a *personal learning landscape* can evolve that represents an "interactive portal with all accesses to the personal digital world" (Kerres 2006) of the individual. In a constant process of knowledge production, learners as curators aggregate their learning contents according to personal interest, reflect on it and put it together anew individually, sharing it with others in the desired social context.

As early as 2006, Kerres pointed out that existing e-learning (1.0) approaches often have the disadvantage that learning programmes, but also modern learning platforms, have to be laboriously filled with content, a lot of time and money by the teachers and then often degenerate into a *data grave*, while real life "now takes place next door, on the Internet" (Kerres 2006). With the tools of Web 2.0, internet contents, continuously generated and autonomously regenerated, can be used for teaching (ibid: 5). In this model, an active and creative way of "rip, mix and learn" (Richardson 2005) replaces the editing of premade course materials. Instead of an LMS, e-portfolios could be used by learners to manage and document their learning and work processes themselves and to share them with others.

Informal learning

The concept of lifelong learning emphasises that learners cannot permanently attend courses, but that new forms of learning are needed that are self-directed, fast, flexible and problem-oriented. Informal learning, "evolving in mediate life and experience contexts outside of the formal education system" (Dohmen 2001), is once again at the centre of discussion. It comprises – as much is known today – 70 to 80 percent of all learning activities. In his latest book "Informal Learning" (2003), Jay Cross says that only 10 to 20 percent is learnt by formal learning scenarios, while 80 percent is learnt by informal learning. This calls for a formalisation of informal learning and an informalisation of formal learning. Nevertheless, formal education today is still considered far more important than informal education (Cross 2003).

Networked learning

Studying in the future will be about learners learning in a self-regulated way in social networks – digital and analogue. From the (constructivist) perspective of learning theory, the advocates of this type of learning fundamentally question the *possibility of instructing* human learning. This is justified by the fact that a self-controlled system (learner) cannot be determined by its environment but can at best be disturbed (*perturbed*) and stimulated. In addition, it is argued that

learning does not solely work by external demands being made – learning, that is the idea, cannot be planned without the learner (cf. Holzkamp 1993: 184). The concept of self-regulated learning hereby becomes enormously important. Self-regulated learning is often understood as a *generic term* for all forms of learning in which learners can determine (and/or co-decide) and take responsibility for their own learning process or tasks, methods and time investment (Deitering 1996: 45). Friedrich and Mandl (1997) illustrate the difference between *self-determination* and *self-controlling* as follows:

> "Self-determined learning gives learners the opportunity to independently determine the selection modes (what is learned?) and the learning objectives (whereupon?). Self-determined learning includes the learners' option to determine their learning paths, their regulation of learning, (how? when?) when learning content and objectives are given." (Friedrich & Mandl 1997: 219)

The basic *media-didactic* challenge is to align the didactic learning arrangement with the parameters of the didactic field, such as the characteristics of the target group, the specification of teaching content and objectives, didactic methods, didactic transformation and structuring of learning opportunities, characteristics of the learning situation and specification of the learning management, characteristics and functions of the selected media and tools (Kerres 2001). It is important to point out the primacy of didactics and to first raise the question of educational goals and only then to choose suitable teaching/learning scenarios and methods as well as the necessary tools to implement them.

George Siemens developed a new learning theory, which was published in 2004: Connectivism. He states that his design of connectivism goes beyond the previous approaches of behaviourism, cognitivism and constructivism in its principles and takes into account the increasing tendency of learners towards informal, networked and electronically supported learning. Learning is seen as an increasingly continuous, lifelong process that permeates everyday work and even leisure activities, influencing both the individual and the organisation and their links. Siemens explains that knowledge about *where?* and *who?* is more important today than the *how?* and *why?* Although Siemens' approach does not clearly set itself apart from existing learning theories, but rather describes a network-oriented learning philosophy, the approach is particularly valuable in that it clearly emphasises the development of networked, digital learning and social processes as the basis for the learning and interaction processes that take place.

C 2.2.2 Beyond Disciplines

How can societal issues become the pivotal element of learning causes during studies, so that students can become acquainted with different and sometimes competing different scientific disciplines and assess them for their contribution to solving the problem?

Problems do not follow any discipline – study programmes do. This describes a fundamental problem of academic differentiation. It makes sense and is even essential that the different scientific disciplines develop and maintain their own core, their own identity, their own methods, contents, research fields, knowledge and teaching traditions. The history of *Academia,* however, is a history of differentiation that frequently emphasises one's own point of view more than mutual ones and ignores the question of the contribution of other approaches, disciplines and methods to solving a social problem. As a result, higher education processes which are strongly focused on one discipline and one paradigm for solutions and which do not have a broad orientation and ability to navigate in different scientific fields are encouraged. However, this is necessary in order to solve problems, especially social problems. It is necessary in order to answer the question of what the individual scientific discipline actually contributes to the solution of a specific problem, how this contribution can be evaluated and weighted in relation to alternative contributions from other sciences and/or disciplines, and where gaps arise that raise questions to other sciences. The method of problem-oriented learning is the actual key in higher education studies to relate trans- and interdisciplinary scientific approaches to one another (see Figure 36). Because: Problems do not comply with any discipline. Inter- and transdisciplinary teaching and learning require:

- Linking and applying what has been learned to concrete and real tasks,
- Development of interdisciplinary solutions,
- collaborating on topics from society and business.

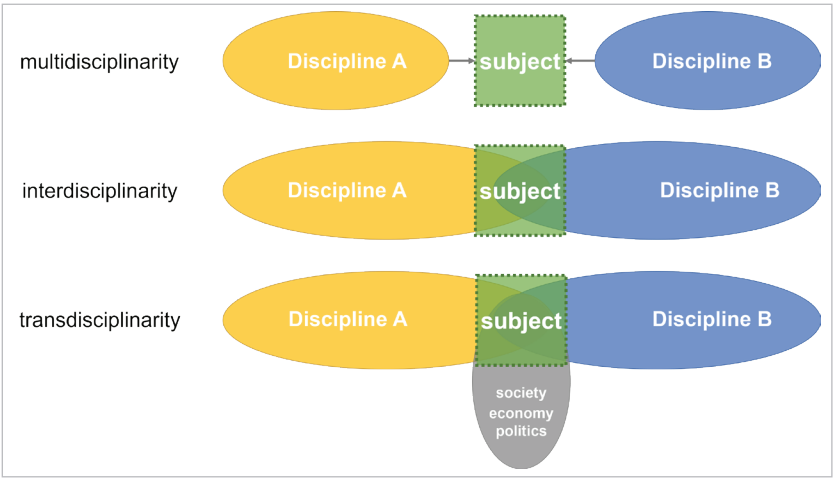


Fig. 36 Inter- and transdisciplinary learning

It is therefore essential that graduates are enabled to acquire an interdisciplinary and/or transdisciplinary basic attitude and the competence to creatively analyse problems on the basis of methodological tools of various scientific disciplines. They do not have to be experts in the respective scientific domain, but they do have to be experienced in assessing the different contributions that different sciences can make to a defined problem.

Good practice examples

- HOTSPOT (House of Transdisciplinary Studies for practice-oriented teaching and learning) at University of Pforzheim.
- Interdisciplinary Bachelor's programmes at the University of Hanover

C 2.2.3 Flexible Study Pathways

How can curricula be enriched with content from study programmes at other higher education institutes that are made available digitally, i.e. imported digitally? Another way of making study programmes more interdisciplinary and flexible, allowing more choice and strengthening students' self-organisation is the digital import of curricula from other academic institutions, recently known as *virtual*

Erasmus or *virtual mobility.* In this case, students attend a course, a summer school or do an internship, which is taught in the form of an online course at an academic institution (often abroad) other than the institution at which they are enrolled. The course taken this way is recognised as a full academic achievement and can be integrated into one's own studies with all acquired credit points. The digital import of teaching from other academic institutions can be facilitated if faculties give thought to the possible import possibilities, set up rules for this and include these in a virtual mobility catalogue for students beforehand.[43]

An alternative to the above-described flexibilisation of the course of studies is a stronger interdisciplinary design of course offerings through the use of digital media. Flexible electives are defined in order to attend modules and courses outside one's subject area. Possible examples are the theologian who also wants to attend management seminars, the manager who is interested in group psychology, etc. Higher education institutions are starting to define Bachelor's and Master's programme modules as so-called 'polyvalent modules'. This has an impact on the capacity calculation and utilisation of degree programmes. Digitisation enables the presentation and accessibility of content independent of time and place, even across faculty, department, campus and even institution boundaries. One example of this is the Virtual University of Bavaria, through which many Bavarian higher education institutions now offer over 300 courses and modules in digital form.

C 2.2.4 Soft Skills as a Hard Currency

It cannot be stressed often enough that *Future Skills* are not contradicting the importance of knowledge but rather enrich it with values, attitudes and behavioural dispositions. In the agenda for future higher education teaching, *Future Skills* do not replace the transfer of knowledge, but raise knowledge to a higher stage – entirely in line with the stage model presented in Figure 32. *Future Skills* will be equally important in future higher education teaching as concepts of knowledge transfer (see Figure 37) – this is how the experts of the international *NextSkills* Delphi assess this aspect ($M = 4.16$, $SD = 0.70$, $A = 91.1\%$, $N = 45$)[44]. Their significance acknowledged by both the interviewees of the *NextSkills* Studies and the panel of experts in the

43 The EU project "OER Test" has worked out and published the conceivable possibilities: https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Open-Learning-Recognition.pdf

44 A denotes the agreement index as the share of those who have strongly agreed (=5) or agreed (=4) to the agreement index.

NextSkills Delphi Study begs the question whether the term *soft skills* is actually still viable for the competences described as *Future Skills*. The classification as *soft* and *hard* often suggests that they can be *transferred* and less *transferable*, or that it can be *tested well* and *less well*. In fact, there seems to be a major barrier to the widespread implementation of a higher education curricula orientation towards *Future Skills* – namely in that examination systems have so far been designed primarily for the assessment of knowledge and not for the assessment of capacities to act.

While slightly more than four out of ten respondents indicated that *Future Skills* are already on a par with pure knowledge transfer, almost half of the respondents see the implementation of *Future Skills* as a guiding orientation in a five-year period, and one in ten respondents in a ten-year period.

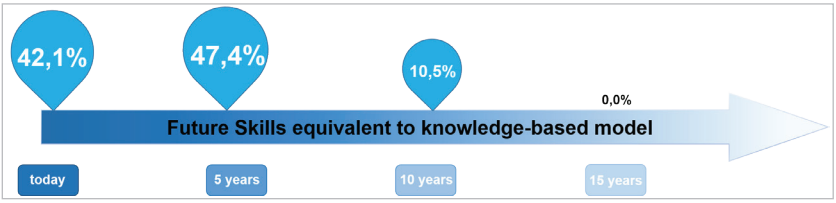


Fig. 37 Time of adoption for *Future Skills* equivalent to knowledge-based model (N = 38)

The respondents to the *NextSkills* Delphi Study cited the capacity to act in highly emergent action contexts – i.e. *Future Skills* – as a new key objective for future higher education teaching. The focus is on dealing with situations of insufficient information and potentially uncertain situations. The capacity to find one's way in unknown and complex future contexts becomes the main orientation in higher education and thus more important than knowledge transfer. This estimation is strongly approved by experts: $M = 3.64$, $SD = 0.99$, $A = 62.2\%$, $N = 45$. Asked about the *time of adoption,* almost five out of ten Delphi experts stated that the capacity to act in emergent contexts is already an important, decisive field for the design of higher education teaching today. This trend will intensify over the next ten years (see Figure 38).

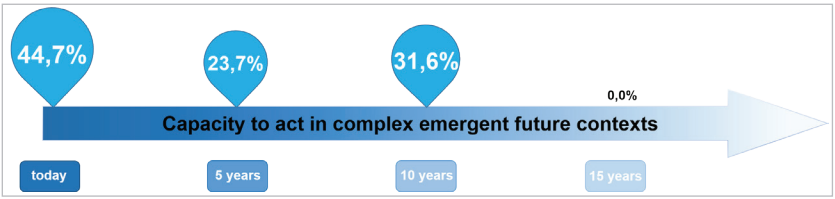


Fig. 38 Time of adoption for the increasing importance of the capacity to act in emergent, complex future contexts (N = 38)

C 2.2.5 From Defensive to Expansive Learning

How can higher education institutions abandon the illusion that learning processes can be completely planned in advance by scheduling, curricula and teaching processes? How can the vision of a participatory, student-centred way of teaching in terms of shifting from teaching to learning really be realised? The understanding of learning as an active and intentional process was developed and formulated within the framework of the critical learning theory of Klaus Holzkamp, professor from Hamburg, Germany. The term expansive learning represents learning which is done out of one's own intention and interest and serves to overcome subjectively perceived activity barriers. Holzkamp (1995) states that *intentional learning* can be divided in *expansive* and *defensive learning*. Expansive learning signifies the kind of learning that aims to improve one's own quality of life in order to overcome subjectively perceived activity barriers – not to be confused with intrinsic motivation according to the motto *want what you should*. Rather, it is about opening up the world by learning in contrast to the defensive learning effort. This stands for learning as defence against imminent threats and thus serves to avoid problems (cf. Holzkamp 1995: 190ff.).

> "Holzkamp criticised the idea that learning processes could be clearly planned ahead by curricula, teaching strategies or didactic preparation as fiction. Didactics beyond the teaching-learning short must therefore give up on all illusions of preparation (...)." (Rotting Stitch 2008: 56)

For individual competence development, learning situations must be created in which self-directed, application-oriented, situational, emotional, social and communicative learning is promoted (Mandl & Krause 2001). The integration of complex and authentic problems in diffuse starting situations is an essential element in competence-oriented learning scenarios. In the future, learning designs will

increasingly turn away from presentation and knowledge transfer methods and instead focus on interactive socio-constructive approaches (M = 3.76, SD = 0.76, A = 64.5%, N = 45) (see Figure 39).

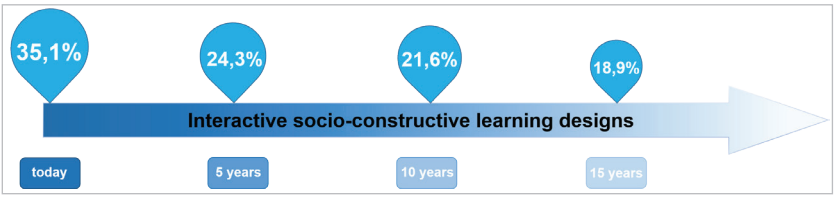


Fig. 39 Time of adoption of interactive socio-constructive learning designs in higher education (N = 37)

Digital media can be used to support this: Digital learning environments can support students in digitally getting in touch with involved actors and experts and in developing a real, authentic problem scenario in addition to a theoretical body of knowledge, instead of only dealing with artificially processed questions in a seminar room. At the Hamburg Open Online University (https://www.hoou.de), this interlocking of academic analysis and actual problem fields is actually approached by means of many projects in which students collaborate with subject matter experts and also protagonists from civil society initiatives. Furthermore, digital media can offer possibilities to practice individual reflection skills via video take or reflexive writing, for example in weblogs, and to integrate them into higher education teaching.

In addition, collaborative learning scenarios in which learners learn together will gain in importance instead of an orientation towards knowledge transfer (lecture formats). This prediction is based on the *NextSkills* Delphi with high approval values M = 3.71 and A = 60.0 % (SD = 0.91, N = 45). While many experts already regard these learning scenarios as significant today (39.5 %), one in three (34.2 %) considers this development to be realistic only in ten years' time (see Figure 40).

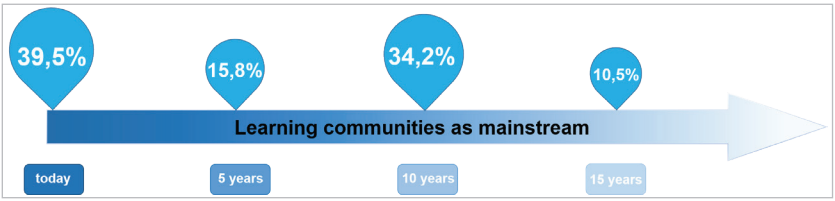


Fig. 40 Time of adoption for mainstreaming learning communities in higher education (N = 38)

C 2.2.6 The Future of Assessment

How can assessment practice, often oriented towards the reproduction of knowledge, be enhanced in favour of competence-oriented forms of assessment and peer validation models? In terms of the constructive alignment approach (Biggs & Tangs 2011), competence-oriented teaching and learning scenarios only make sense if assessment methods are also competence-oriented. It is clear that these forms of assessment will become more relevant in the future. In this context, assessments as learning (formative and peer assessment) will take the place of assessments of learning (summative assessment) (see Figure 41, $M = 3.80$, $SD = 0.86$, $A = 66.7$ %, $N = 45$).

Fig. 41 Time of adoption for mainstreaming "Assessment as Learning" (N = 38)

In higher education learning design this topic is already strongly discussed while it is not yet very common in actual higher education teaching in favour of mass assessments in the sense of "memorising and reproducing", following a rather reproductive understanding. This also poses a digital challenge for higher education. In an overall view, it can be stated: Only if the assessment forms and contents are also oriented towards competences or *Future Skills* and are not being reduced to

knowledge queries, it makes sense to look at *Future Skills* as a guiding concept for higher education learning processes. For some time now, digital media have also been used for assessment and evaluation processes. The study "Digital Examination and Assessment" (Michel et al. 2015), published in 2015, provides a structured overview of the current state of affairs and the variety of (partly) digitised assessment formats that are already being used at higher education institutions.

One critical remark according to Gabi Reinmann (2014) shall be issued here: Really thinking the focus of higher education on *Future Skills* to an end would mean to only allow assessments that actually try to capture *Future Skills* and competences and meet the requirements of integrated assessments. However, modesty is called for, as competence-oriented assessment have so far remained an ideal that can only be approximated. Precise and unambiguous statements about which competence or which *Future Skills* – in the best sense of a disposition to act – someone has developed through learning can hardly be evaluated for theoretical and practical reasons. Since competences are represented in dispositions to act and are not completely self-contained, scripted and retrievable finished action sequences. Complex examination formats are needed that assess competences in a reflective manner. Both the design and the implementation of such assessments is very complex. It turns out that competence-oriented assessment is a complex project. In this case, however, digital media can also be used productively. In the sense of the ideal of *Universitas,* the focus would then no longer be on testing what has been learnt by heart, but on discussing what is new and remarkable.

The aim is to move away from the often-predominant *inquiry-response cycle* towards an exchange between students and teachers at *eye level*. In order to make this possible, the candidates can be included in the selection of topics, for example with the aid of a portfolio. A portfolio is a collection of documents that the student develops autonomously during the course(s). It thus represents the involvement and active dealing with important seminar contents. Such a portfolio is a suitable basis for an examination on the contents presented in the portfolio (Wildt, J. & Wildt, B. 2011). Students are thus involved to a much greater extent in the design of the examination by compiling the portfolio themselves and thus exerting influence on the relevant examination contents and can, as producers of the portfolio texts, also be regarded as *experts* for their contents.

In the reality of higher education institutions today, a Bachelor degree consists of about 25 to 30 modules. Each module finishes with an assessment. Often in real practice, several subjects are assessed within the scope of one module's assessment, which in fact resembles a subdivision of the examination into several partial examinations (Pietzonka 2014). As a result, students today have to take about 50 to 60 parts of assessments within the scope of their bachelor studies – each of which

is included in the final grade (cf. e.g. Wannemacher & Kleimann 2010). Gabi Reinmann (2014) describes this as follows: The exceptional psychological situation for students in the final phase of their studies (before the Bologna reform) now extends over the entire duration of their studies (Bülow-Schramm 2008: 31). Consequently, one has moved from one extreme to the other: the one decisive examination date at the end of one's studies was traded for an all-dominant assessment period from the beginning to the end of one's studies. Huber (2008: 22) even considers competence-oriented examination forms to be utopian.

In any case, competence-based examinations will be more complex procedures, usually requiring the use of open written, oral and practical performative formats. Since this is much more complex than today's assessment practice, a correspondingly oriented study programme in which competence-oriented assessment forms are used could contain only much fewer assessments. Reinmann (2014) concludes:

> "...the optimal number of these 'assessments with legal consequences' [depends] on the field of specialisation, but [should] remain in single figures [...]. This does not apply to formative performance records, which serve exclusively to provide students with feedback on their learning process and on skills already acquired. They have no influence on the final grade and are part of didactic scenarios."

The enhancement of assessment formats represents an important future component for teaching at the university of the future – respondents to the *NextSkills* Delphi Study estimate that within the next five to ten years, higher education will increasingly rely on learning by peer assessment ($M = 3.73$, $SD = 0.90$, $A = 62.2\%$, $N = 45$) (see Figure 42).

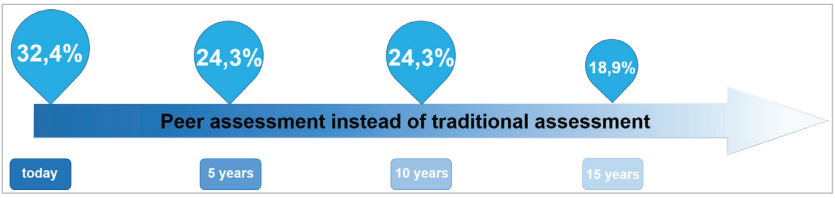


Fig. 42 Time of adoption for peer assessment instead of traditional assessment (N = 37)

C 2.3 Rethinking Higher Education: Towards an Evolved Organisation

C 2.3.1 The New Digital – Transformation Beyond Technisation

How can higher education institutions develop strategies for digital transformation in which digitisation is not viewed as *technisation or technologisation*, but as a call to rethink and enhance teaching, learning and studying? Digital media open up new opportunities for higher education to make teaching more personalised as well as time- and location-independent. The results of the most recent debate on *digital higher education* show that digitisation does not stand for technisation, but for enabling didactic imagination in teaching (Hochschulforum Digitalisierung 2016). It is recognisable that higher education institutions are concerned with supporting young people in the development of their ability to work independently and autonomously in heterogeneous teams and with encouraging them to enhance their capacities to act by solving complex problems. Digitisation is an enabler here, a source of impetus for the teaching of the future. Higher education institutions and their teaching staff make use of digital media in the most diverse ways and use the resulting changing framework conditions in order to productively break fresh ground. Higher education teaching is designed to attract students beyond pure monodirectional knowledge transfer concepts and mass events. Then higher education teaching becomes a Real-World Laboratory in which concepts are developed and implemented where students learn as reflective practitioners in "reflective laboratories" (Ehlers 2014), in which they collaborate and in which they are encouraged in their evolvement into autonomous and self-regulated learners. Digitisation does not pursue the goal of *technisation,* but calls for didactic, curricular and organisational innovation in teaching.

C 2.3.2 From Programs to Missions

How can higher education institutions flexibilise and individualise curricula and thus realise the potentials which arise from 'build your own curriculum' approaches?

Today, study programmes are characterised by great internal cohesion. The aim is to integrate a self-contained system of coordinated qualification goals within six, eight (Bachelor) and/or four (Master) semesters. This is usually based on a long process of analysing an occupational field from which the relevant qualification objectives, learning and competence goals are derived. The aim is to structure a clearly defined overall degree for the study programme. The degree designations

are officially awarded by a higher education institution. However, in times where concrete qualification goals can be less and less well derived from occupational field analyses, the question arises as to whether the currently predominant academic basic unit of the *study programme* will still be adequate in the future. The international *NextSkills* Delphi Study comes to the conclusion that studying will look different in the future. It is assumed that students will switch back and forth between different higher education institutions and take courses at different institutions in multi-institutional study programmes. Changes are equally assumed for the internal structure of studies. The experts assume with high approval values ($M = 3.6$, $A = 60.0$ %) that a higher education programme no longer follows a clearly defined curriculum but takes place sequentially or in parallel at several institutions ($SD = 0.84$, $N = 45$).[45] This results in a patchwork of institutional study experience. Several academic institutions are involved, and the students organise the study framework flexibly and adapted to their needs.

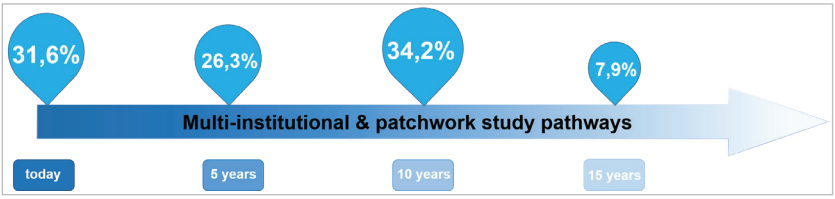


Fig. 43 Time of adoption for multi-institutional & patchwork study pathways (N = 38)

The study programme then consists of small study units that can also come from different (higher education) providers. There will be more short format courses, more certification courses, refresher courses. This results in patchwork courses of study that can then be combined into larger degree certificates, such as a final degree, and certified by a higher education Institution. More than nine out of ten respondents assume that there will be major changes within a period of ten years (see Figure 43).

45 The experts were asked to assess the following statement: "Students will study sequentially or in parallel at several Higher Education Institutions, thus their studies constituting an institutional patchwork of study experience".

More and more higher education institutions are already offering so-called *elective curriculum options*[46]. The Jacobs University in Bremen offers a so-called "3-C Model" (Choice – Core – Career), in which students can design their own curriculum with a high degree of freedom of choice. At first, a *foundation year* enables students to orient themselves towards their interests, academic disciplines, questions and methods before choosing their study programme. In higher education Institutions that offer an opportunity for students to compile their own curriculum, this usually requires them to submit a written proposal to a curriculum committee, which is then examined and discussed; for example, at the University of Maryland or Michigan in the USA.

For higher education Institutions, these *Build Your Own Curriculum* (BYOC) approaches represent new challenges. The institutions must provide appropriate advice, support and coaching. These must be professionalised services offered by both professors and learning coaches who accompany and support students in increasingly diverse learning experiences, both in terms of reflection and in the application and integration of learning content in relation to larger units of meaning, problem formulations and *Future Skills,* in the disciplinary as well as in the interdisciplinary context.

C 2.3.3 Recognition of Prior Learning

How can higher education Institutions develop more expertise and professionalism in crediting and recognising prior experience and achievements in order to make studying more flexible and permeable? Higher education Institutions in Germany are obliged to recognise competences from the academic (up to 100 per cent) and non-academic (up to 50 per cent) fields as prior knowledge in the course of study for the examination requirements to be met. However, there is no great experience with this kind of recognition practice, and this often leads to a lack of understanding on the side of teachers, since it is unclear whether the previous achievements brought in for recognition also really comprise adequate competences (Hanft et al. 2014). However, recognition and crediting are the essential key to enabling new (digital) diversity for courses of studies. Digital courses (of different faculties and

46 The collegechoice.net website lists 20 private and public higher education institutions from the USA that offer Bachelor's programs for students with particularly good grades. Students can compile their own curriculum with the help of "Academic Advisors" and "Study Coaches" (https://www.collegechoice.net/best-bachelors-programs-design-your-own-major/).

academic institutions) can only be fully ranged with face-to-face courses if they are also fully recognised. In many cases the recognition practice must be extended. Both individual (recognition of individually contributed achievements) and institutionalised concepts (cooperation models in which other institutions' services eligible for recognition were examined in advance) are conceivable (ibid.). In the international *NextSkills* Delphi, the experts are largely in agreement: more than 75 percent assume that within the next five years there will be a sharp increase in episodic patchwork study experiences in which previous achievements and existing competences are being recognised. (M = 3.59, SD = 0.96, A = 59.1 %, N = 44).

C 2.3.4 Microcredentials & Alternative Certification Methods

How can higher education Institutions gain experience with microcredentials and alternative certification procedures in order to make studies increasingly more compatible, permeable and flexible? While in today's higher education models teaching and examination as well as examination and certification processes are linked to each other, these processes will be increasingly untied and independent of each other in the higher education models of the future. These decoupling processes from previously largely structurally linked and related processes of transfer, testing and certification constitute both opportunities and challenges. Opportunities lie in the flexibilisation of study processes, entirely in line with the individual patchwork study pattern described above. Once academic learning is not only led towards examinations and assessment, the actual learning process becomes central. Intrinsic learning becomes more prevalent, moving beyond testable contents relevant for examinations. At the same time, one can observe an increasing importance of accompanying and reflecting on academic learning, oriented to the learners' contribution to overcoming her/his own previously perceived action barriers. Digital teaching allows the flexibilisation of space and time and therefore also promotes seizing study opportunities simultaneously at different institutions and in different modes – both in physical attendance and virtually online, officially enrolled and as a participant in an open online course. In the international Delphi Survey, the participants largely agree with the statement that study experiences certified in small, modularized units (microcredentials) will in future have the same significance as the certification of entire study programmes (M = 3.50, SD = 1.10, A = 56.8%, N = 44). The majority of experts consider this development to be realistic in a time period of five to ten years (see Figure 44).

Fig. 44 Time of adoption for microcredentials and alternative certification systems (N = 38)

That implies another point: today, the university's reputation determines the value of the degree on the labour market. Students who have studied at a particularly prestigious university have an advantage over students who have studied at an institution with less reputation. By alternative certification methods, such as portfolios, microcredentials, badges, etc., students will be able to document various types of certification in their personal competence portfolio in the future. In many cases, the skills and experiences documented there are also available as qualitative information, thus a meaningful information basis is created. On the one hand, it contains academic achievements from various higher education Institutions and courses, as well as further qualifications and competences acquired by learning or practical experience. This will lead to the fact that the actual practical orientation of the study programme, the experiences made and documented there, and represented competences will in future constitute the value of the higher education degree. More and more so-called skill platforms are emerging online, such as the Hamburg startup Qompetent (https://www.qompetent.com). Job matching platforms, which are already in high number on the American market and are aimed specifically at demonstrating technological capabilities, are becoming increasingly important when it comes to recruiting tech specialists. In the case of interdisciplinary qualifications (entrepreneurial activity, adaptability, collaboration), elements of gamification can significantly improve recruitment.

Platforms such as Portfolium allow users to easily upload work samples, such as term or project papers. The inputs are then automatically analysed and linked to information about documented work experience and the competences acquired hereby. A systematic matching of these millions of user profiles with job postings results in extensive technical qualification profiles on the basis of which individual candidates can be put in touch with compatible companies. Particularly in the area of technological capacities, specialised skill platforms can facilitate and improve the identification and recruitment of experts (Ehlers 2018).

Besides, platforms that do not perform the matching described above but are nevertheless focused on demonstrating skills are also becoming more important: The Klout Score of the identically named online service (now no longer active) evaluates the reach and impact of a person's social media activities. This information enables HR departments to make an initial assessment of this person's suitability for specific jobs related to social media marketing. In the IT sector, GitHub has become a standard platform for work references (https://github.com).

C 2.3.5 Lifelong Academic Learning

How can higher education Institutions become an active engine of academic lifelong learning? If we follow Beck's postulate of the risk society (Beck 1986), then continuous (academic) education is an important way of risk management. In the sense of lifelong learning, continuous advanced academic training is turning from a *possibility* of avoiding life risks to a compulsion, from an option to an obligation. This is accompanied by the evolution of employability, where higher education studies are no longer aimed at being employed, i.e. preparation for a career, but rather at being employable, i.e. targeting the lifespan: From 'lifetime employment to 'lifetime employability'. The undermining of traditional biographical patterns in the course of modernisation has become a widespread experience. Biographies are characterised by interruptions and changes, by reorientations and conversions, and they entail the permanent risk of slipping or falling (cf. Beck, Giddens, & Lash 1996). This means that qualification is never really completed. Here, too, there is pressure on higher education Institutions to increasingly conceive educational processes as episodic rather than as singular and permanently completed.

According to the expert panel, lifelong academic learning is on the rise. Nearly one third (28%) indicated that lifelong academic learning was already considered as equally important to standard academic qualifications in some higher education Institutions. Four out of ten respondents believed that this trend would only become relevant in the next five years (38%); about a quarter were of the opinion that this would only become important in a ten-year period (see Figure 45). However, since this is a systemic change, a five-year period for change operations both at institutional and legal level appears to be rather short. However, at both national and European level there are already programme-generated guidelines which could very well highlight lifelong higher learning in education systems within a five- to ten-year period. Especially under the conditions of rapid transformation of knowledge, technology acceptance rates and the dynamically changing work context, this time frame could even be shortened.

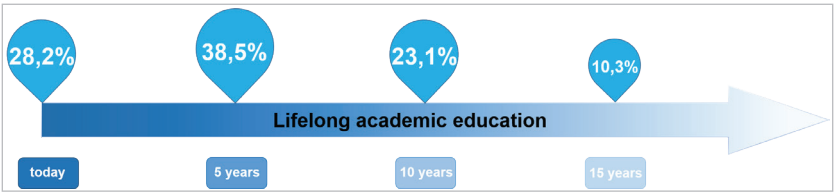


Fig. 45 Time of adoption for lifelong academic education (N = 39)

Studying in the future will have to take into account the fact that greater flexibility in the labour market entails a great need for lifelong academic education. Over 90 per cent of respondents see an increasing relevance of episodic, lifelong academic education over the next ten years, in which previous achievements and existing competences are recognised (see Figure 46, $M = 3.59$, $SD = 0.96$, $A = 59.1$ per cent, $N = 44$).

Fig. 46 Time of adoption for lifelong, episodic study experiences (N = 38)

The knowledge-based modern society implies that lifelong learning (LLL) becomes a necessity for all parts of the population. Lifelong learning (LLL) includes "all learning throughout the life-cycle that serves to improve knowledge, qualifications and competences" (European Commission 2001: 34). Demographic transition implicates that all people of working age have to pass recurrent periods of education in order to maintain the necessary high level of qualification. Against the background of international migration flows, the requirements of different cultures must also be taken into account when developing concepts for LLL. The evolution towards a knowledge-based economy also makes ever more complex demands on the workforce.

- While today's studies are still largely structured by module and audit plans within the framework of study regulations, with little flexibility in terms of time and

content, the studies of the future will be determined by a flexible study process with a wide range of options.
- While today's studies are still strongly structured on the basis of time units (ECTS), the studies of the future will be structured more strongly according to content criteria.
- While there is a clear distinction between part-time and full-time structures for a study programme today, there will be a more flexible, individual time structure, and there will also be more extra occupational and lifelong models.

Overall, it is becoming apparent that the current lead structure of higher education studies will have to change in order to meet the requirements of lifelong learning. This will gain relevance within the next 5 to 10 years, so that the current *preparatory model* of higher education will be replaced by lifelong studies as a guiding. Many design questions remain to be answered.

From an economic-political perspective, one of the core tasks is to create adequate framework conditions so that employability is maintained or improved. But it is also about using LLL to improve the active participation of the individual in society, because equal opportunities and LLL are seen as the basis of social inclusion. Particularly important in this context is the support of socially or geographically disadvantaged groups and people with low basic qualifications. The aim is to create an inclusive society that provides equal access to learning and opportunities to participate in academic learning to all people.

Demographic developments implicate that all people of working age have to go through recurrent periods of education in order to maintain the necessary high level of skills. Against the background of international migration flows, the needs of different cultures must also be taken into account when developing LLL concepts. The development towards a knowledge-based economy also puts ever more complex demands on the workforce. In recent years, higher education Institutions have taken up this task by moderately increasing their capacities in the field of continuing scientific education. However, it is becoming apparent that this will not be enough.

The future relevance of lifelong academic education is not (only) about participation in continuing education in order to restore employability where it has been lost or merely to maintain it. Rather, it is a question of undertaking a paradigm shift in academic education, which no longer sees higher education as a preparatory model, but as a continuous activity of higher education to be designed. Both the organisational prerequisites as well as the pedagogical and capacity requirements for the design of such a new paradigm do not exist at higher education Institutions and are currently not laid down in law. Following Jochen Robes (2016), a list of

key parameters for a future university of lifelong academic education could look as follows:

1. Higher education Institutions take advantage of all the opportunities offered by digitisation in administration, teaching and research. Teaching and learning do not only take place in the lecture hall or seminar room, but make full use of the possibilities to inform, discuss, publish and collaborate that the Internet offers today.
2. The LLL University is more permeable: it is a public higher education Institution which, thanks to innovative network technologies, involves interested citizens, employers and other universities, other educational institutions and teachers in its own teaching and learning opportunities and research projects. Massive Open Online Courses (MOOCs) and Open Educational Resources (OER) are part of this development.
3. The LLL-University puts the imparting of individual knowledge management as a core competence of LLL at the heart of academic education. Individual knowledge management, this means finding, evaluating and classifying information, self-designing new content, passing on information and results and eventually networking – not only but especially in virtual space.
4. The LLL-University is not only the key point of students' interests for a limited period of time, but it continues to accompany them after the completion of their *initial study programme: a*s an education partner, as a network, as an information resource.
5. The LLL University is an organisation that promotes the idea of networking actively and on every level -– from the university administration to the individual chairs and lecturers. It opens up room for students, lecturers, researchers and all interested parties to exchange ideas – and that before *Google*, *Apple* and *LinkedIn* are the only ones to set the pace.[47]

47 With the acquisition of the skills analysis platform bright.com, the Internet video learning portal Lynda and the development of the so-called "StudyPath Explorer", LinkedIn has already created an opportunity for LinkedIn members to obtain lifelong and apposite qualifications for their respective goals.

C 2.3.6 Integrating Theory and Practice

How can the University of the future use digital media to allow studying at different locations, job-related learning and practice-integrated studies? Increased lifelong learning opportunities will entail an increased importance of in-service and job-related academic education. Overall, it can be assumed that job-related academic education will gain in relevance and represent an essential structural feature of future higher education opportunities.

Digital media can be used in cooperative, practice-integrated, practice-oriented or dual study programmes in order to link the two usually existing learning environments – the workplace and the higher education Institution. For instance, course formats enabling students to get back to content that they have prepared for project and research work carried out at the practical learning location, or such as reflexive writing of learning diaries for exploration and reflection tasks which students conceive on the basis of theoretical concepts during the study phase at the higher education Institutions and which are to be realised at the practical learning institution, are suitable for this.

C 2.3.7 From Isolation to Permeability

How can higher education Institutions open up even more to alternative target groups and increase compatibility and permeability with different education sectors? Higher education systems are becoming increasingly open and permeable as a result of alternative courses of study – this is what the experts interviewed in the international Delphi Survey greatly agree on (M = 3.95, SD = 0.82, A = 81.8%, N = 44). The existing boundaries between school, vocational training and higher education will become more blurred in the future and increased permeability will be of great importance.

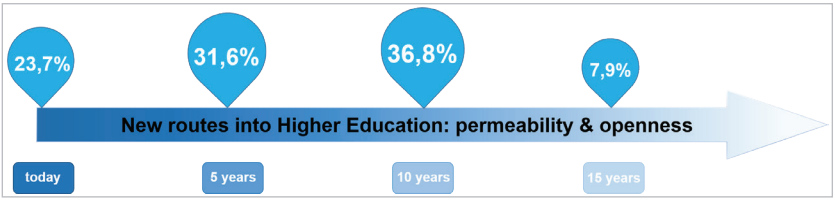


Fig. 47 Time of adoption for openness of higher education institutions for permeable access pathways (N = 38)

The surveyed experts estimate the period in which this development will be realised to be between five and ten years (see Figure 47). The aim will be to create a permeable continuum between the educational sectors of school, vocational training and higher education and the respective levels of education of the national and European qualification frameworks. This development will particularly be triggered by the increased need for lifelong learning. In addition to promoting individuals' willingness to learn, the aim is to break up the more or less existing segmentation of the education system in order to make individual learning biographies more flexible (Bohlinger & Heidecke 2009: 454). The demand for cross-system and permeable learning pathways is at odds with a highly segmented education system, which often requires individuals to make a final and hardly correctable decision about a vocational or academic qualification career.

The traditional isolationist mechanisms between the vocational education and the higher education system is problematic for the future, because according to relevant forecasts a shortage of academically qualified specialists is expected (Nickel & Leusing 2009: 19), which explicitly underlines the relevance of the learning environment of higher education. Since not all those who want to study in the future also have a general or subject-linked higher education entrance qualification, the issue of establishing more flexible transitional passages between vocational education and higher education, beyond formal entitlements, is right at the top of the political agenda (KMK 2009a / 2009b). Realising permeable and lifelong learning opportunities in higher education takes place at different levels – beginning with educational policy perspectives and reaching out to different target groups in connection with, in order to allow a broadening of access paths for non-traditional students by means of crediting procedures.

Opening higher education to more and more young people of the same age automatically leads to a flow of non-traditional target groups to higher education and increases the diversity of circumstances in which people turn to academic education. This poses a challenge for higher education Institutions when it comes to academic accomplishment. Especially in STEM disciplines, higher education Institutions are often confronted with mathematical entry-level qualifications for first-year students that are not sufficient to successfully come through the introductory phase (Heublein et al. 2014). More and more higher education Institutions are now experimenting with online courses which students take before their studies and which give them the opportunity to acquire the appropriate level of qualification in the necessary domains.[48]

48 Within the EU project "OER Test" we have worked out and published the conceivable possibilities: https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Open-

A further possibility to support the opening of higher education Institutions to non-traditional target groups are so-called bridging courses, which can be coupled with equivalence tests. If, for example, professionals with long professional experience want to return to higher education, it is appropriate to support them with *onboarding courses*, propaedeutics or alike to get back to academic studies – and that without having to attend regular classroom training at University.

C 2.4 Summary: The Dawn of the Future of Higher Education

Many higher education Institutions have already set out for the future. The two main influencing factors described, digitisation and the increasing importance of academic qualification as a normal biographical experience, will have the effect that academic education must evolve in terms of organisation, didactics, institutional orientation and profile. Digitisation is not a panacea for higher education institutions and their didactic design. It rather has the potential to support the transformation of higher education in terms of societal demands. More than ever, higher education institutions are currently faced with the task of sensibly integrating digital media.

Higher education institutions have become Real-World Laboratories in which courageous concepts are being developed. In these settings digitisation is experienced as didactisation and not technologisation, because with the use of new media, questions of learning organisation and learning design come into focus anew. It is actually through digital media that one can even realise that the ideal of *Universitas* is not often lived in reality of everyday university life. The *NextSkills* Studies provide concrete starting points for the design of the university of the future (see Figure 48).

Learning-Recognition.pdf In addition, more and more higher education institutions are offering their students support in organising their studies and their mathematical skills during the introductory phase: http://www.optes.de

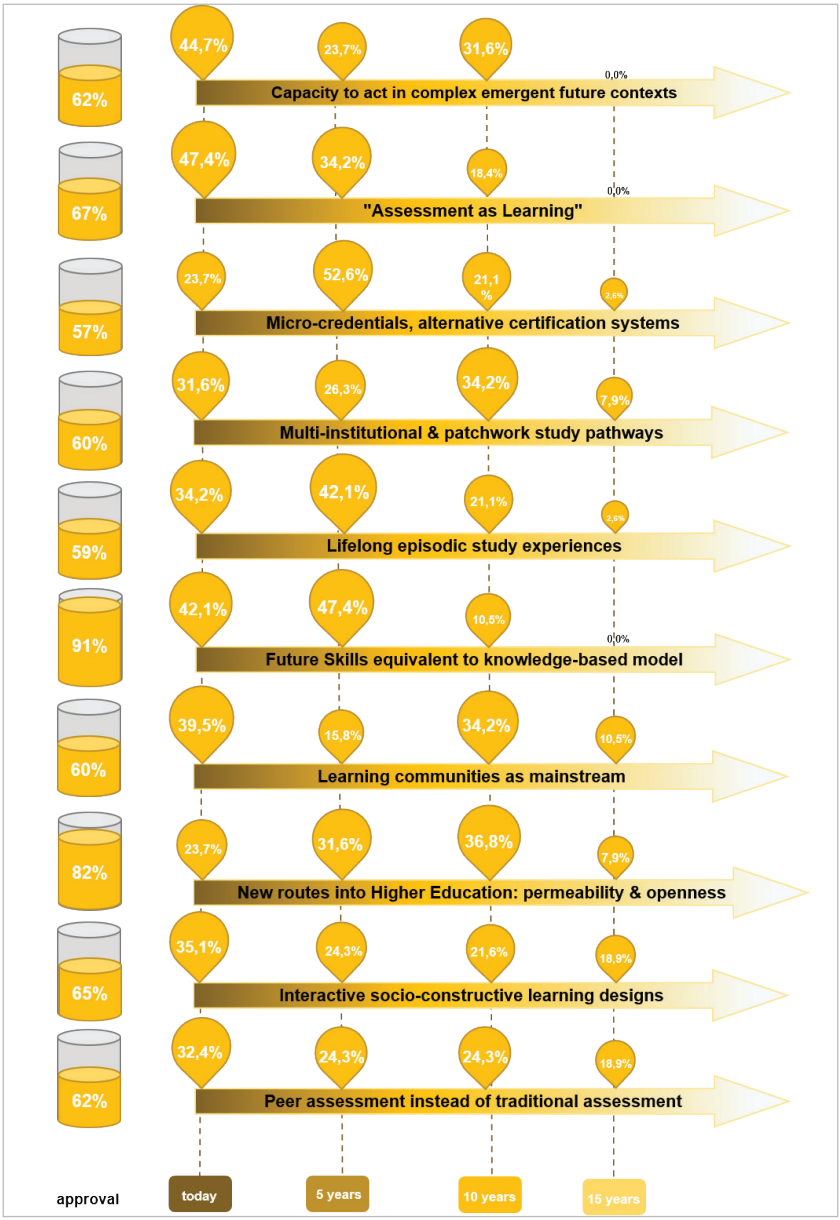


Fig. 48 Time of adoption for selected higher education developments

Overall, the international expert sample agreed on the above statements (Figure 48, all mean values ranged between 3.54 and 4.19). The statement that traditional certification procedures of university degrees would be replaced by microcredentials ($M = 3.54$, $SD = 1.10$) was the one which receiving least accepted amongst them. On the other hand, the following elements were assessed as key characteristic factors for the future of higher education: firstly, the importance of *Future Skills* ($M = 4.19$, $SD = 0.71$) and secondly, as a consequence thereof, the necessary adjustment of appropriate quality standards to ensure that students' employability would remain guaranteed ($M = 4.15$, $SD = 0.82$) and thirdly, an increased degree of diversity and permeability with regard to higher education institutions, which would pave the way for alternative pathways of studies and non-traditional student groups ($M = 4.00$, $SD = 0.84$). In order to be able to promote *Future Skills* in higher education Institutions, the respondents of the Delphi referred to the importance of qualifying teaching staff accordingly. Only if teachers are able to use the right teaching methods it is possible, according to expert opinion, to also promote students' skill enhancement. Although the experts criticised the role of quality standards as drivers of change, they generally agreed on the necessity to adapt them for students according to new requirements. The increasing openness of higher education institutions was assessed as profitable for society as a whole; however, the interviewed experts expressed concerns about the extent to which higher education institutions are already in a position to undergo such a change and whether the changes actually have the potential to compensate for or at least reduce social differences.

In addition, the experts identified five factors which they considered to be already highly relevant for the organisation of higher education.[49] These were the assessment of learning for the sake of learning (formative assessment), institutional university patchwork, peer evaluation and validation, and alternative courses of study.

According to the international expert sample, two trends in particular are expected to change the way higher education institutions will operate in the next five years: a changed understanding of higher education institutions as transfer-oriented places instead of their current focus on transfer of specialist knowledge. According to the experts, students' ability to find their way in complex, unknown future contexts as a trend-setting factor for future higher education will also become relevant in the short term (in the next five years).

The sample identified the change towards socio-constructive approaches for higher education learning and a more flexible course of study between individual institutions as becoming relevant in the medium term. The latter is facilitated by

49 "Already relevant" received the most votes for this factor and was used as the basis for assessment.

the recognition of previous academic achievements and existing competences. Although the sample mean value indicates that these last two trends will only be relevant in the next ten years, the assessment of the majority of the sample indicates that both factors are already relevant today.

Four Scenarios for the University of the Future

C 3

In the previous chapter (Chapter C 1 Ten Seconds of the Future of Higher Education), we have demonstrated which factors influence higher education institutions today. It was possible to reconstruct indications within the data of the *NextSkills* Studies, that indicate four dominant development strand of future higher education institutions (Chapter C 3.1 A Framework for the University of the Future). These were submitted to the *NextSkills* Delphi experts for discursive validation. The experts were asked to do two things: On the one hand, they were asked to assess the relevance of the influencing factors formulated in each case. On the other hand, they were requested to assess the so-called *time to adoption*, i.e. the estimated period for effectively shaping and implementing the influencing factors at the universities.

Four additional future scenarios were presented to the respondents on the basis of these influencing factors. These have been constructed on the basis of a fundamental scenario (*business as usual* scenario) which was then extended in each scenario by the assumption of the realisation of one of the four influencing factors.

C 3.1 A Framework for the University of the Future

The study results indicate four different influencing factors, that are referred to below as the *pillars of change in higher education*. The use of the term "pillar", in the sense of an architectural metaphor, intends to express the setting of a space in which higher education will develop over the next ten to fifteen years (see Figure 49). The identification of these factors constitutes the first methodical step within a scenario method, in which scenarios for higher education development will be identified in Chapter C 3.2 Scenarios for the University of the Future.

Although it is not possible to precisely limit the extent, intensity and speed of change, it is possible to provide information about its character. The four pillars of change model obtained high approval (see percentages within the pillars).

As an expert oriented consensual procedure, the Delphi procedure allowed the experts to initially adapt the formulations in the first Delphi round and to add or change components and weightings of the formulations. They were able to indicate their agreement with the four factors on a five-stage Likert scale, which ranked between the two poles 1 = "strong rejection" and 5 = "strong agreement". In case they wanted to comment on a factor – for example for the purpose of item reformulation or as specification/explanation for their response behaviour – a separate commentary field was provided. In this way about 26 notes and comments have been collected to improve the depth and range of formulation. In the second round,

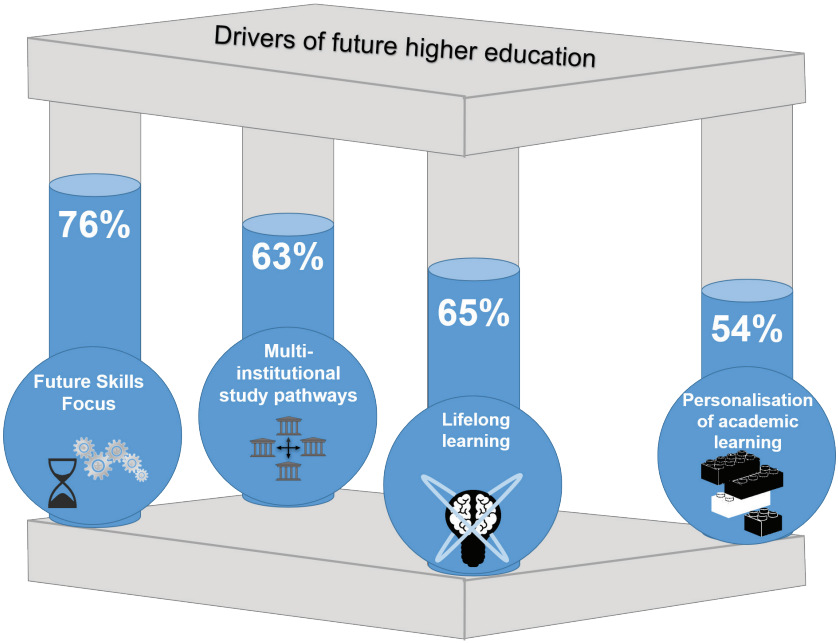


Fig. 49 The four pillars of the future development of higher education with experts' opinion[50] (N = 46)

50 The approval value *A* (for *Agreement index*) indicates the percentage of those who answered with 4 or 5 (approval or strong approval) on the 5-step Likert scale.

these more precise formulations were then reassessed by all participating experts with regard to the period in which these influencing factors would be implemented at the university. In the following, these are described as the supporting pillars bracing the space for the development of future higher education (see Figure 49 The four-pillar space of the Delphi for the future development of higher education with approval values of the sample).

The architectural metaphor of a development space used here refers explicitly to the fact that it is due to an interplay of all four factors that will determine the shape of the future university profiles.

What drives future 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.

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.

C 3.1.1 Pillar 1: *Future Skills* Focus

An emerging Future Skills focus is changing the common focus of knowledge transfer in higher education in favour of a "next mode" of studying.

Factor 1 indicates that the focus in higher education will shift to *Future Skills*, leading to a radical change in the definition of graduate attributes. This change implies that the current focus in higher education on academic and valid expertise (learning is understood as a mean to provide correct answers to familiar issues) would change in favour of a next mode of study. In this next mode, learning is understood as application and reflection on knowledge and as creative development of new knowledge, which replaces memorizing knowledge. New teaching and learning methods aiming at the development of *Future Skills* would be used to support this. The international Delphi panel generally agreed with this factor (M = 3.81, SD = 1.22, AFactor1 = 76.1%).[51] Thanks to the qualitative comments of the experts, the description of the factor could be refined towards a clearer and stronger vision of *Future Skills* and learning. Among other things, it was shown that *Future Skills* and knowledge are not perceived as opposing components of higher education, but rather build on one another. Knowledge is the basis for *Future Skills* but is no longer sufficient. The expert panel used terms such as "specialized knowledge" or "knowledge mode 2" as semantic markers to point out that a concept for "next knowledge" was

51 *A Factor 1* denotes the agreement (A=Agreement) to factor 1 and indicates the percentage of those who responded with 4 or 5 (agreement or strong agreement) on the 5-step Likert scale.

indispensable. These concepts can be related to Gibbons et al. (1994), who speak of new and collaborative knowledge production in this context. The respondents also stated in some cases that a stronger focus on *Future Skills* was no longer a vision of the future but was already part of the agenda in some institutions. The statements of the experts indicate not only a focus shift towards a change of the importance of knowledge, but also of the competences referred to as *Future Skills*. While the direction and the concept of the development presented are clearly evident in the opinions of the panel of experts, it has to be noted that a *Future Skills* focus will not be equally critical for all (types of) universities, faculties, subjects and degrees (Bachelor and Master) equally critical to success.

Future Skills: Estimated duration of change

Interestingly, the data showed that the predicted change towards a stronger focus on *Future Skills* in higher education institutions (factor 1) was already taking place according to the majority opinion of the international panel (35.0 %). Autonomous Learning Competence, self-organisation competence, application of and reflection on specialist knowledge as well as creativity and innovation are already important components of academic training at many universities. For this *next mode* of study, the sample of experts assumes that it will gradually replace the reduced/narrow focus on academic knowledge acquisition (with the aim of developing a fixed curriculum for a specific occupational field). Figure 50 displays that the remaining 65 percent assume that the importance of this factor will increase in the coming years and decades.

Fig. 50 Time of adoption for the increasing importance of *Future Skills* focus for higher education (N = 40)[52]

52 Note: In this and the following figures the percentages may add up to more than 100 percent due to rounding errors.

C 3.1.2 Pillar 2: Multi-Institutional Study Programmes

Higher education is increasingly moving from a 'one-institutional' to a 'multi-institutional' model, in which several institutions unite to form alliances for higher education transfer.

According to the second factor, higher education develops into a multi-institutional study experience. This means that higher education would tend to break with the current single-institution model and instead open up to cooperation with other institutions in an alliance network. The mean value of 3.72 (SD = 1.12, $_{AFactor2}$ = 63.0 %) shows that the international panel of experts generally agrees with this concept. However, they point out that study courses that extend beyond institutional boundaries would require a consolidated experience in dealing with the recognition of previous academic credits. In such a setting, students would change higher education institutions according to their personal preferences in terms of reputation, quality and the range of courses. Smaller or larger parts of the curriculum would be divided between different institutions, which generate patchwork-like, multi-institutional study organisation.

While the aspect of credit transfer within the Bologna signatory countries is at least conceptually realised, there is still a lack of practicability at the institutional level. As it can be seen distance learning institutions can draw on a much greater wealth of experience than *traditional* institutions. For example, one Delphi participant stated that students in Canada already had the opportunity to transfer their credit points among different educational institutions, highlighting the pioneering role of the *Canadian Virtual University*. Two other respondents explained that this trend was also reflected in the voting behaviour of students with regard to the selected university: Students enrolled for a Bachelor's programme at one university, and then chose another institution for their Master's programme. *Erasmus mundus,* for example, offers a joint Master's degree and organises the academic training of students as an integrated, international study programme provided by a consortium of different universities. This programme was also mentioned by the sample of experts as an existing example of the increasing importance of multi-institutional study paths. One interviewee also supposed whether the Internet could replace a multi-institutional network of higher education institutions as an additional source of knowledge generation and provision.

While these examples demonstrate that there is already first evidence of multi-institutional approaches in higher education, three experts indicated that in their opinion this trend would only become real in the next five to ten years, but they agreed with the general trend towards this alternative form of study course.

In addition, the experts tried to identify reasons why higher education institutions should become involved in this type of network organisation, especially smaller, specialised institutions could benefit. Following a similar reasoning, one of the experts criticised the willingness of large higher education institutions (such as the US *Ivy League Colleges*) to participate in such multi-institutional arrangements. According to the argumentation, this could damage their strong brand name. In addition to the respective character of the different higher education institutions and types, regulatory and economic framework conditions were also discussed, as they could function either as enabling or limiting conditions for the formation of multi-institutional networks. Two further respondents identified the students as key influencers on which it would depend whether and to what extent this factor would be anchored in future educational scenarios.

Multi-institutional courses of studies: Estimated duration of change

According to the experts' estimation, the second factor, *multi-institutional courses of studies,* will gain in importance for higher education institutions over the next five (30.8%) to ten (30.8%) years (see Figure 51). The above-mentioned development of comprehensive rules and experience for the practice of the recognition of academic achievements are a major prerequisite. Smaller or larger parts of the curriculum would be allocated among different institutions, which would generate a patchwork-like, multi-institutional study organisation.

While the Bologna Process and European qualification frameworks have created an initial basis for multi-institutional alliances in the higher education sector, the mutual recognition of credit points acquired at other institutions has by no means become a reality – this position is also reflected in the qualitative comments of the experts. Despite the systemic nature of this factor and the fact that higher education institutions will have to develop cross-border transfer systems, portable credit points and mutually understandable and trustworthy formats of academic credentials, the experts within the sample estimate that this trend will become more prominent over the next five to ten years.

Fig. 51 Estimated time of adoption for the increasing importance of multi-institutional courses of studies (N = 39)

C 3.1.3 Pillar 3: Personalisation of Academic Learning

The curricula are developing from a completely predefined structure to a more flexible, personalised and participative model in which students cooperate with their professors, lecturers and counsellors to jointly develop curricula.

By a third factor the role of students was examined in more detail. In future, students would create their own personalised curricula in cooperation with teachers and professors. As a consequence, this would lead to a significant diversification of study programme options. In addition, a shift towards personalised curricula would lead to a departure of the predefined *up-front* structure, being replaced by a participatory, personalised model in which students and teaching staff collaborate to jointly design curricula. The agreement on this factor was similarly high as for the other factors ($M = 3.68$, $SD = 0.98$; $_{AFactor3} = 54.4\%$). Most of the critical comments, restrictions that may apply to the development of personalised curricula, were traced back to institutional resistance. Another aspect mentioned by the interviewed experts was the students' ability to act in order to be able to cope with and benefit from this increased freedom of choice. In addition, questions arose regarding academic quality concepts for this type of personalised future study modes.

With regard to the higher education institutions, the experts identified a high need for cultural change towards a more education-oriented perspective. Although the sample majority agreed that it would be desirable for students to design their own curricula and have more freedom of choice, the experts were also in favour of *safety nets* to be guaranteed by the institutions.

Thus, the degree of personalisation is linked to an increased offer of coaching and support for students to help them develop their own academic structures and develop them into autonomous learners. This role was considered necessary to help learners reflect on their progress.

Of course, the implementation of this factor requires a radical paradigm shift with which institutions and stakeholders of higher education institutions are not familiar. However, more heterogeneous target groups and the addition of students who are not students in the traditional sense seem to open up more space for personalisation possibilities, which is reflected in the high approval ratings of the experts, while at the same time concerns arise about the implementation of such personalisation possibilities.

Personalisation of academic learning: Estimated duration of change

According to the OECD, factor three can be seen as an acute development trend with regard to the increasing number of students in industrialised countries (Baethge et al. 2015; Teichler 2013; OECD 2016).

This trend would lead to a greater diversity of target groups making use of the offered courses and higher education would have to meet their demands. Personalisation, studying at different speeds and a variety of choices for students with different backgrounds and at different life stages would call for more personalised approaches to academic education in higher education. It is likely that the rising number of an increasingly heterogeneous group of students can only be coped with the help of improved target-group-oriented approaches. The structure of these approaches would have to be adapted that the heterogeneous learning requirements of learners are taken into account and otherwise aligned with the increasingly heterogeneous needs of students in the future.

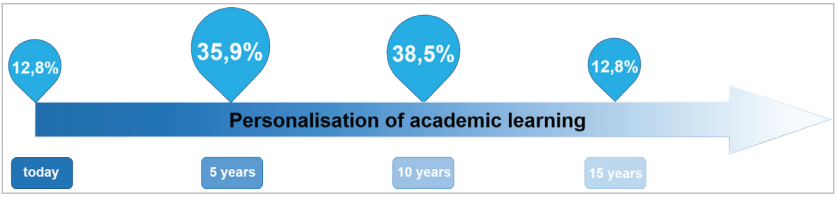


Fig. 52 Time of adoption for the increasing importance of personalised academic learning (N = 39)

As a consequence, the study programme curricula would have to be detached from completely predefined and given structures, and make use of more flexible, personalised and participatory models in which students actively cooperate with teachers, professors and consultants within the design of curricula and study programmes. Personalisation then also means being able to reassemble individual existing programs. The aim is to help students take their first steps in their academic careers, to discover their mission and their passion. And it means allowing greater freedom of choice regarding learning content and modules. All in all, it amounts to a *design your own curriculum approach.* The sample majority indicated that this factor would rather become reality in the next five (35.9%) to ten (38.5%) years (see Figure 52).

C 3.1.4 Pillar 4: Lifelong Learning

The current higher education model aims to prepare students for their future careers. This model is complemented by opportunities for lifelong learning.

The fourth pillar of change is based on the fact that lifelong learning in higher education institutions becomes just as important as the (current) *mode of preparation*. The term *preparation mode* addresses the current university model. This model is based on the assumption that academic education should follow the paradigm of learning certain knowledge assets that would later be applied to a professional context and would be needed to perform and accomplish tasks in professional life. However, the current model is under increasing pressure from ever faster changing knowledge, technology acceptance rates and changing professional contexts. To the extent that higher education institutions concentrate on imparting knowledge, but in professional action contexts *Future Skills are* needed above all, there is a gap between requirements and offers. Faster innovation cycles in the professional context are widening this gap. One way to mitigate this risk from the gap is to shift the focus to teaching *Future Skills,* which includes, but goes beyond, knowledge.

Lifelong learning – or in the higher education context *lifelong academic learning* – allows students and workers alike to continue their education and to adapt to the new challenges of their changing field of work. However, this concept should and cannot only be thought of from the perspective of an individual. Rather, it highlights the need for a paradigm shift in higher education organisation: Academic

education should no longer be seen as a phase at the beginning of working life, but as a continuum of constant biographical learning episodes.

Consequently, Bachelor's and Master's qualifications must then stand as a basic phase at the beginning of an academic career, with which one stage does not end, but which only lays the foundations for the further steps, which means repeatedly entering and leaving the academic education phases. The University of Stanford calls these phases In-Loop and Out-Loop cycles. Transfer of credit points, recognition of achievements already made (academic and professional), compatibility of different competences and flexible processes would enable individuals to shape their own individual lifelong learning paths. The *NextSkills* Delphi Survey respondents showed high levels of agreement with the development towards lifelong academic learning as equivalent to the current predominant preparatory model (M = 3.72, SD = 1.33; $_{AFactor4}$ = 65.2%) (see Figure 53).

Although most of the experts stated that a shift in focus towards lifelong academic learning was desirable, doubts were raised as to whether higher education institutions would be able to make the necessary changes on their own. They also pointed to the need for support from higher education legislation. Some experts also pointed out that lifelong higher learning does not necessarily have to be part of higher education but has to be understood as the individual's responsibility towards oneself. Finally, according to the respondents, it could be assumed that external providers would also play a more important role outside the higher education institutions in the future.

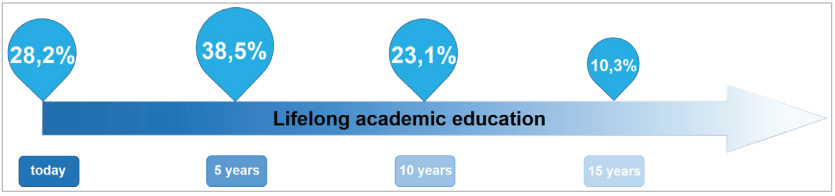


Fig. 53 Time of adoption for lifelong academic education (N = 39)

Lifelong learning in higher education: Estimated duration of change

According to the experts, lifelong higher learning is becoming increasingly relevant. Nearly one third (28.2%) indicated that lifelong higher learning was already considered as important as standard academic qualifications in some higher education institutions. Four out of ten respondents believed that this trend would only become relevant in the next five years (38.5%) and about a quarter in the next

ten years. About a quarter said that this would only become important in a ten-year period. However, since this is a systemic change, a five-year period appears short both for higher education institutions and for necessary legislative changes. However, at national and European level, there are already guidelines developed through programmes which could very well direct the focus of education systems towards lifelong higher learning within a five to ten-year period. Especially under the conditions of rapid knowledge change, high technology acceptance rates and a rapidly changing work context, this time frame could even be shortened.

As a consequence of completely predefined and given structures, the study programme curricula would have to be detached and make use of more flexible, personalised and participatory models in which students actively cooperate with teachers, professors and consultants in the design of curricula and study programmes. Personalization then also means being able to reassemble individual existing programs. The aim is to help students take their first steps in their academic careers, to discover their mission and their passion. And it means allowing greater freedom of choice in terms of learning content and modules. All in all, it amounts to a *design of your own curriculum approach.* The sample majority indicated that this factor would only become reality in the next five (35.9%) to ten (38.5%) years (see Figure 52).

C 3.2 Scenarios for the University of the Future

Academic education is on the verge to become the norm. Digital transformation is allowing new learning paths. The currently predominant model of a three- to five-year study block with subsequent following lifelong employment is empirically losing relevance. It will be replaced by more flexible, often lifelong study models. Universities, policy makers and society, together with students, must create the vision and conditions for this development and work together to design a new guiding consensus for the university of the future. The expectations and requirements of students also change rapidly. Even today they are much more diverse as a group than they were before (see Chapter C 1.3 Third Second: Demographic Change). In 2016 in Germany, for example, more than one in five students had before completed their vocational training already, one in ten continued higher education despite a health impairment, and one in fifty did not have the standard university entrance qualification (Abitur).

What the university of the future will look like will certainly depend on the regional-local context conditions in which it is placed. What is certain is that the

university of the future will look different from the present one. The influencing factors (see Chapter C 1 Ten Seconds of the Future of Higher Education) are too powerful and are pushing and pulling in diverse directions. If we try to deduce which main influencing factors result from this, one arrives at the four pillars of change described in the previous chapter. They open up a space for future developments in higher education. The study experience will change depending on the respective configuration within the developments of the four pillars.

As part of the *NextSkills* Studies, experts were presented with four different scenarios based on the four factors (see Chapter C 3.1 A Framework for the University of the Future). Table 4 explains the four scenarios. They all are based on a baseline scenario in which all drivers are set to low intensity. The derived baseline scenario for today's study experience is as follows:

Baseline Scenario today: Business as usual

Higher education is generally institutionalised – students enrol – usually directly after graduating from school at an institution where they later graduate. They study along a pre-defined curriculum with predefined contents in order to achieve prescribed learning goals, which are usually derived from a specific occupational field or scientific discipline. Study programmes are located in an academic discipline or faculty/ organisational unit of the current academic system.

Based on this baseline scenario the four possible future scenarios were elaborated. They are based on a cumulative logic – the next scenario is always adding another factor into the elaboration. Table 4 shows the different configurations of the four factors and their distribution within the scenarios – each formulated from a student perspective. As can be seen from the table, the scenarios build on each other. Delphi respondents were asked to indicate their level of agreement with the proposed scenarios on a five-level Likert scale, ranging from strong agreement (=5) to strong rejection (=1) (see Figure 54). In addition, respondents were given the opportunity to provide written justification for their decision or comments for potential reformulations of the scenario description.

Table 4 Scenario Building: current and future higher education – students' perspective

Drivers	Scenario: Today	Scenario: Future 1	Scenario: Future 2	Scenario: Future 3	Scenario: Future 4
Future Skills	Low intensity	High intensity	High intensity	High intensity	High intensity
Multi-institutional	Low intensity	Low intensity	High intensity	High intensity	High intensity
Personalization	Low intensity	Low intensity	Low intensity	High intensity	High intensity
Lifelong learning	Low intensity	Low intensity	Low intensity	Low intensity	High intensity

The following infographics summarize the four scenarios and show experts' approval rates for the scenarios (Figure 55).

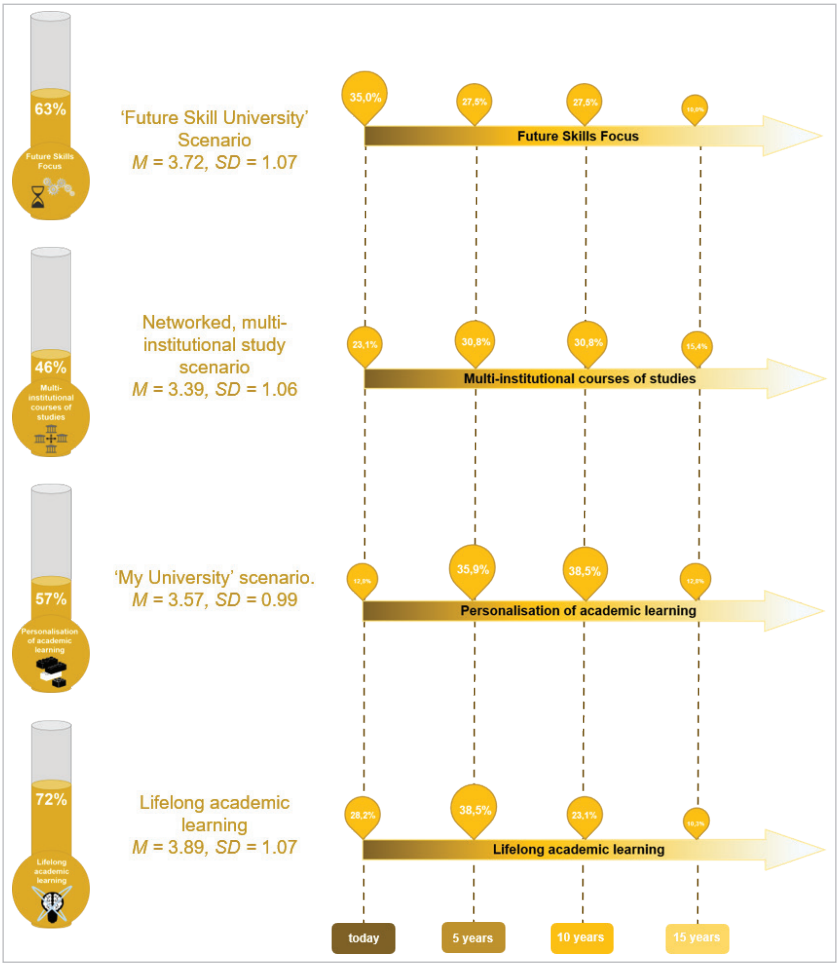
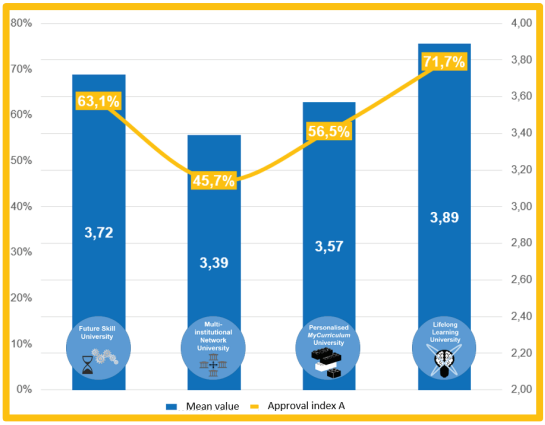


Fig. 54 Experts' evaluation of importance and time of adoption of the scenarios for higher education ($_{NRunde1} = 46, _{NRunde2} = 38$)



Scenario 1

Future higher education focusses on developing the future skills of its graduates: e.g. problem-solving competence, dealing with uncertainty or developing a sense of responsibility. Such an organisation goes beyond the mere transfer of knowledge application and predefined curricula of narrow profession profiles. Instead, students predominantly engage in the reflection, application and creative development of new knowledge and academic methods. Thus, at its core, future higher education aims at the development of competences that enable students to act successfully in unknown future contexts within their field of work.

+ Scenario 2

In addition to scenario 1, the standard study experience at higher education institutions is changing from a mono-institutional model to a multi-institutional model. As a result, large parts of the study programmes are offered by university alliances of several institutions and study courses are increasingly organised in a multi-institutional and patchwork-like manner. Cooperation as well as digital import and export of curricula play an important role in this context. From a student's perspective, institutional boundaries are becoming less important. A diversification of academic providers is taking place, in which some institutions specialise in certification, while others focus on supply and learning.

In addition to scenario 2, the degree of student autonomy increases significantly. To become autonomous learners who design their curricula by composing their academic course portfolio from different disciplines and course offerings of different institutions, students are guided by professors, lecturers, and consultants. Disciplinary boundaries within study programmes become increasingly open and flexible, allowing students to follow individual pathways. Thus, the focus is on the increasing degree of student autonomy and their personal requirements as well as on the future professional context.

+ Scenario 3

In addition to scenario 3, seamless lifelong higher education becomes as important as the initial higher education. Professionals will constitute the major part of the students. Students choose their module portfolio largely autonomously according to their personal skill and competence requirements throughout their lives. Institutions offer micro-credentials which students can acquire individually and according to their personal interests and requirements.

+ Scenario 4

Fig. 55 Four future scenarios for the University of the Future

C 3.2.1 Scenario 1: The *Future Skill* University

Scenario number 1, the *Future Skills* scenario, assumes that higher education institutions would turn away from their current model of knowledge transfer. Instead, new study and university profiles would emerge, aimed at supporting students' development of *Future Skills*. *In* this scenario, higher education would be oriented towards one main objective: to enable the development of F*uture Skills*, i.e. the ability to act in highly emergent contexts of a future professional field or in private life. This would not replace the acquisition of knowledge and defined curricula for fixed occupational profiles but would go far beyond them. Instead, students would focus on reflection on values and attitudes, application and creative development of new knowledge and academic methods. The main ambition within this scenario would be to prepare students to be able to act in uncertain and uncertain future contexts.

The Delphi experts expressed a high degree of approval for this scenario (M = 3.68, SD = 1.07, AScenario1 = 63.1%). *Future Skills* are understood as a concept that builds on expertise but goes beyond it to enable students to access higher levels of learning (e.g. conceptualised within Bloom's taxonomy) that will be necessary for future academic education. The experts agreed that higher education institutions should offer learning opportunities aimed at developing *Future Skills*. However, it was also noted that the definition and scope of what would be considered *Future Skills* would vary within the disciplines.

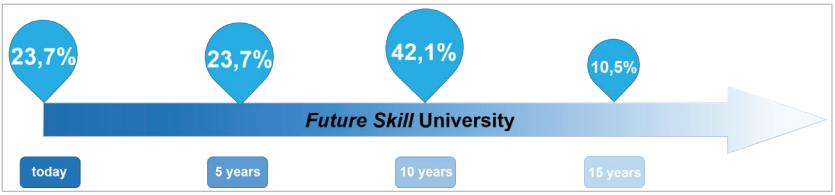


Fig. 56 Time of adoption for an increasing importance of the *Future Skill* University scenario (N = 46)

The majority of respondents (42.1%) estimate the time of adoption for this scenario to be ten years ($M = 2.39$, $SD = 0.97$) (see Figure 56). The analysis of the qualitative comments revealed that the main reason for the experts' time estimation was primarily four factors: a perceived inertia of university systems, their internal cultural resistance and the slow pace of change processes with regard to changes in legislation and financing rules. It was also stressed that, in addition to macro- and meso-level changes (state policy and institutional regulations), university staff and students would also have to adapt their mindsets accordingly.

The heterogeneity of the respective national context conditions and the different types of higher education institutions were identified as moderators of such change processes: While some respondents indicated that private colleges and business schools were already actively engaged in helping their students develop *Future Skills*, traditional higher education institutions in particular often placed a high value on knowledge transfer.

> "It is already a reality that the knowledge needed for a certain profession is evolving constantly and needs a permanent update. So, having the skills for this adaptation and having skills more focused on developing capacities is much more important than just information and knowledge in a specific field." (Participant NextSkills Delphi Study)

C 3.2.2 Szenario 2: The Multi-Institutional Networked University

The second scenario assumes that, in addition to the focus on *Future Skills,* a higher education structure will be established that will enable new study experiences in a network of many higher education institutions, referred to here as *multi-institutionality.* This will shift the linchpin of previous higher education. So far, everything has rotated around the axis of the individual university, where everything from enrolment to graduation takes place, now this axis is completely rotated. The scenario envisages a mode of higher education which no longer revolves around the axis of the institution as the centre, but around the academic program. The focus is on the question of how completely new study experiences can be made possible through institutional cooperation. The linchpin for the definition of a university course of study has been completely shifted.

This requires a radical rethinking of the current model of higher education as this is based on the assumption that institutions are full-service provider and students study at a single institution, and that these institutions also represent spaces for personnel and organisational identity development that are occupied as *campus mentality* or with terms such as *alma mater.* The new concept of the multi-institutional network university is about enabling the advantages of networking while at the same time not abandoning the identity-forming space of the one-university model – also in the sense of a protected space. For this, the idea of the previous university organisation must be rethought. How can a course of study at different institutions in a network structure nevertheless be designed in such a way that the presumed coherence of the one-university model is not lost?

Previous approaches, especially in the USA, often appear to be based on a neoliberal market model and try to work out cost advantages through economies of scale (cf. Selingo 2017). In Europe, too, approaches of the networked university are being discussed in various forms, for example in the form of the so-called "European University" initiative of the European Commission. The aim is to bring

together networks of higher education institutions in Europe in completely new forms of cooperation in study and research.[53] Regional networks are also establishing themselves more and more, but so far mostly research focussed. One example is the "Network of medium-sized universities" in Germany, a network primarily for research cooperation.[54] However, the strongest innovation potential lies in the possibility of enabling completely new study experiences. The scenario of the multi-institutional university network would make this possible.

The scenario of a multi-institutional university network follows the idea of radically integrating the curricula of different higher education institutions into one network. For institutions, this means an increased import and export of curricular components from other higher education institutions. This integration of study programmes through digitisation will become increasingly important and simpler in the future. The increasing availability of open online courses and open educational materials suggests that study experiences will increasingly have to remain less institution-bound. However, it would be a misconception to think that digitisation automatically leads to (meaningfully) networked study programmes. For this purpose, tools for recognition must be developed and made available. Study experiences are no longer credit points administered by universities, which only lead to a degree in certain combinations regulated by higher education institutions themselves but become portable academic credentials that are the personal responsibility of students. The necessary concept of an academic qualification approach, which is *personally responsible* and *made possible by higher education institutions,* continues to be *advised* by *teachers and coaches,* has not yet been tested or conceived. In *NextSkills* Delphi, respondents point out that on the one hand it is becoming apparent that this development is imminent, and on the other hand there are also risks pointed out with regard to the coherence and connectivity of such study experiences.

The standard study experience at higher education institutions changes in this scenario from a *single-institutional* model to a *multi-institutional* model (see Figure 58). For students, this means that they enrol at university 1, but therefore do not necessarily graduate at this university or take all courses at this university only. Instead, the study becomes a patchwork or network experience, which depends more on the respective interests and individual preferences of the students for certain topics and profiles, the desired access to specific institutions or course profiles than

53 See the description of the initiative on the European Commission's website: https://ec.europa.eu/education/education-in-the-eu/european-education-area/european-universities-initiative_en

54 See the network's website: http://www.mittelgrosse-universitaeten.de

on the curricular possibilities and capacities of the university or its competences to offer a certain range of courses. If these are not available, students at another institution will take advantage of the corresponding offers. From the perspective of the institutions, this would mean that they would have to organise themselves in alliances and networks with other higher education providers, develop cooperation interfaces and mutually recognisable, portable credit schemes and certificates. Academic programmes in this scenario would be provided by university alliances and would enable students to create individual, patchwork-like courses of study that cross institutional boundaries. This would be made possible by cooperation and the digital import and export of curricula. From a student perspective, therefore, institutional boundaries would become less visible and there would be a diversification of providers of academic education, with some institutions specialising in certification, some in coaching and learning guidance, while others focusing more on content provision. Thinkable multi-institutional study paths that would be made possible in this way are shown in Figure 57.

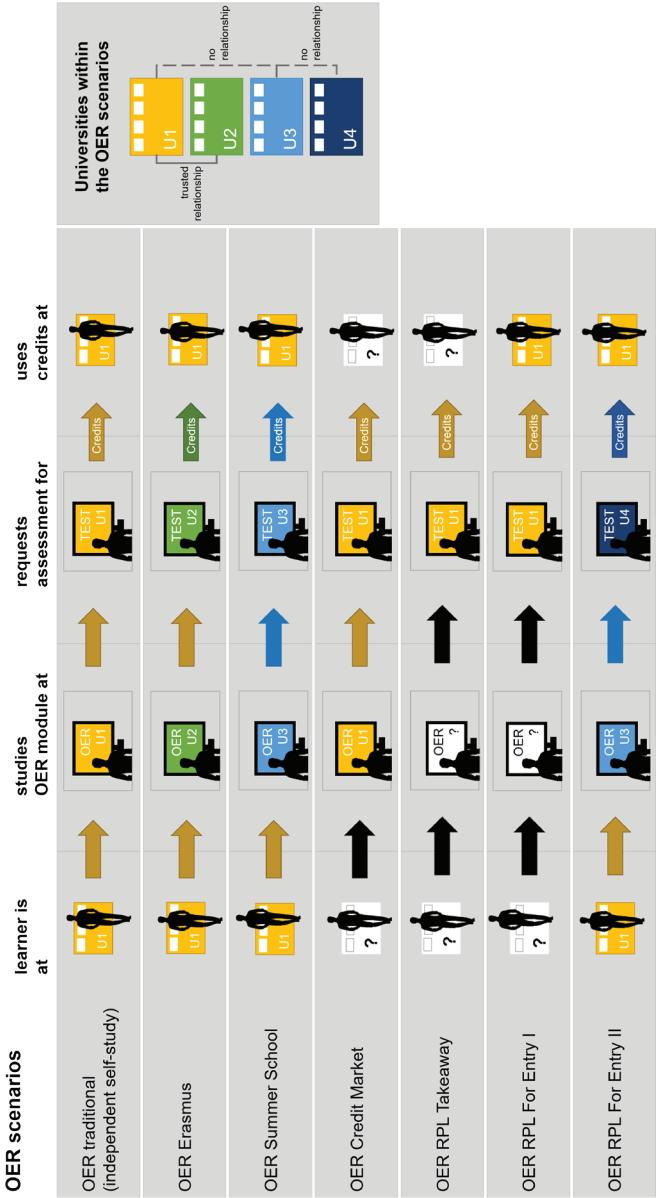


Fig. 57 Multi-institutional study paths scenarios (Source: Ehlers et al. 2011)

The participants of *NextSkills* Delphi were asked to assess the scenario in terms of their agreement and the time span of implementation. On the one hand, there is a cautious approval of the scenario with an average value of 3.43 (*SD* = 1.06) and an approval index A of 45.7 % (see Figure 58).[55] However, respondents estimate the *time of adoption* for this scenario to be slower, with four out of ten respondents who expect a ten-year period for this and every fifth who sees this development only in a fifteen-year period. Thus, more than half of the respondents assume this scenario as a long-term perspective.

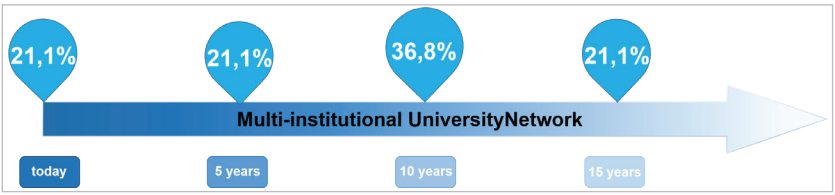


Fig. 58 Time of adoption for the Multi-institutional University Network (N = 46)

Experts stated that new business models had to be developed along the lines of a "co-opetition" paradigm.[56] They also indicated that higher education institutions would have to accept the willingness to adopt new competitive models in order to make this scenario possible. Constructive discussions would therefore be necessary in order to specify the conditions under which higher education institutions could develop towards cooperative networks without losing sight of the conditions that would lead to a weakening of their own competitive position. Business models that include instruments for recognition and credit transfer should also be developed further to motivate the emergence of such institution-wide arrangements. According to experts, student demand will drive this scenario forward:

> "A rather neo-liberal ideal of a market place with infinite choice and competition but at what cost? I'm not sure this is as liberating as it sounds." (NextSkills Delphi Study participant)

55 The approval value *A* (for *Agreement index*) indicates the percentage of those who responded with 4 or 5 (approval or strong approval) on the 5-step Likert scale.

56 Coopetition refers to the duality of competition and cooperation on markets (Bouncken et al. 2015). Coopetition is a word composed of the English terms cooperation and competition.

According to the experts' assessment, the time to adoption for the scenario will realistically within the next ten to fifteen years. However, the international experts hint to certain prerequisites for the implementation of this scenario:

- The will of higher education institutions to preserve their own identity and status while embarking on an intensive cooperation and recognition process could be seen as a risk of loss for the location of study programmes at their own institution.
- Although some respondents stressed the benefits of this scenario, others questioned the applicability and desirability of multi-institutional cross-country and cross-university arrangements.
- The concept of the transferability of academic achievements must first mature before higher education institutions can make use of it in both directions: on the one hand as self-exhibiting, on the other hand as recognising institutions.

In the scenario of the multi-institutional university network, student support plays an important role in the experience of study across institutions and higher education contexts. Coaching and supporting students to not lose sight of the red thread within their academic education becomes more important because fewer external guidelines exist. In developing this scenario, it also becomes clear that the infrastructure for coaching, mentoring and accompanying students to integrate their academic learning experiences into a larger and coherent whole would be necessary. Otherwise there would be a risk of loss of coherence.

C 3.2.3 Scenario 3: The Personalised MyCurriculum University

The *MyCurriculum* scenario focuses on increasing the involvement of students in designing their own personal curricula. More electives, more participation and more opportunities to actually compile your own course of studies – not alone,

but in cooperation with professors, coaches or specialised committees. Students can thus compile their own curricula and learning formats based on their personal interests. Therefore, in this scenario, the academic curriculum concept changes fundamentally – from a *previously designed* structure towards a personalised, more flexible and participative model in which students actively cooperate with professors, lecturers, counsellors to develop their own curriculum. In addition to sovereignty concerning curricula, there will also be greater freedom of choice and variety in teaching formats, which will enable higher education institutions to better respond to the greater diversity of students in the future (see Chapter C 1.3 Third Second: Demographic Change). This can be reflected in the different needs for assistance, the more or less marked interest in certain study contents, the different study speeds, the different preferences regarding online and face-to-face teaching as well as internationality.

As a consequence, the rigid ties of the overwhelming majority of academic programmes to an academic organisational unit (faculty, school, etc.) are loosened. The main focus is thus on the students' individual study needs and their future professional contexts in a personalised study environment. The majority of the experts stressed that this was not to be equated with a dissolution of academic-scientific disciplines. Rather, it would result in interdisciplinary cooperation for academic higher education programmes, which would make more flexible, personalised curricula possible. Initial approaches to this are already being seen in private higher education institutions, such as *Jacobs University*, a private university in northern Germany. An expert who himself attended a highly personalised course of study assesses his own experience as follows:

> "The challenge was creating a balanced degree (temptation to choose 'easy' or familiar subjects), so some criteria should be agreed on, such as a balance between practical/theoretical, subject-related/soft skills. Future professional contexts are uncertain, so this scenario needs to be associated with sound orientation approaches, both human and machine-based." (NextSkills Delphi Study participant)

Overall, the sample shows a high approval of the third future scenario ($M = 3.57$, $SD = 0.99$). According to respondents' perceptions, this scenario will also become relevant in the next ten years. Approximately 56.5 % expressed agreement or even strong agreement with the *MyCurriculum* model (approval index A) (see Figure 59).

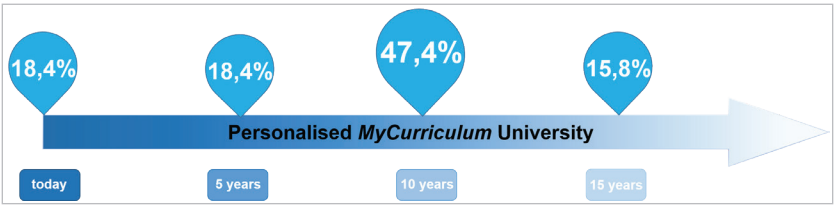


Fig. 59 Time of adoption for the increasing importance of the MyCurriculum scenario (N = 46)

The experts' discussion shows that this scenario is challenging in terms of students' ability to study and would entail an increased need for student support and coaching. On the one hand, students can focus on subjects that are of particular interest to them thanks to flexibilisation. On the other hand, it can be questioned whether students are already prepared to decide what is not only interesting, but also important to know. Higher education institutions must therefore develop entirely new coaching and mentoring formats and a new kind of expertise in this. Initial experience with the *MyCurriculum* approach shows that higher education institutions invite students to compile their proposals for studies and then submit them to an advisory curriculum committee, which together with the student(s) advises on how suitable the planned study path is.

In addition – according to the opinion of the respondents to the *NextSkills* Studies – it can be assumed that the degree of personalisation potential depends on the respective field of study, national contexts of the higher education system, traditions and the students themselves:

> "I believe that there is room for personal learning paths for professionals and skilled workers, who wish to upgrade or diversify their work. However, younger students don't always have much of an idea on their personal study needs, but professionals in the field can better make these choices." (NextSkills Delphi Study participant)

An additional challenge is the resulting increasing diversity of degrees, which would be reflected in the personalised curricula. Further mechanisms should therefore be introduced to ensure that study experiences are meaningfully documented and presented in a way that third parties can apprehend them, and that quality concepts for individualised study courses can be developed.

The realisation speed for this scenario depends on various factors: the technological infrastructure, counselling and mentoring skills of the teachers – who must be trained as mentors and tutors – as well as a high degree of autonomy and

responsibility on the part of the students. An increasing number of students as well as decreasing federal basic funding of the higher education institutions are mentioned as special challenges in the context of the *MyCurriculum* scenario. In addition, the respondents stressed the dependence of the feasibility of the scenario on the students' ability to self-regulated learning.

C 3.2.4 Scenario 4: The Lifelong Learning University

In this scenario, lifelong academic education is considered as important as initial higher education at the beginning of the career phase. In this scenario, employees make up the majority of the students, who choose their module portfolio according to their personal skill needs and competence requirements with a high degree of autonomy over their life course and independently according to their requirements. Institutions therefore also offer alternative certification procedures, such as microcredentials, which students can acquire individually according to their own interests and needs. In this scenario, the recognition of academic achievements and practical experience allows flexible switching between different providers of higher education. These enable students to document previous learning experiences in the form of more comprehensive certificates.

In the scenario, four essential dimensions are addressed which would have to be substantially further developed for its realisation:

- Permeability: The creation of access routes for people with vocational qualifications and the recognition of competence from academic and non-academic pre-qualification phases should be guaranteed. In Germany, state legislation and university practice are making strong progress in this respect, but lag behind the equivalence of lifelong and initial academic education formulated in the scenario.

- Study organisation: The creation of flexible in-service study formats and part-time models as well as *short courses*, *micro and nanodegree formats are* particularly important here. In addition, the organisation of higher education studies over the life span requires the creation of appropriate administrative processes as well as teaching organisational processes for corresponding offers.
- Study formats: Suitable flexible study formats are needed, both with regard to the sensible integration of digital media into teaching and with regard to flexible times and spatial possibilities as well as didactically with regard to the target group of working adults.
- Continuing scientific education: The creation of legal and higher education administrative framework conditions as well as strategies in which higher education teachers can design courses in the field of lifelong learning within the framework of their activities and duties as teachers.

The lifelong students represent an increasingly growing target group for universities, which in this scenario are finally added to the already existing, traditional target groups in terms of numbers. An interesting idea that has not yet been implemented in Germany is the introduction of a lifelong matriculation number that would make it easier for students, at least once in administrative terms, to take advantage of courses offered during their life course even after the official end of a first or second study cycle (Bachelor's or Master's degree). Higher education would thus move from its momentary *up-front mode* to a new form of seamless lifelong academic learning. An initial academic qualification phase corresponding to the current Bachelor's or Master's programme is not excluded. However, this would only be the prelude to the further academic path of life learning. In this scenario, students would choose their module portfolio with a high degree of autonomy and according to their personal or professional skill requirements and competence requirements of their respective life phase. Universities, on the other hand, would offer *portable* microcertificates. Depending on their own preferences, these students could then compile a cumulative or complementary final profile for an individual degree profile.

The fourth scenario received the highest approval ratings of the participants of the *NextSkills* Delphi: 71.7 % of the sample indicated a (strong) approval (approval index *A*) (see Figure 60). Respondents underlined that in order to succeed in today's competitive *global village,* individuals have an unprecedented need for lifelong academic learning.

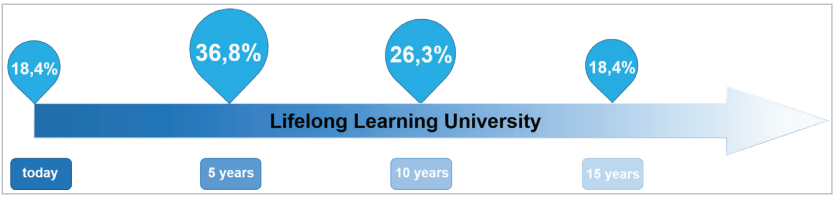


Fig. 60 Time of adoption for the Lifelong Learning University (N = 46)

With a few exceptions, the target group of lifelong academic learners has so far tended to be on the fringes of the strategic efforts of higher education institutions to expand their study programmes, which are primarily geared to the type of *normal student* (admission directly or shortly after obtaining a higher education entrance qualification without prior vocational qualification, full-time/presence studies). Above all, it was three social dynamics that fuel the fourth scenario:

1. Demographic change,
2. the demand for skilled workers forecast by many labour market experts, and
3. the demand for greater permeability between vocational and academic education and training.

With regard to the assessment of the time to adoption of the scenario, the assessment is slightly contrary to the importance of the scenario. While there is a strong consensus among the experts on the relevance of the scenario, the scenario in this clearly and pointedly formulated variant (lifelong academic learning would be regarded as just as important as the current model of higher education) is not considered immediate and already feasible today. The majority of experts assume that this scenario will become more relevant in the next five years (55.2%). However, one in four respondents estimates the *time of adoption* at around ten years and one in five at fifteen years. In terms of the scenario, respondents tend to view an *evolutionary* path of change rather than a realistic one. In their view, the first step is to open up higher education institutions more to working lifelong learners. This would also mean that higher education institutions would in future focus more strongly on maintaining intensive relationships with their alumni, who would turn to their *alma mater* again after graduation whenever they needed further academic training in their professional lives.

Challenges to the scenario arise from the need for a real paradigm shift in academic education, with implications for existing courses and higher education

structures. In addition, it must be taken into account that a change towards lifelong academic education cannot be shaped solely by higher education institutions, but also by learning individuals and their willingness to participate in education, as well as by employers. They must recognise the importance of lifelong academic learning and provide additional learning and training opportunities for their staff accordingly.

Four Scenarios for Universities of the Future

The *NextSkills* Studies take a student`s perspective on the Future of the University. Four scenarios for the Future University can be described as gravitation centres of organisational development: (1) the *Future Skill* university scenario, (2) the networked mulit-institutional study scenario, (3) the MyUniversity 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 involved. 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 emphasise graduates' *Future Skill* development. In this scenario, higher education would mainly be organised 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 higher education study structure and experience would shift from a "one-institution" model to a "multi-institutional" model.

3. The "MyUniversity" scenario: This scenario describes higher education institutions 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, personalised and participatory model in which students actively cooperate with professors/ teachers/ advisors in curriculum building of higher education 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.