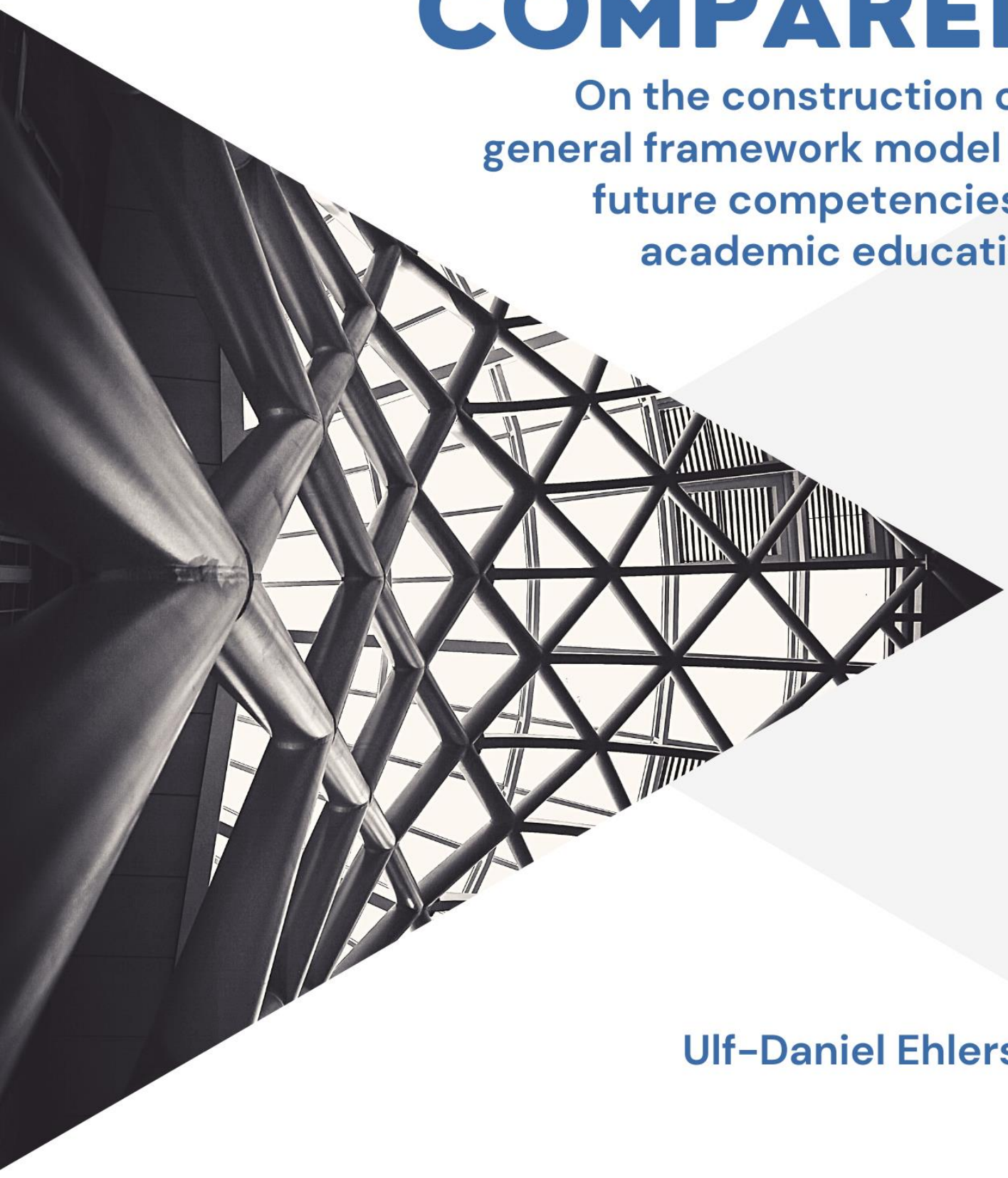
FUTURE SKILLS COMPARED

On the construction of a general framework model for future competencies in academic education.



Ulf-Daniel Ehlers

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Editorial

Future Skills in comparison

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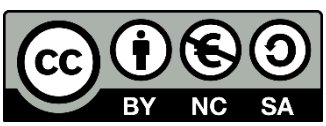

Future Skills compared

On the construction of a general framework model for future competencies in academic education.

Summary

This paper describes how the variety of existing future skills approaches can be compared conceptually. For this purpose, a framework model for future skills is proposed, which contains 17 future skills profiles in three different categories. The skill descriptions of the about a dozen future skills studies published in German-speaking countries since 2015 are assigned to the 17 future skills profiles in a confirmatory manner using a qualitative content analysis procedure.

Abstract

D Future Skills gelten derzeit als „Rising Star" der Kompetenzforschung. Der Begriff ist jedoch nicht einheitlich definiert und in der Bildungswissenschaft nicht klar operationalisiert. Anhand der NextSkills-Studie werden im Beitrag 17 Future Skills-Profile beschrieben. Diese werden dann als Rahmenkategorien für eine vergleichende Einordnung aller seit 2015 im deutschsprachigen Raum publizierten Future Skills-Studien herangezogen.

E Future skills are currently considered the "rising star" of competence research. However, the term is not uniformly defined and not clearly operationalized in educational science. Based on the NextSkills study, 17 Future Skills profiles are described in the article. These are then used as framework categories for a comparative classification of all Future Skills studies published since 2015.

F Les compétences futures sont actuellement considérées comme une "étoile montante" de la recherche sur les compétences. Le terme n'est toutefois pas défini de manière uniforme et n'est pas clairement opérationnalisé dans les sciences de l'éducation. Sur la base de l'étude NextSkills, l'article décrit 17 profils de compétences futures. Ceux-ci sont ensuite utilisés comme catégories cadres pour un classement comparatif de toutes les études Future Skills publiées depuis 2015.

Keywords

Future Skills, Hochschulwandel, Triple Helix, Bildungsforschung, Kompetenzforschung, Schlüsselkompetenzen

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1 Introduction

Future Skills – Guiding principles of a new educational concept for universities

With the increasing flexibility of biographies, the responsibility of individuals to develop individual competence strategies for their own lives is growing. Professional and private spheres of life are becoming increasingly blurred and intertwined. In terms of education, we can diagnose a real "drift to self-organization" (Ehlers 2020). This is characterized by a de-standardization of educational pathways, in which the fit between informal and formal educational opportunities and professional and private requirements must more and more be prioritized by the students themselves and translated into *individual learning and action strategies* that are increasingly aimed at acquiring "Future Skills". Universities are faced with the challenge of responding to this.

Future skills are competences of a specific nature (e.g. Ehlers 2020, Agentur Q 2021). For example, if the task is to develop a solution to a new problem, the ability to change perspectives, flexibility and openness, but also interdisciplinarity are important. In the NextSkills study, these competences are summarized in a "Future Skill" profile with the label "design-thinking competence" (Ehlers 2020). If, for example, another area involves finding one's way around increasingly networked, often unclear and complex organizational roles and discussion contexts at work or operating privately in very widely differentiated patchwork and elective family constellations, skills such as dealing with ambiguity, acting in uncertain situations and dealing with heterogeneity are important. All these skills are summarized in the NextSkills study as "future skills" under the label "ambiguity competence". These labels are called *Future Skills profiles* in the NextSkills study. It contains 17 such Future Skills profiles (Ehlers 2020).

In the last five years – since 2017 with the publication of the first (explicit) Future Skills study in Germany (see Appendix I) – the interest in Future Skills for the field of academic education has multiplied and is reshaping the discussion about key competences. The reasons for this are diverse and lie in societal megatrends such as digitalization, demographic change, and the development of an educational society (Ehlers 2020). They lead to an increasing importance of future skills as precisely those abilities that allow individuals to possess and/or regain the ability to shape their own lives and social contexts in a world of constant change and in future emergent - i.e. unpredictable - and rapidly changing demand situations. "Future skills" are therefore about those competences that are of particular importance for the ability to act in such future situations, which, due to their rapid changes, repeatedly produce new, complex problem situations, for which preparation through education and training in the previous sense (knowledge transfer in preparation mode) is no longer possible. Numerous Future Skills studies are now available, both internationally and for Germany (see Appendix I for a bibliography of studies published since 2016). However, they are very heterogeneous both in their understanding of what Future Skills are and in the methodological design of their identification and conceptual quality. One example is the formulation of "virtual leadership" as well as "leadership skills" in one and the same study (Stepstone/Kienbaum 2020) and "adapting leadership culture" (Hays 2017) as well as "leadership skills" (Agency Q 2021) in other studies - it remains unclear whether they are the same thing or in what way, if any, the future skills mentioned are nuanced differently. Also, the approaches and the terms used are not always (educationally) theoretically connectable, i.e., they do not work with concepts that actually have content in the sense of educational science.

There is currently a lack of approaches to a common framework that would allow the existing concepts to be classified comparatively. This involves both the naming of individual future skills and a comparative presentation of the scope and impact of the respective studies. This results in a design vacuum with regard to support processes and the associated change in learning culture for the acquisition of future skills, both in universities and in other places of learning, such as the workplace and for continuing education. What should one base oneself on, what should one orient oneself to, how do the terms and concepts of one approach relate to those of the other?

This describes the problem that this article is intended to address and solve: the variety of approaches and concepts currently available is not easily comparable. What individual approaches and studies do and which areas of competence they cover is not transparent and thus not accessible for orientation in the field of higher education. In this paper, a categorical framework will be developed that allows a comparison of all approaches and studies available in the German-speaking area since 2016. For this purpose, the approach of the NextSkills study will be used and the extent to which their Future Skills formulations can be classified in the Future Skills profiles of the NextSkills study will be examined on the basis of the available other studies. The question posed in this paper is thus: is the Future Skills approach of the NextSkills study suitable for providing a conceptual analytical framework for the currently existing Future Skills studies and concepts?

First, a brief overview of the conceptual genesis of the term Future Skills is given (section 2). This is followed by a presentation of the state of research on Future Skills with regard to its implementation in higher education (Section 3). In order to present the Future Skills category framework for a comparison of Future Skills studies, the empirical method used to identify the 17 Future Skills profiles is then described and comprehensively presented in Section 4. In addition, the understanding of competences and the internal structure of the NextSkills model are presented. In a further step - section 5 - the Future Skills lists of the 12 existing Future Skills studies in German-speaking countries since 2016 are then assigned to the 17 profiles.

2 Future Skills in Higher Education

Research status and classification of a term with a short history but an enormous career

Research and practice on *Future Skills* for higher education are booming. The different conceptualizations and understandings that are emerging in the related discussion can be roughly divided into two directions: on the one hand, there is a general discussion of first professional and then specific higher education concepts in the area of conflicting priorities of the change from a "mimetic" (imitative) to a "transformative" (change-oriented) paradigm, which began in Germany in 1974 with Dieter Mertens and his concept of key qualifications ("Schlüsselqualifikationen") and is still being expressed internationally with continuing intensity in research work on the topic of *graduate attributes*. On the other hand - emerging since the 2000s - there is the discussion on the topic of *Future Skills* or 21st Century Skills.

The increasing relevance is reflected in the sharp rise in the number of publications on the topic over the last 15 years (see Ehlers 2020 for more details). In the background, there is an ongoing debate about employability, which has put the discussion about the educational function of universities on the agenda of higher education development, especially since the Bologna reform in Europe. While interesting in terms of higher education policy, the term is controversial in the professional debate. Teichler (2013: 35) concludes that the term "employability" is unfortunate in several respects, as it primarily addresses the exchange dimension (income, position, etc.), whereas the Bologna Process is primarily concerned with the use dimension of studies (independent action, etc.) and the employment dimension is only supplementary (also in detail: Schubarth & Speck 2014). In Germany - after key qualifications beginning with Mertens 1974 - the term key competences has been established since the 1990s (Kunze 2021), which is now being continued by Future Skills (Ehlers 2020), which can be understood as a specific profiling of action competences.

#Concept

From a conceptual point of view, Future Skills represent a selection of action competences that are important for the future. These, in turn, are defined as dispositions for action that are based on knowledge, enable skills, and are motivated by values and attitudes (for a definition of action competences, see also Heyse & Erpenbeck 2009). Based on these definitions, Future Skills are also defined as competences that enable individuals to solve complex problems in a self-organized manner in highly demanding contexts (see section 3.2 for a detailed definition). The starting point for the enormous career of the concept of Future Skills is the diagnosis that current concepts of higher education do not confront the pressing challenges of our societies with convincing concepts for the future (Hippler 2016; Kummert 2017) - neither the sustainable design of our environment nor the related social or economic challenges.

#Meaning

The importance of Future Skills can be stated for Germany specifically for the field of university graduates (Kunz 2021, Schlaeger & Tenorth 2020, Huber 2016: 106, 2019: 157, Ehlers 2020, Wild et al. 2018: 274) as well as for professional development (Agentur Q 2021, Kienbaum & StepStone 2021, Stifterverband & McKinsey 2018), also internationally (OECD 2018, World Economic Forum 2020, McKinsey Global Institute 2017, Ashoka & McKinsey 2018). Currently, there are 13 Future Skills studies for the german-speaking area since 2016 and at least 37 international studies (see Appendix I). General trend: Future Skills concepts also include digital competences, but place an emphasis on competences of a transversal nature (e.g., ethical competence, dealing with ambiguity, etc., see Section 3.2 for comprehensive details).

There are only few and non-systematic data on the current status of Future Skills in higher education, which mostly refer to general competence development, e.g. in the report "Bildung in D 2020" (Autorengruppe Bildungsberichterstattung 2020) as well as from the graduate panel of the DZHW (Fabian et al. 2021), the National Education Panel (LIfBi 2021), the project Digitales Deutschland (JFF 2021) or internationally from the PIACC studies (GESIS 2021). The reasons for this insufficient data situation lie in the complexity of measuring Future Skills (e.g., measuring creativity or ethical competence) and in the low level of maturity of the young and still developing empirical research.

Despite insufficient measurement methods, the international research literature describes in detail and with only a few discrepancies that universities are not sufficiently geared to Future Skills. Accordingly, it can be stated that there is a general deficit in the curricula of universities to align them with the promotion of competences that are particularly relevant to Future Skills. In the U.S. literature, the gap between skills demanded by the labor market and those taught in higher education institutions is supported by a number of empirical studies (e.g., Aasheim, Williams & Butler (2009); Cox et al. (2013); Koppi et al. (2009); Koppi et al. (2009). Koppi and colleagues (2009), Daud et al. (2011), and Finch et al. (2013) identified that employers placed the most importance on "soft skills" - academic reputation was ranked as least important. Rigby et al. (2009: 8) also speak of an "implementation gap" in this context, while Osmani et al. (2015: 367) refer to it as a "broad mismatch". According to Tran (2015), university graduates are poorly prepared for "Life Skills" because curricula are often outdated or irrelevant.

Term History

The terminology for Future Skills has been subject to a conceptually differentiated development within the last 20 years. In Germany, they have developed in the field of vocational training from key qualifications - introduced by Mertens in 1974 - to key competences also for higher education in an intensive debate within the 1990s to further concepts around core and key skills, which Echterhoff traces in detail in 2014. Internationally, Treleavan and Voola 2008 name eleven different terms: key skills, key competences, transferable skills, graduate attributes, employability skills (Curtis & McKenzie 2002), soft skills (BIHECC 2007; Freeman et al. 2008); graduate capabilities (Bowden et al. 2000); generic graduate attributes (Barrie 2004, Bowden et al. 2000); professional skills, personal transferable skills (Drummond et al. 1998); generic competences (Tuning Report 2008). Rigby et al. (2009) summarize these synonymously used terms under the umbrella term "graduate skills". They define these as skills that are not only relevant for professional development, but above all focus on personal development and the holistic education of the individual to become an engaged member of society (ibid.: 4).

An analysis of more than 50 existing approaches to Future Skills by Ehlers (2020) shows that they usually consist of lists of more or less important skills; however, the approaches are mostly not based on sound competence-theoretical approaches (Barrie 2004; Clanchy & Ballard 1995; Sin & Reid 2005, Ehlers 2020). Moreover, there is no empirical or conceptual modeling that would allow to critically classify the models in terms of their substance and scope. From the perspective of educational science, the character of arbitrariness can be stated for many of the approaches.

This paper aims at closing this currently existing orientation gap. For this purpose, a categorical framework is constructed, by means of which existing approaches can be divided into larger and well-defined fields of competence.

3 Construction of a general Future Skills framework model

The state of research shows that Future Skills are highly relevant for the future of universities, both curricularly and strategically for the profile of universities and their ability to make attractive offers for students. In order to take Future Skills as a starting point for curricular and strategic processes, an orientation within the currently existing approaches is necessary. Currently, there is no universal framework to compare Future Skills studies and the skills listed in them.

In the NextSkills study, such a categorical framework was developed for the first time. It was developed from an empirically qualitatively determined extensive inventory of Future Skills, which were grouped into thematic fields, so-called Future Skills Profiles. The fields constructed in this way serve as Future Skills Profiles within so-called reference competences are contained. This structure goes beyond a simple list of competences and, by defining profiles, offers the possibility of providing a framework for other existing lists and concepts. The derivation of the construction of this framework and its suitability for the currently existing studies on Future Skills will be examined in this paper. In the following, the development of the 17 Future Skills profiles will be explained methodologically, the underlying theoretical concept for action competences will be described and all Future Skills profiles with the corresponding definition will be explained.

3.1 Methodological design of the NextSkills study

The research project NextSkills aims to analyze which skills - i.e. Future Skills - are needed for a productive and proactive design of future life and work contexts in order to derive requirements for universities. The following questions guided the research:

- Is it possible to identify competences that are of great importance as Future Skills for a future successful and effective shaping of and participation in different areas of life - including economic, political, social and individual personal development?
- If so, what kind of competences are they and what characterizes them as Future Skills? How can they be described and justified in terms of educational theory? What are the components and sub-competences of these Future Skills?
- Do Future Skills function independently of each other, or should they be viewed as an interdependent group or constellation of competences?

To this end, Future Skills profiles were identified in a multi-step research process using a multi-method design.

1. Identification of Future Organizations: In a first step, Future Organizations were identified as an empirical field. These are organizations that already have explicit experience in the implementation of competency models, an idea of Future Skills and a high degree of maturity in the design of future work contexts. The selection process took place in 2015 as part of a competition in which over 8,500 partner organizations of the Baden-Wuerttemberg Cooperative State University were contacted and given the opportunity to submit their HR development concepts. 124 organizations took part in the competition. All submitted concepts were evaluated in a criteria-supported expert rating. The resulting ranking was discursively validated in a further discussion by 15 experts and 20 organizations and their competence concepts were selected for a shortlist. All 20 organizations were invited to participate in the next step of the NextSkills study and 17 were finally included in the interview study. The

interviews took place between December 2016 and June 2017.

2. Interview study: Guiding questions were developed for the interview study, which were used for orientation within the framework of an open, less structured, problem-in-depth interview. Participants in the interviews were the staff responsible for the *Future Organizations* and, in some cases, students who were studying there as part of (dual) degree programs. A total of 17 in-depth interviews were conducted, in which 20 people participated, resulting in approximately 700 minutes of qualitative interview material. The in-depth interviews were transcribed word-for-word and independently coded by two researchers using the inductive coding technique (Mayring 1996; Thomas 2006) using MaxQDA software (VERBI Software 2017). Constructs were extracted from the interview data to reconstruct contexts, values, and processes and dependencies for Future Skills considered important in individuals.
3. International Delphi study: In order to further refine and validate the qualitatively acquired results, a Delphi study was conducted with an international panel of experts. The Delphi study (for Delphi methodology, see Dalkey and Helmer 1963), entitled Future Skills - Future Learning and Future Higher Education (Ehlers and Kellermann 2019), included two rounds of interviews. Fifty-three international experts from different organizations and institutions were invited to participate in the study (ibid.).

3.2 The NextSkills concept with 17 Future Skills profiles

The results of the NextSkills study show: Future Skills can be identified, described and operationalized. Based on the in-depth interviews and the assessment of the experts surveyed worldwide, 17 skills profiles were constructed that represent the competences that are important for future university graduates. Each skills profile consists of a bundle of individual competences - so-called reference competences. Skills profiles are, as it were, clusters of future-relevant skills. They are in turn divided into three superordinate areas of competence.

The importance of Future Skills points to a change of state in higher education, in which the focus is no longer on the function of preparation through knowledge transfer, but on how students are supported in the development of Future Skills, i.e. dispositions for action and readiness to deal with complex, unknown problem situations through reflection, values and attitudes. Future Skills are defined as follows:

Definition: Future Skills are competences that allow individuals to solve complex problems in highly emergent contexts of action in a self-organised way and enable them to act (successfully). They are based on cognitive, motivational, volitional and social resources, are value-based and can be acquired in a learning process.

Section 2 already introduces that Future Skills are competence constructs with special content profiling (Figure 1). They enable individuals to act in highly emergent contexts. From the perspective of competence theory, the ability to act (fed by knowledge and further developed into skills) comes together with dispositions and willingness to act, which are primarily fed by values, motivational and habitual factors - in other words, personality traits.

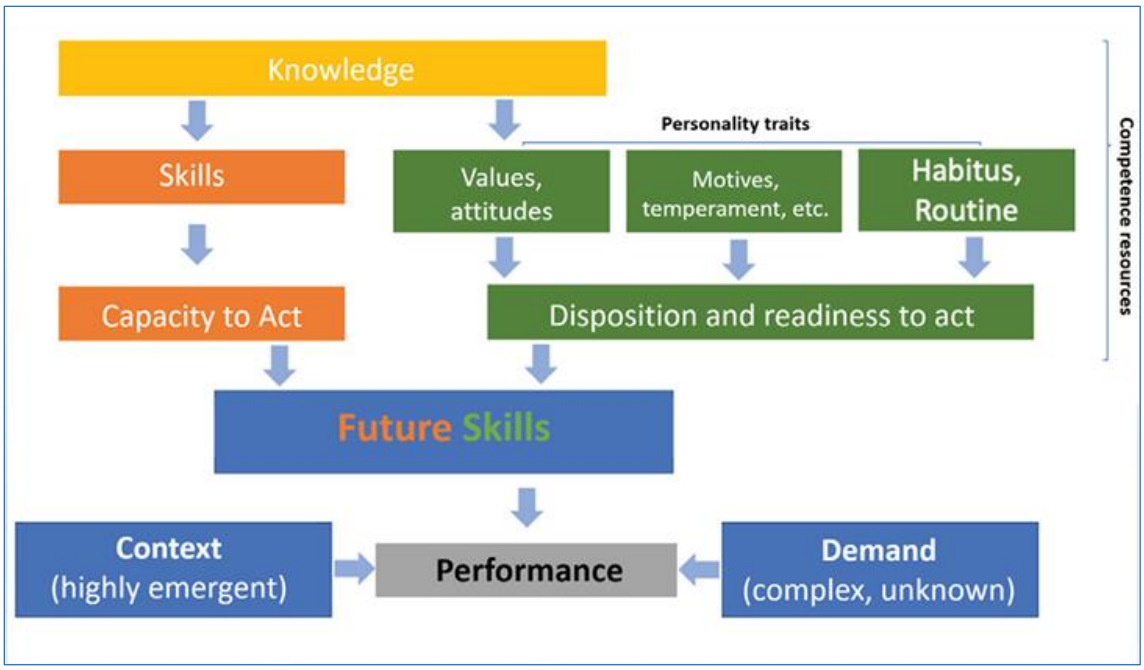


FIGURE 1: THE FUTURE SKILLS CONCEPT FROM A COMPETENCE PERSPECTIVE, © EHLERS

In terms and concepts, Future Skills can be distinguished from those competences that are not particularly future-oriented. The concept of emergence serves as a differentiating dimension between current or previous competence requirements and those that are relevant to the future: In particular, those contexts of activity that exhibit highly emergent developments in life, work, organizational and business processes require Future Skills to cope with the requirements. Emergence thus defines the dividing line that separates previous or traditional and future work areas. Since this boundary is not clearly schematic, but rather fluid, and many organizations are in transformation processes in which weakly emergent work contexts develop into highly emergent work contexts, the need for Future Skills is also an evolving area and not a binary state of either/or.

Emergence versus submergence is thus an important basic distinction for explaining the meaning of Future Skills. The NextSkills study shows that low-emergent (stable) professional action contexts change often, quickly, and with high intensity toward high-emergent action contexts. We speak here of the drift-to-self organization. This change corresponds to a change in the system state of organizations. It is triggered by changes in macro-, meso- and microsystems and reinforced by their interdependent constraints. In the resulting new system state, the system elements cannot be traced back causally or linearly to the previous state. The system condition of irreducibility and unpredictability applies. Analogous to actions within organizations, this description can also be applied to the private sphere of life and other fields of social action in general (for more details, see Ehlers 2020).

Future Skills profiles consist of bundles of individual related competences. A total of 17 such competency profiles can be reconstructed from the qualitative data (see Figure 2), which are presented and described below. The division into three competency fields, which are shown in the graphic as three subway lines of the Future Skills Map, follows the systematics of the so-called "Triple Helix Model" by Ehlers (2020). It is based on the insight that the skills required to cope with the demands of action

can be structured on the basis of three interacting dimensions, which are designated with specific terms in the triple helix model:

1. competences for learning and personal development: Individual-development-related Future Skills that relate to the ability to develop oneself as a person, referred to here as individual-development-related competences,
2. those Future Skills that relate to the creative development of solutions and the handling of subjects and work objects, work tasks and problems, referred to here as individual-object-related competences, and
3. those Future Skills that relate to dealing with the social, organizational and institutional environment in the sense of co-creation (Scharmer 2007), referred to here as organization-related competences.

The individual Future Skills named by the respondents can be conceptually located within this three-dimensional action space (Fig. 2).

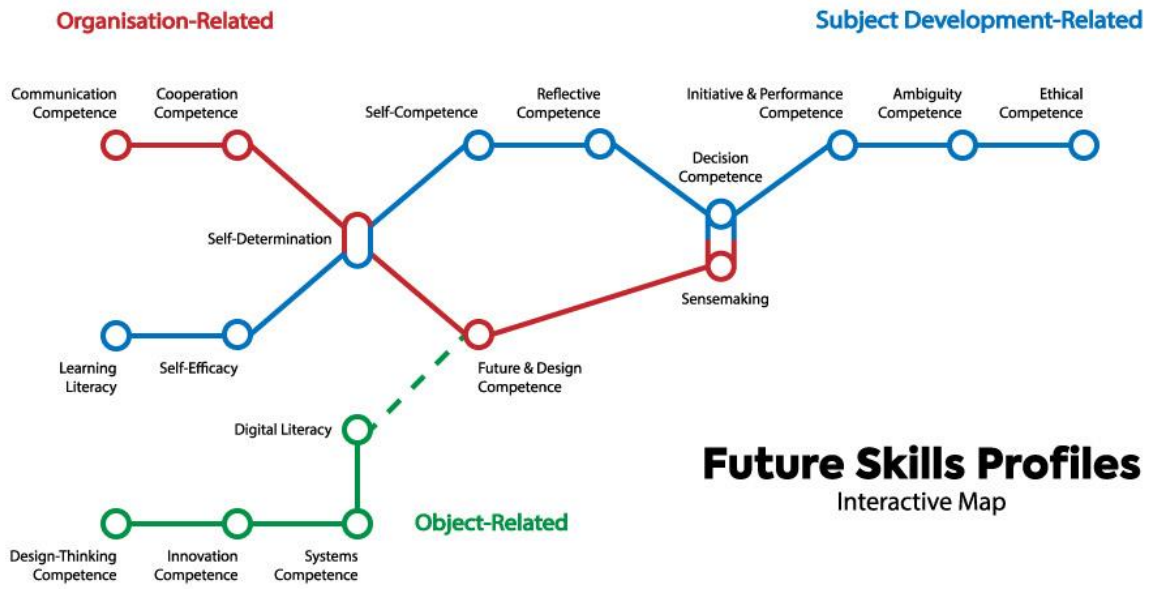


FIGURE 2: FUTURE SKILL-PROFILES OVERVIEW, © EHLERS

Table 1 provides an overview of the individual Future Skills profiles, the associated reference competences and the descriptions of the competency fields.

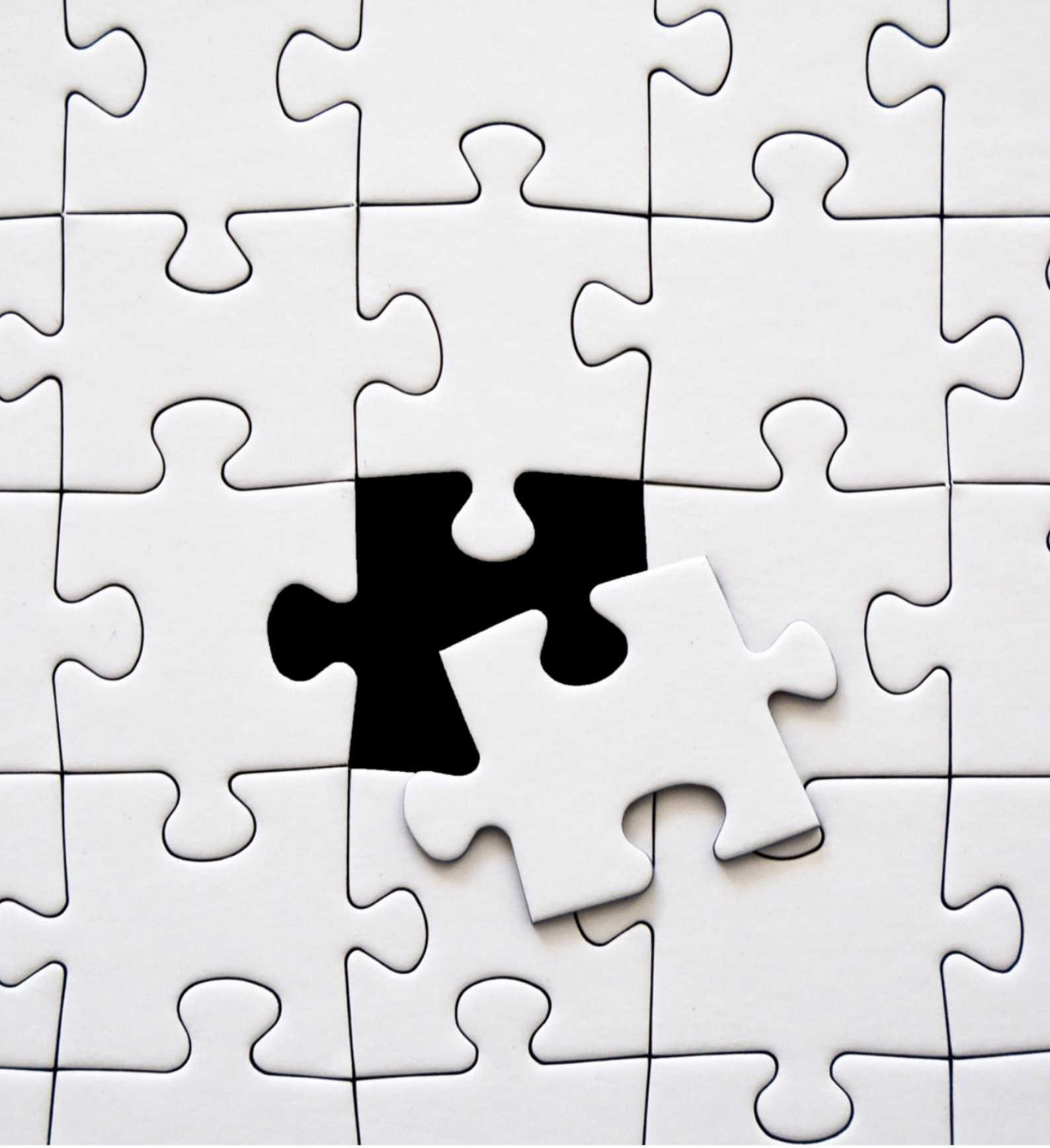
TABLE 1: FUTURE SKILLS COMPETENCE FIELDS AND PROFILES IN OVERVIEW

The 17 FutureSkills Profiles: Definition and related reference competences
Learning: Subject development-related competences Subject development-related competences entail the ability to be able to act from within oneself, engage in self-directed learning and development activities within a professional context. Autonomy, self-competence, self-efficacy as well as performance competence play an important role in this context.

1	**Learning literacy:** Learning literacy is the ability and willingness to learn in a self-directed and self-initiated fashion. It entails metacognitive skills as well.
	Reference competence(s): Self-directed learning, Metacognitive skills
2	**Self-efficacy:** Self-efficacy as a Future Skills Profile refers to the belief and one's (self-)confidence to be able to master the tasks at hand relying on one's own abilities and taking over responsibility for one's decisions.
	Reference competence(s): Self-confidence
3	**Self-determination:** Self-determination as a Future Skill describes an individual's ability to act productively within the field of tension between external structure and self-organisation, and to create room for self-development and autonomy, so that they can meet their own needs in freedom and self-organisation.
	Reference competence(s): Autonomy
4	**Self-competence:** Self-competence as a Future Skill is the ability to develop one's own personal and professional capabilities largely independently of external influences. This includes other skills such as independent self-motivation and planning. But also, the ability to set goals, time management, organization, learning aptitude and success control through feedback. In addition, cognitive load management and a high degree of personal responsibility.
	Reference competence(s): Self-management, Self-organisation competence, Self-regulation, Cognitive load management, Self-responsibility.
5	**Reflective competence:** Reflective competence as a Future Skill includes the willingness and ability to reflect, i.e. the ability to question oneself and others for the purpose of constructive further development, as well as to recognise underlying systems of behaviour, thought and values and to assess their consequences for actions and decisions holistically.
	Reference competences(s): Critical thinking, Self-reflection competence
6	**Decision competence:** Decision competence is the ability to seize decisions and to evaluate different alternatives against each other, as well as making a final decision and taking over the responsibility for it.
	Reference competence(s): Responsibility-taking
7	**Initiative and performance competence:** Initiative and performance competence refers to an individual's ability to motivate him-/ herself as well as to his/her wish of contributing to achievement. Persistence and goalorientation form the motivational basis for performance. A positive self-concept also plays an important role as it serves to attribute success and failure in such a way that the performance motivation does not decrease.
	Reference competence(s): (intrinsic) Motivation, Self-motivation, Motivation capability, Initiative-taking, Need/motivation for achievement, Engagement, Persistence, Goal-orientation
8	**Ambiguity competence:** Ambiguity competence refers to an individual's ability to recognize, understand, and finally productively handle ambiguity, heterogeneity, and uncertainty, as well as to act in different roles.
	Reference competence(s): Dealing with uncertainty, Dealing with heterogeneity, Ability to act in different roles
9	**Ethical competence:** Ethical competence comprises the ability to perceive a situation or situation as ethically relevant, including its conceptual, empirical and contextual consideration (perceive), the ability to formulate relevant prescriptive premises together with the evaluation of their relevance, their weight, their justification, their binding nature and their conditions of application (evaluate) and the ability to form judgements and check their logical consistency, their conditions of use and their alternatives (judge).
	Development: Object-related competences Individual object-related competences group together competences that refer to interacting with certain objects, topics, and tasks in a creative, agile, analytic fashion, and with a high degree of understanding of the system – also in highly uncertain and/or unknown environments.
10	**Design-thinking competence:** The Future Skill Profile Design Thinking competence comprises the ability to use concrete methods to carry out creative development processes open-endedly with regard to given problems and topics and to involve all stakeholders in a joint problem and solution design process.
	Reference competence(s): Flexibility and openness, Versatility, Ability to shift perspectives, Interdisciplinarity

11	**Innovation competence:** Innovation competence as a Future Skill Profile includes the willingness to promote innovation as an integral part of any organizational object, topic and process and the ability to contribute to the organization as an innovation ecosystem.
	Reference competence(s): Creativity, Innovative thinking, Willingness to experiment
12	**Systems competence:** Systems competence as a Future Skill is the ability to recognise and understand complex personal-psychological, social and technical (organisational) systems as well as their mutual influences and to be able to design and/or accompany coordinated planning and implementation processes for new initiatives in the system.
	Reference competence(s): Systems-thinking, Knowledge about knowledge structures, Navigation competence within knowledge structures, Networked thinking, Analytical competence, Synergy creation, Application competence, Problem-solving, Adaptability
13	**Digital literacy:** Digital literacy is the ability and disposition to use digital media, to develop them in a productive and creative way, the capacity to critically reflect on its usage and the impact media have on society and work, both for private and professional contexts, as well as the understanding of the potentials and limits of digital media and their effects.
	Reference competence(s): Media literacy, Information literacy
	Co-Creation: Organisation-related competences A third group of Future Skills Profiles entails all those competences that refer to interaction of an individual with his/her social, organisational and institutional environment. Amongst them are sensemaking and value-orientation, the ability to actively design future environments, collaborate and cooperate with others, to be able to communicate in a certain way, be open to criticism as well as to finding consensus.
14	**Sensemaking:** The Future Skill Profile Sensemaking comprises the willingness and ability to construct meaning and understanding from the rapidly changing structures of meaning within future work and life contexts, to further develop existing structures of meaning or to promote the creation of new ones where they have been lost.
	Reference competence(s): Meaning creation, Value orientation
15	**Future and design competence:** Future and design competence is the ability to master the current situation with courage for the new, willingness to change and forward thinking. To develop situations into other, new and previously unknown visions of the future and to approach these creatively.
	Reference competence(s): Willingness to change, Ability to continuously improve, Future mindset, Courage for the unknown, Readiness for development, Ability to challenge oneself
16	**Cooperation competence:** Cooperation competence is the ability to cooperate and collaborate in (intercultural) teams either in face-to-face or digitally-aided interactions within or between organisations with the purpose of transforming differences into commonalities. Social intelligence, openness, and advisory skills play a key role for this competence.
	Reference competence(s): Social intelligence, Team-working ability, Leader as a coach, Intercultural competence (organisational culture), Counselling competence
17	**Communication competence:** Communication competence as a Future Skill entails not only language skills, but also discourse, dialogue, and strategic communication aspects, which – taken together – serve the individual to communicate successfully and in accordance with the respective situation and context, in view and empathy of her/his own and others needs.
	Reference competence(s): Language proficiency, Presentation competence, Capacity for dialogue, Communication readiness, Consensus orientation, Openness towards criticism

The next step is to examine the extent to which the 17 Future Skills profiles of the NextSkills study are suitable for providing a conceptual framework for other currently relevant Future Skills studies.



4 Classification of existing Future Skills concepts within the general Future Skills framework

4.1 Comparison of research methods

There are currently 13 Future Skills studies available for Germany since 2016 and at least 37 internationally (see appendix). The general trend is that Future Skills concepts also include digital competences, but focus on competences of a transversal nature (e.g., ethical competence, dealing with ambiguity, etc.). They differ in focus, methodology, and orientation. For example, studies such as the D21 Digital Index (Initiative 21) are more focused on digitization, digital and media competences or digital skills. Stifterverband/McKinsey also focus on digital skills, but also include transversal Future Skills and so-called transformative skills.

		quantitative methods				qualitative methods				
		Quantitative expert survey	Stakeholder survey quant. Company	Stakeholder survey quant. Learners/ citizens		Expert interview qualitative	Focus Group	Delphi	Job advertisement analysis	Literature review
1	Ehlers 2020			(X)		X		X		X
2	Graf et. al. 2020							X		X
3	Stifterverband McKinsey 2018/21		X			X	X			
4	Handelsblatt 2021								X	X
5	Strametz 2020									X
6	Agentur Q 2021	X							X	
7	TH Nürnberg 2017	X		X						X
8	Stepstone/Kienbaum 2021		X							
9	GDI/Jacobs Foundation 2020	X								X
10	Sinus-Institut 2020			X						
11	Hays 2017			X						
12	ZiviZ 2020			X						X
13	bitkom 2017		X							

FIGURE 3: METHODS IN FUTURE SKILLS-STUDIES

In terms of methodology, Future Skills studies use forecasting methods to determine future skills requirements (Wagemann et al. 2018). Figure 3 provides an overview of the methods used. Most of the approaches use several methods, although only three of the studies use qualitative methods that are suitable for modeling future competence requirements inductively (exploratory qualitative interviews, Delphi or focus group methods). All other

studies use rather confirmatory approaches, which are based on already existing operationalizations by competence descriptions e.g. from job advertisements. The example of the study by Agency Q shows particularly well how the analyses of current job advertisements are used to try to identify those competences that are currently particularly important in certain industries (Agency Q 2021). While these methods can be easily operationalized empirically - and large amounts of data can be processed, especially with the help of machine learning methods - they tend to describe current skills requirements that are already relevant today. If, on the other hand, one wants to go beyond the requirements defined in job advertisements to determine what the contours of future forms of life and work and their competence requirements might look like, this can be done more by means of open and qualitative procedures such as expert and learner or employee interviews or other qualitative procedures such as data collection via focus group methods or Delphi procedures and subsequent inductive construct-forming data evaluation procedures. This is especially true for assessments of scenarios that lie in a more distant future. The distinction made by Niklas Luhmann (1976) with regard to the prognosis of the future is very appropriate here: Luhmann distinguishes between the future present and the present future. Present futures are projections in the form of utopias (based on e.g. qualitative construct-generating methods), future presences those that are predicted on the basis of technological, causal or stochastic connections of future events (e.g. job advertisement analyses).

A dimension not considered in the analysis of the methodological approaches, but also considered in a very heterogeneous way in all approaches, is that of the competence understandings and educational theoretical foundations underlying the approaches. They vary from a list of terms currently frequently found in job portals (Agentur Q 2021) to references to action competences and their components anchored in educational theory (Ehlers 2020). While all of the studies mentioned above refer thematically to Future Skills, the ethical heterogeneity and the different focal points therefore lead to different designations of Future Skills. Differently named Future Skills refer to actually similar competences. For example, the ability to change perspective is also referred to as flexibility and openness, or as in the NextSkills study with the Future Skills profile "design-thinking competence". The ability to deal with increasingly networked, often unclear and complex organizational roles is also included in some of the studies as an important future competence with different designations. In the NextSkills study, this competence is summarized with the label "ambiguity competence".

4.2 Content Comparison

In order to create a possibility to compare the lists of competences of the different existing Future Skills studies, a category framework is needed, with the help of which the similar but differently designated competences can be recorded and classified in terms of content. This framework must be broad enough to summarize the differently nuanced designations for similar or identical competences and differentiated enough to adequately discriminate different competences from one another. The category framework for the comparison to be made will be the approach introduced earlier in the NextSkills study with its 17 Future Skills profiles. The profiles contained in the study describe competency fields within which individual competences that are significant for coping with handling situations of a similar nature can be assigned as "reference competences". For the comparison of the Future Skills studies, the 17 Future Skills profiles (see Tab. 1) are therefore used in the following. The classification of the existing Future Skills studies is a qualitatively constructive act. Thereby, the necessity

of a qualitative content-analytical approach exists in a deductive, confirmatory way (according to Mayring 2005), insofar as competence designations from the 12 studies to be examined are always assigned to a competence profile if they refer to the ability to act, which is defined for the respective competence profile. These definitions were elaborated in detail in the NextSkills study and form the basis of the procedure (see Tab. 1 and in detail Ehlers 2020). In the process, a team of researchers with two researchers and a process of communicative validation attempted to increase intercoder reliability (Mayring 2008). Figure 4 serves to illustrate the process of mapping.

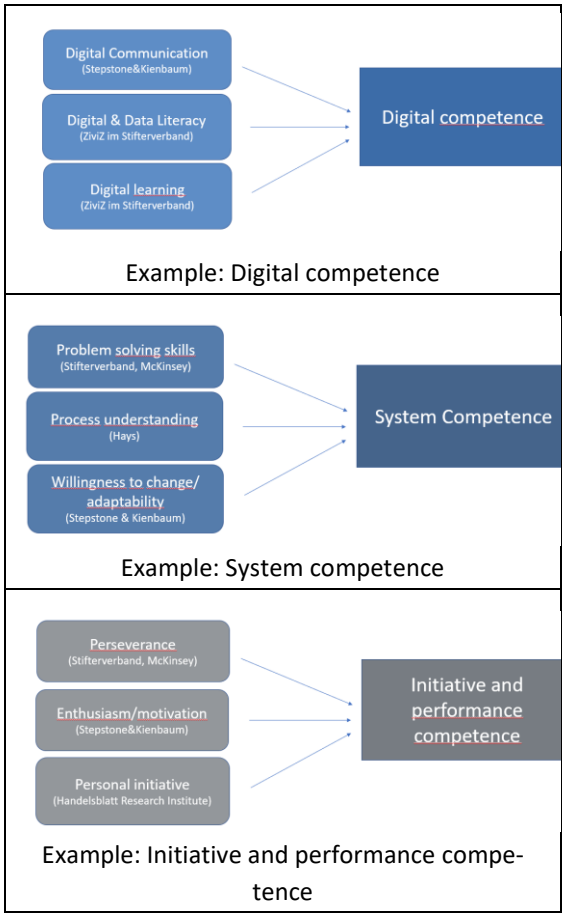


FIGURE 4: EXAMPLES FOR THE PROCEDURE OF CONTENT ANALYTICAL ASSIGNMENT

In order to process the 252 Future Skills terms and designations from the 12 german-speaking Future Skills studies analyzed, which were to be assigned to the 17 Future Skills profiles, the first step was to prepare lists of competences, if these did not already exist. These lists of competences were edited insofar as competency descriptions that were formulated multidimensionally, i.e. that encompassed several competences, were separated into their respective competency dimensions. In total, the 12 studies to be examined contain 252 different Future Skills differentiated in this way. These were then assigned to the 17 Future Skills profiles of the NextSkills study - analogous to the qualitative coding.

Nr.	Aktuelle Future Skills Studien / Future Skills Profile Next Skills Studie	Graf et. Al. 2020	Stifterverband McKinsey 2021	Handelsblatt 2021	Strametz 2020	Agentur Q 2021	TH Nürnberg 2017	Stepstone/Kienbaum 2021	Stifterverband McKinsey 2018	GDI/Jacobs Foundation 2020	Sinus-Institut 2020	Hays 2017	ZiviZ 2020	bitkom 2017	Matches TOT
	Anzahl Kompetenzen	*22*	*21*	*52*	*5*	*33*	*16*	*35*	*18*	*3*	*6*	*23*	*11*	*7*	*252*
	Zuordnungsquotient	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	
	Subjektbezogene Kompetenzen														
1	Lernkompetenz	x	x	x			x	x	x	x		x	x		9
2	Selbstwirksamkeit	x			x		x			x	x				5
3	Selbstbestimmtheit	x													1
4	Selbstkompetenz	x	x	x		x	x	x	x	x	x	x	x		11
5	Reflexionskompetenz	x	x	x	x		x		x	x	x		x		9
6	Entscheidungskompetenz	x			x	x	x	x*			x	x			7
7	Initiativ- und Leistunskompetenz	x	x	x	x	x		x	x				x		8
8	Ambiguitätskompetenz	x	x			x	x	x				x			6
9	Ethische Kompetenz		x	x	x										3
	Individuell-objektbezogene Kompetenzen														
10	Design-Thinking Kompetenz	x*	x	x	x	(x)		x	x		x		x		9
11	Innovationskompetenz		x		x	x	x		x	x					6
12	Systemkompetenz	x		x	x	(x)	x	x							6
13	Digitalkompetenz	x	x	x		x	x***	x	x		x		x	x	10
	Organistationsbezogenen Kompetenzen														
14	Sensemaking		x	x	x	x			x	x		x			7
15	Zukunfts- und Gestaltungskompetenz		x	x	x		x	x		x		x			7
16	Koopertationskompetenz	x	x	x	x	(x)	x	x**	x	x	x	x	x	x	13
17	Kommunikationskompetenz	x	x	x	x	x		x	x	x	x	x			10
	TOT	**13**	**13**	**12**	**12**	**11**	**11**	**11**	**10**	**9**	**8**	**8**	**7**	**2**	
	** Risikobereitschaft, ** virtuelle Kooperation, *** speziell für Künstliche Intelligenz*														0
	Zusätzliche Branchenbezogene Fachkompetenzen														0
	Fachkompetenzen					x	x								2
	Technologische Fachkompetenzen		x	x		x	x		x				x		6

FIGURE 5: COMPARATIVE ANALYSIS OF EXISTING FUTURE SKILLS MODELS (SEE APPENDIX FOR SOURCES)

The result shows that it was possible to completely assign all 252 competences of the 12 Future Skills approaches examined to one of the 17 Future Skills profiles of the NextSkills study. This is shown by the determined "assignment quotient", which indicates the percentage of assigned competences of the respective study (see Tab. 2). The assignment quotient was 100%, which means that all Future Skills designations were successfully assigned. The 17 profiles of the NextSkills study can serve as a framework model that enables a conceptual

categorical comparison of the Future Skills approaches examined.

On the basis of the assignments of the Future Skills designations from the 12 Future Skills approaches to be assigned, it can be determined that the profile designations formulated in the framework model are sufficiently precise to permit selective assignments and, on the other hand, broad enough to cover all the areas addressed in the Future Skills approaches.

Two of the Future Skills approaches examined list subject-related and industry- and/or occupation-related Future Skills in addition to Future Skills (Agentur Q and TH Nürnberg). These play a special role because, in addition to the overarching Future Skills, they can be understood in the future as important specialist competences in a particular industry or occupation. They are shown separately in the table and are not included in the classification process.

An analysis of the frequency of mentions within the respective Future Skills profiles reveals an accumulation in the following areas:

1. self-competence (10 mentions) and learning competence (8 mentions) in the individual-subject-oriented dimension.
2. digital competence (9 mentions) and design thinking competence (8 mentions) in the individual-object dimension
3. cooperation competence (12 mentions) and communication competence (9 mentions) in the organization-related dimension.

The Future Skills profiles Self-Determination (2) and Ethical Competences are those with the fewest mentions among the approaches examined.

The approach developed by the Stifterverband and McKinsey is already available in a second version. In the more recent version from 2021, a new dimension of Future Skills was added to the approach, the so-called transformative competences. However, it is not stated which method was used to determine the newly added Future Skills and which others were discarded.

4.3 Analysis of digitally related Future Skills

In five of the 12 studies examined, the area of digitally related Future Skills is particularly differentiated and forms a focal point. In this analysis, all digitally related Future Skills were assigned to the Digital Skills profile. However, since digitally related competences are of particular importance in many approaches and are also given special attention by specific guidelines and competency concepts for digitization, an additional, separate analysis is conducted here for these competences. The main focus here is on the question of content (which dispositions for action do the competences address?) and structure (which competency dimensions do the competences belong to?).

The four dimensions of Baacke's media competence approach (source) were used as analysis categories. These are suitable for an inter-competence comparison, since it is the only approach that contains both action dimensions, such as media use and media design, as well as analytical-reflexive dimensions. The four underlying competence dimensions are divided as shown in Table 2.

TABLE 2: MEDIA COMPETENCE DIMENSIONS ACCORDING TO BAACKE (1997)

A	Media Criticism	Critical examination of the content of media
A1	analytical	adequate comprehension of social processes
A2	reflexive	relate what has been analyzed to oneself and one's actions
A3	ethical	Clarification of the analysis and reflection on social responsibility

B	Media Studies	Knowledge about media and media systems
B1	informative	Knowledge of processes and structures, e.g. how journalists work
B2	instrumental-qualificational	Knowledge about the operation or technical handling
C	Media usage	Apply media and use interactive offers
C1	receptive, apply	Program usage skills, reception
C2	interactive, offer	interactive action - beyond receptive-perceptive use
D	Media design	Innovative, creative, aesthetic changes & developments
D1	innovative	Changes and further development of the media system
D2	creative	New, creative, aesthetic innovations

Within the 12 studies examined, a basic list was first compiled of all 93 competences that had been assigned to the category of "digital skills" in the first step of the analysis (see Fig. 5 for illustration). In most of the digital competences included in the studies currently available, it is noticeable that no clear definition is given for the digital skills listed (e.g., "cyber security" as a Future Skill). For this reason, a multi-step approach was used for the assignment. In a first step, those competences were assigned to the four dimensions and sub-dimensions of the media competence model that could be clearly assigned in terms of content. In the second step, those competences were assigned for which there were no direct equivalents in the media competence dimensions, for example, because they merely describe a topic area but do not represent a formulation of action competence (e.g., "cybersecurity"). These competences were understood as "application and implementation of concepts in the respective subject area". The topic keyword "cybersecurity" was interpreted as "application and implementation of concepts in the topic area of cybersecurity" and therefore assigned to category C1 (media use, receptive).

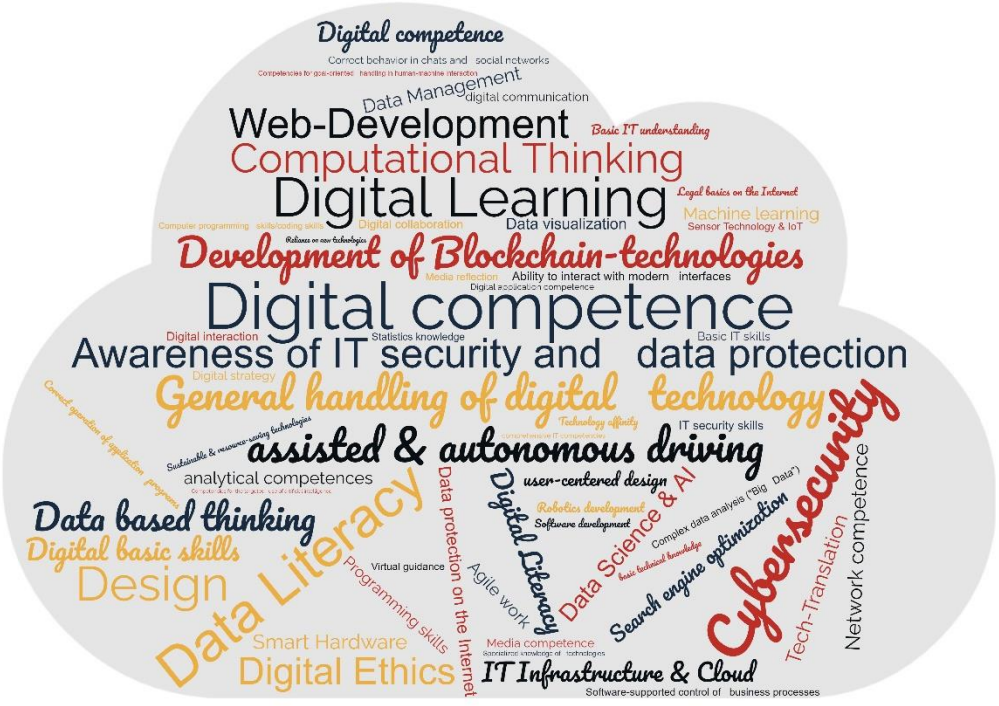


FIGURE 6: CLOUD OF TERMS IN THE FIELD OF DIGITAL LITERACY

This procedure made it possible to assign all 93 Future Skills in the area of digital-related competences.

Figure 7 shows the result.

	Bez.	Future Skills Approaches / Media competence Dimensions and sub	Description	Ehlers 2020	Graf et. al. 2020	Stifterverband McKinsey 2021	Handelsblatt 2021	Agentur Q 2021	TH Nürnberg 2017	Stepstone/Kienbaum 2021	Stifterverband McKinsey 2018	Sinus-Institut 2020	ZiviZ 2020	bitkom 2017	Nennungen TOT
Mediation	A	**Media Criticism**	Critical examination of the content of media												15
	A1	analytical	adequate comprehension of social processes	1			4					1	1	1	8
	A2	reflexive	relate what has been analyzed to oneself and one's actions	1			1			1					3
	A3	ethical	Clarification of the analysis and refexion on social responsibility	1		1		1			1				4
	B	**Media Studies**	Knowledge about media and media systems												23
	B1	informative	Knowledge of processes and structures, e.g. how journalists work	1			2			1				1	5
	B2	instrumental-qualificational	Knowledge about the operation or technical handling	1	1	2	3	2	1	1	3	1	2	1	18
Goal orientation	C	**Media usage**	Apply media and use interactive offers												42
	C1	receptive, apply	Program usage skills, reception	1	1	3	3	2	3	1	3		1	3	21
	C2	interactive, offer	interactive action - goes beyond receptive-perceptive use	1	1	1	5	1	2	3	3		3	1	21
	D	**Media design**	innovative changes and developments and creative aesthetic variations												13
	D1	innovative	Changes and further development of the media system	1		3	3		1	1	2				11
	D2	creative	"Going beyond the limits of the communication routine", aesthetic variants	1			1								2

FIGURE 7: A COMPARATIVE OVERVIEW OF DIGITAL FUTURE SKILLS

The analysis shows that there is an over-proportionally strong occupation of the media use dimension within the digitally related Future Skills. Almost every second of these skills falls into this area (42 out of 93). The dimension of media literacy is also strong, with a total of 23 out of 93 mentions. The focus here is on instrumental skills (18 mentions). Thus, in the present Future Skills approaches, such digital competences which refer to receptive and interactive usage competences as well as knowledge about media (informative sub-dimension) and instrumental-qualificational usage are most pronounced.

In contrast, reflexive-ethical aspects and the ability to analyze the social consequences of digitization, which are grouped together in the dimension of media criticism, are strongly underrepresented. In total, only 15 of the 93 mentions fall into the three sub-dimensions of media criticism: ethical (4), reflexive (3) and analytical (8). This paints a picture of skills approaches that are primarily focused on use and application and implementation (dimensions B & C), while a reflexive, questioning determination of the position of digital capabilities is not strongly reflected in the Future Skills approaches analyzed. Only Stifterverband (2021), Ehlers (2020) and Agentur Q (2021) explicitly mention ethical digital skills at all.

Finally, the fourth dimension, creative media design, is the weakest. This is actually about the ability to act in a reflexive and creative manner in order to be able to innovatively develop new creative solutions to previously unknown problems and to create developments that are also aesthetically pleasing. The sub-dimension creative media design (D2) is the weakest of all, with only two mentions. Innovative media design (D1) is more pronounced, with a total of 11 mentions.

In the area of digitally related Future Skills, the concepts examined - with the exceptions mentioned - can therefore be said to relate less to a creative, socially reflective and ethically sound approach to an uncertain digital future than to the use and application of existing concepts. Further development of digitally related Future Skills within the existing Future Skills approaches is therefore necessary, both structurally (to which dimensions of competence do the competences belong?) and in terms of content (to which dispositions for action are the competences directed?).

5 Conclusion

Current Future Skills studies and concepts can be described with the NextSkills model, which contains 17 profiles that form a framework concept for Future Skills. By dividing Future Skills into three dimensions of action - subjective - individual development-related skills, objective - task- and topic-related skills, social - world/organization-related skills - the NextSkills approach also goes beyond a static model of pure skills enumeration and definition.

The contribution takes place at the transition point of a concept change. Previous concepts such as 21st Century Skills or Sustainability Competences, which were used to describe key competences or transversal skills, are replaced by the concept of Future Skills. However, this term is not a conceptually rigid and unambiguously dimensioned term, but rather a collective category of such key competences, which are compiled as lists of different types and now stand for future competency concepts or "Future Skills".

The article presents the studies on this topic published in German-speaking countries within the last five years and analyzes them in their respective conceptual depth and definitional strength. In addition, a framework model is proposed, which can be used to classify all existing approaches. The classification into the categories or profiles of the NextSkills approach used for this purpose allows a complete assignment of all 252 Future Skills concepts.

The comparative analysis makes it possible to draw the following conclusions about the status of current Future Skills research:

1) **Heterogeneous and evolving field:** the term used in all the approaches under review is "Future Skill". However, it does not denote a clearly delineated and well-defined concept of skills, but rather describes a variety of key points and ideas about what skills people would need to possess in order to positively shape the future of their respective organizations or lives. In some cases, the respective approaches only mention topics or topic words instead of competences.
2) **Many approaches without a clear theoretical foundation for action:** Future Skills is an "emerging concept" for which there are only a few approaches to date with a theoretical foundation for action. The NextSkills study proposes such an action-theoretical foundation. The approach of action competence, which makes it possible to describe Future Skills as a set of selected action competences, is a path that can be consolidated in the future. Some of the concepts mentioned contain references or descriptions of the understanding of action competence in their respective publications. Overall, it could be cautiously formulated that Future Skills each represent a specific selection of action competences.
3) **Harmonization of the available approaches is possible via a category model:** The framework model presented here for Future Skills with 17 profiles is suitable for assigning the large number of different Future Skills and thus making them comparable. An analysis of the frequency of mentions within the respective Future Skills profiles reveals a clustering in the following areas:
    - Self-competence (10 mentions) and learning competence (8 mentions) in the individual-subject-oriented dimension.
    - digital competence (9 mentions) and design-thinking competence (8 mentions) in the individual-object dimension
    - Cooperation competence (12 mentions) and communication competence (9 mentions) in

the organization-related dimension.

- The Future Skills Profiles Self-Determination (2) and Ethical Competences (4?) are those with the fewest mentions within the approaches examined.

4) **Ideas about digitally related competences within Future Skills concepts diverse:** The analysis paid particular attention to digitally related Future Skills. Digital or technical skills will undoubtedly be an important Future Skills ingredient, but many of the Future Skills approaches examined lag behind existing comprehensive digital skills models in terms of concept breadth and depth. The analysis shows a wide range of more than 93 digital skill mentions, which are predominantly located in the area of use and conceptual knowledge about digitization, but not to the same extent in the critical reflection of the consequences of digitization or the creative redevelopment of digital work and life ecosystems.

5) **Education as a point of reference:** Almost all contributions on the topic of Future Skills lack a clear (educational) theoretical foundation of what constitutes competence or competence acquisition, which makes its use for educational processes difficult, arbitrary or impossible. At present, only the approach we have developed (Ehlers 2020) has an explicit theoretical foundation. Many of the topics or competences listed as Future Skills are identified without underlying personality and learning theories and refer exclusively to the cognitive domain.

All in all, Future Skills is a very dynamically developing concept that is suitable for promoting a new negotiation about future educational goals between universities, the labor market and society. The NextSkills framework can serve as a frame of reference.

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