

## Must the traditional key competences be extended?

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**Abstract:** *Soft skills or better key competences are getting more essential in normal working life. In Germany, nearly all universities have implemented key competences in their study courses. Human factors, skills, qualifications, and competences are defined, and the difference are shown. The traditional portfolio of the different key competences in Europe and of the OECD are explained. A practical portfolio of key competences at the Bochum University of Applied Sciences is described. It is divided into three main categories and 21 subcategories. It was very successful. Parallel a >learning id card< was designed for a better orientation. A test was designed for monitoring the selection of the different courses and also to monitor the progress of the competences. Later it was extended with an additional category founding a startup. The lectures of this category were not honored by many students. Today cyber-physical systems or the internet of things will be implemented in the normal working life. The implementation of a new section in the portfolio -computing and data- is discussed with the pro and con. New content will be defined.*

**Keywords:** *soft skills, key competences, portfolio, internet of things, cyber physical systems*

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### I. Introduction

In the present key competence and soft skills are getting more and more important in the whole life. It is a traditional portfolio of key competences that were trained. But today the world is changing very rapidly special in the world of computing. Today the internet and smartphones are a tool which is used by a lot of people. The development continues to artificial intelligence and the internet of things. In the future, these new fields will come more and more dominant and will take a not neglectable role in normal life. This means on the other hand, that you must get a basic knowledge of the mentioned fields. In this paper, a new section of key competences will be discussed.

### II. Basics

The term key qualifications were pushed by Mertens (Mertens, 1974) in Germany. Before we look at this development, for a better understanding some basic definitions must be made concerning knowledge, crafts, and skills and on the other side qualifications and competences.

The Organization for Economic Cooperation and Development (OECD) defined 2005 (OECD, 2005) knowledge and skills as essential components for full participation in society. In this context, an additional component is a craft, defined as basic manual skills. Participation does not mean that you can not only work in a normal but also a high sophisticated job with complex structures. In this case, you need more than only basic knowledge.

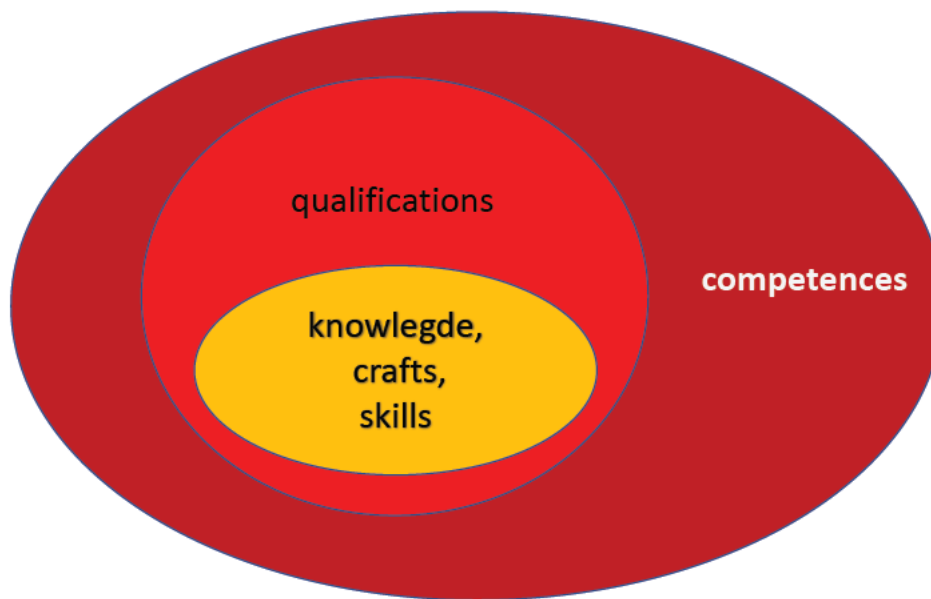
The definition of qualification which will be done now, to see the connection to knowledge, crafts, and skills. A representative definition is which has been analogously translated: Qualifications are knowledge, skills, crafts, which should be used for special tasks or jobs. Qualifications are determined from the view of external demands and not from the view of the individual person. They are ancillary to professional competences and professional decision-making and responsibility. (The original citation is: „Unter Qualifikationen werden Fertigkeiten, Kenntnisse, Fähigkeiten und Wissensbestände im Hinblick auf ihre Verwertbarkeit für bestimmte Tätigkeiten oder Berufe verstanden. Qualifikationen werden aus der Sicht der Nachfrage und nicht aus der Sicht des Subjekts bestimmt. Sie sind den beruflichen Kompetenzen und der beruflichen Handlungskompetenz untergeordnet bzw. sind als deren integrale Bestandteile zu sehen.“ (KOMNetz, 2006). Qualification is an expanded area and includes the other knowledge, skills, and crafts. Figure 1 shows the context.

How are qualification proofed? Normally there are interviews or written tests in a “silent” atmosphere. In the scientific world for example certificates are common to show the passing of the exam. Qualification can also be learned of an informal way without any training. In the working world qualification are used in a real environment.

In this context, competences are the keyword. The OECD defines competences: “A competence is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual’s knowledge of language, ICT (information and communication technique) and attitudes towards those with whom he or she is communicating.” (OECD, 2005).

One year later the European Commission of the European Union (EU) gives the following definition: “Competences are defined here as a combination of knowledge, skills, and attitudes appropriate to the context. Key competences are those which all individuals need for personal fulfillment and development, active citizenship, social inclusion, and employment.” (EU, 2006).

What does this mean? Competences can only be proofed in a real situation called performance exams. The requirement is a qualification. It must not be shined on a certificate (Weinert, 2002). You will get more transparency in the following example.

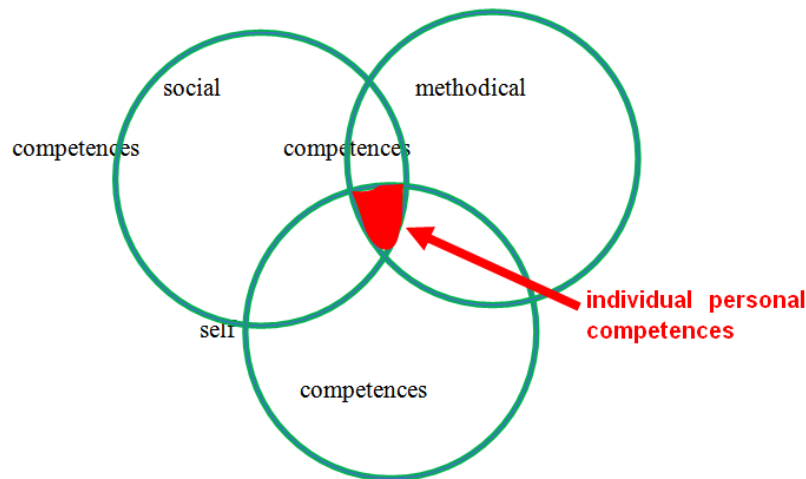


**Figure 1** Embedding of the different fields (adapted from Erpenbeck, 2009)

A typical example is writing a text in Word. The knowledge or skill is speaking and reading the used language and can move the fingers without any handicap. The next step is to learn writing fast with the help of all ten fingers. After learning this, a test is done to show how fast you can write and how many mistakes you made. This is the proof of the qualification. The performance test can look like this: At first, the question what a real situation is must be answered. In this case, the person could be a secretary typing a text. He must interrupt because there is a telephone call. After some minutes the chief is calling because the guests need more coffee. Someone visits the office and ask the person a question. Now a continuation of the writing is possible, and it should be without any delay. The time is running, because the CEO wants to have the contract soon and it should be without any mistake e. g. wrong paper, etc. .

The consequence is to prove competences to performance tests (Weinert, 2014). This means, if no real situation is available, you have to create an artificial situation.

Now the basic knowledge has been explained to understand what key competences are. Looking in the past the word key qualification was used. In 1974 Mertens (Mertens, 1974) published an article in which he uses the word key qualification and started a discussion on how relevant they are. Richter (Richter, 1995) defined different fields of key qualifications which are used for 20 years (figure 2):



**Figure 2** The basic dimensions of key competences (adapted Richter, 1995)

There are three different fields. Methodical competences, social (and also communicative) competences, and self-competences. The intersection are the individual personal competences, because the different fields are individually developed. In modern life all competence fields are necessary for good personal action in society. Richter spoke of key qualifications. In Europe, it is mostly spoken of key competences but in the American area, it is spoken of soft skills. It is a little bit embarrassing. Therefore, in this paper, we use the term of key competences.

Many institutions in Europe take this classification of dimensions as the basis for their further considerations. (e. g. Archan, 2002).

At the Bochum University of Applied Sciences, a so-called learning pass (see fig. 3) combined with a test was developed (with the help of the psychological department the Ruhr University) in which every field is divided in subsections. The individual development of this subsection at a person can be determined. By more diversification, the development cannot give selective results. In the following table all subsections are shown:

**Table 1** Different subsection of the learning pass

dimension	methodical competences	social competences	personal competences
subdimension	problem-solving	project-management	self-conscious
	time-based actioning	team-management	self-management
	presentation	sensitivity	one's initiative
	working strategies	intercultural attitudes	stress-management
	moderation	confessing	goal-orientation
	creative techniques	assertiveness	decision-making
	self-marketing		

A short definition of all subdimensions is given in the appendix.

In the test, the student makes a choice in a ranking from 1 to 5 how, in his opinion, the subdimension is distinctive by himself. He must be honest with himself. After 4 semesters and at the end of university time the test is repeated to see the progress. All results will be documented in the learning pass.

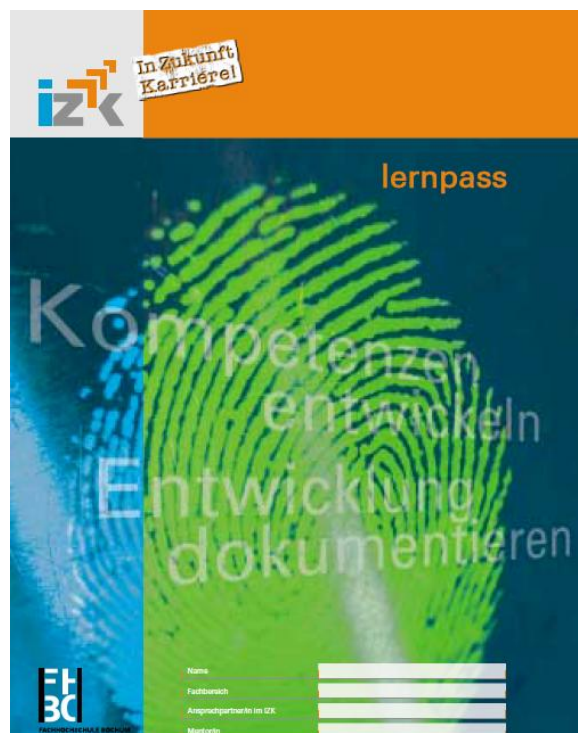


Figure 3 Front page of the learning pass

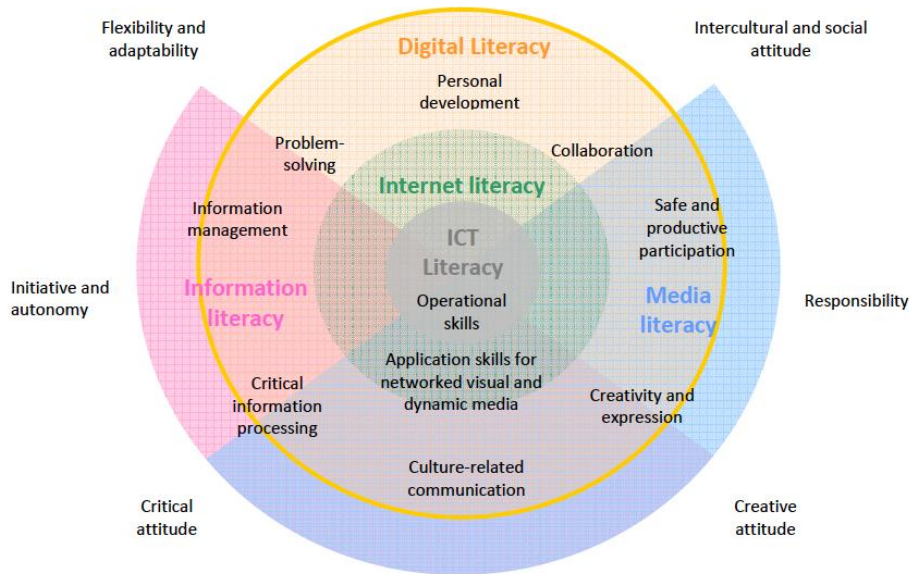
Erpenbeck(2013) expanded the model to the new dimension of intercultural competence. (Erpenbeck, 2013) This competence is compared with the model of Richter (1995)and the learning pass a cross-sectional dimension. Because of the relevance, another test was developed by the Steinbeis-University in Berlin called KODE®(Keim, 2009). The difference is that also an external person will give an assessment. The test will be not further explained here.

In the last century, an enormous development in computing has accelerated. Today the so-called deep learning is available. It is a machine learning base on artificial neural networks(Schmidhuber, 2015). Machines learn without the help of a human being. Computer lean to play chess and after some hundred games the computer has learned so much that every (!) human being will be beaten. The recent development of the last half year deep faking is new. The computer can make a conversation e.g. via Facetime or Skype with somebody that the person can not see that it is not the real person. The computer needs some pictures of the person and some talks. With this information, he can learn the full behavior and facial features to manage such a conversation.

In shorter cycles, new applications appear to manage normal life easier. Most of the people have their own computer at home. More than 85 % in the European Union of all households have a computer at home(Tenzer, 2019). 66 % of the people in the world possess a smartphone (Schobelt, 2017).

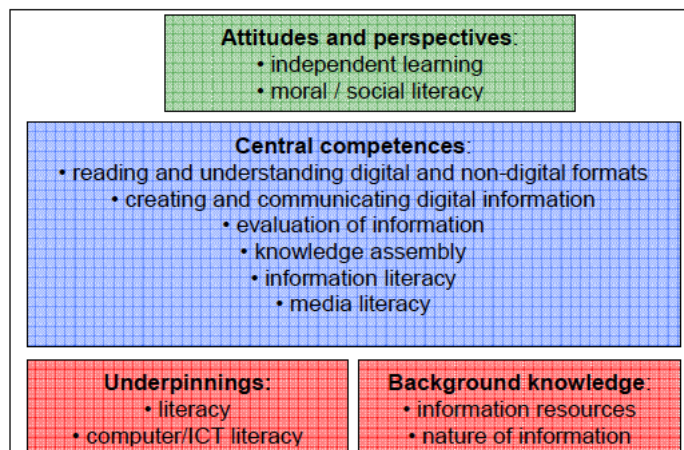
An indication that this dimension is getting relevant is that in Germany the banks give courses for older people in online banking. New competences in direction of ICT must be defined.

A good overview in my opinion about the whole landscape of ICT gives Ala-Mutka. (2011). He shows many key competences in the ICT-dimension. Some were older competences from the classical model of Richter (1995).



**Figure 4** Digital competences landscape for 21<sup>st</sup> century (Ala-Mutka, 2011, p. 44)

Ala-Mutka describes several models concerning ICT-competences. The best model, which can be combined with the traditional model describes Bawden by analyzing several other models (Ala-Mutka, 2011, pp. 45 - 52). The result is shown in figure 5:



**Figure 5** Model developed by Bawden (Ala-Mutka, 2011, p. 45)

The part “attitudes and perspectives” are in a way personal competence, which can be included in the traditional model. All other competences are a new dimension, which must be established. I think the portfolio shows it very well. Lifelong Learning, demanded by different organizations like the EU or OECD (OECD, 2005; EU, 2006, EU 2018), is one key to be on the top level of knowledge. The changes are very fast in this dimension.

With ICT totally new opportunities will be opened. E. g. crowd learning is a very new aspect (Jung 2019). Crowd learning is learning with the knowledge of the whole internet. These may be chats where you post a question or looking for knowledge that someone has posted like at YouTube. One hand it is more effective, but you need the information literacy for critical information processing (see fig. 4). Another comparable example is crowd development. LINUX is an open-source operating system that is very powerful and perhaps before Microsoft. The development costs are at a minimum compared to other operating systems because for the involved person it makes fun. This scenario can be transferred to crowd learning and as a consequence an easy way for lifelong learning (Hoffmann 2019, Moldoveanu 2019).

### III. Looking into the future

#### Sustainability

In the near future or perhaps today another new field has to be added to key competences. The attitude of mankind must change to keep the earth into a stable condition to survive. Already 2005 the OECD and European Union (EU 2006) claim sustainability in their paper. At this time a small group has already an attitude. In the last years particular in Europe sustainability comes more and more in the discussion. For example, "Fridays for Future, a movement with roots in Sweden (*Skolstrejk för klimatet*), which expanded in Germany a lot.

Sustainability cannot be integrated in one of the classic fields. There are methods like recycling or carbon footprint. Also, personal attitudes play an important role. It is very important to organize in a movement social skill. Out of these considerations, sustainability must be an own dimension within the field of soft skills. The BCG (Boston Consulting Group) Henderson Institute demands an optimization in social and business values in relation to sustainability (Yong, 2019). This famous consulting company sees a new area of business coming, where sustainability is one main part to create new business.

#### Operational Excellence

A second new dimension, which is demanded is economic skills. Both organizations (OECD 2005, EU 2006) are writing in their publication of this dimension. More and more in the economic world the expression of Operational Excellence (OPEX) defines the performance of a system mostly for economic processes (Mueller, 2020). The operation process from the customer to the customer should be optimized by three tools: lean management, supporting tools (like TPM) and homemade tools (Mueller, 2020). This kind of work, which is more than a method, can be transferred in not economic workflows like medical practice or taking care of older people. It will broaden more and more a wide field in the society. It is like project management a more social field, but with fixed tools or methods. Therefore, it is difficult to subsume OPEX in one classical dimension.

Readopting the thoughts of BCG in the last section OPEX and sustainability are two main columns in the business of the future. This is the indication to include in the near future or better soon these two dimensions.

### IV. Conclusions

Key competences are getting more and more relevant in the future. New dimensions like ICT must be integrated. The changes in the world will be faster and it is necessary to brace oneself to the future.

Therefore, new information must be received very fast and learning must be quicker. This can be done via ICT.

The two fields of sustainability and OPEX would be also a big task in the future. It must be integrated into the normal portfolio of school subjects and/or at university lectures. Sustainability is in a good way. For example, the Bochum University of Applied Sciences was one of the first universities, which implemented it as a normal course of study.

### References

- [1]. Archan S.;Tutschek, E. (2002): Schlüsselqualifikationen. Wien, Austria, ibw – Österreichisches Institut für Bildungsforschung der Wirtschaft, pp. 4 – 8
- [2]. Ala-Mutka, K. (2011). Mapping Digital Competence: Towards a Conceptual Understanding. Luxembourg:Publications Office of the European Union. Retrieved from <https://bit.ly/1p477BJ>.(access2020, Febr. 9)
- [3]. EU (2006): EMPFEHLUNG DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 18. Dezember 2006 zu Schlüsselkompetenzenfür lebensbegleitendes Lernen zu Schlüsselkompetenzenfürlebensbegleitendes Lernen .Brussels, Belgium, Amtsblatt der Europäischen Union, pp.394/10 – L394/18
- [4]. EU (2018): COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning. Brussels, Belgium, Official Journal of the European Union, pp. C189/1 – C189/13
- [5]. Erpenbeck J. (2013): Interkulturelle Kompetenz. In Bildung. Kompetenzen. Werte., Stuttgart, Germany,Steinbeis-Edition, pp. 439 – 466 Retrieved from <https://bit.ly/1p477BJErpenbeck, J.> (access 2014, July, 12)
- [6]. Hoffman, R.; Yeh, Ch.; Casnocha, B. (2019, March): Learn from People, Not Classes. Harvard Business Review, Retrieved as single paper from <https://hbr.org/2019/03/educating-the-next-generation-of-leaders> (access 2020, Febr. 19)
- [7]. Jung D. (2019, Oct. 4): Lebenslanges Lernen – aber wie?Retrieved from <https://www.xing.com/>, (access 2019, Oct. 10)
- [8]. Kein S.; Wittmann, P. (2009): Instrumente zur Kompetenzermittlung und -messung. Stuttgart, Germany, Steinbeis-Edition, pp. 415 – 441
- [9]. Moldoveanu, M.; Narayandas, D.(2019, March): The Future of Leadership Development. (Harvard Business Review, Retrieved as a single article from: <https://hbr.org/2019/03/educating-the-next-generation-of-leaders> (access 2020, Febr. 17)
- [10]. Richter, C. (1995): Schlüsselqualifikationen. Alling, Germany, Sandmann-Verlag, p. 38
- [11]. Schmidhuber J.(2015): Deep learning in neural networks: An overview. Neural Networks, pp. 85 – 117
- [12]. Schobelt, F. (2017, Oct. 6), :Weltweite Smartphone-Verbreitung steigt 2018 auf 66 Prozent. Retrieved from [https://www.wuv.de/tech/weltweite\\_smartphone\\_verbreitung\\_steigt\\_2018\\_auf\\_66\\_prozent](https://www.wuv.de/tech/weltweite_smartphone_verbreitung_steigt_2018_auf_66_prozent)(access: 2020, Febr. 5)
- [13]. Tenzer, F.(2017, Nov. 7): Anteil der Haushalte mit Computer in ausgewählten Ländern in Europa in den Jahren 2013 und 2017. Retrievedfrom<https://de.statista.com/statistik/daten/studie/20140/umfrage/anteil-der-haushalte-mit-pc-in-ausgewaehlten-laendern/> (access 2020, Febr 14)
- [14]. Young, D., Woods, W.; Reeves, M. (2019, June 27): Building resilient businesses, industries, and societies. Retrieved from <https://www.bcg.com/de-de/publications/2019/optimize-social-business-value.aspx>(access 2020, Febr. 15)



**Appendix**

In die appendix, a short definition of the different subsection will be given. Again, the table of the subsections:

**Table 2** Matrix of the subsection

dimension	methodical competences	social competences	personal competences
subdimension	Problem-solving	project-management	self-conscious
	time-based actioning	team-management	self-management
	presentation	sensitivity	one's initiative
	working strategies	intercultural attitudes	stress-management
	moderation	confessing	goal-orientation
	creative techniques	assertiveness	decision-making
	self-marketing		

Definitions:

**Table 3** Definitionsof the different subsection

subdimension	definition
problem-solving	ability to solve problems in a systematic way
time-based actioning	ability to act in relation to time in the right way
presentation	ability to present subjects in the right way to the spectators
working strategies	ability to find an adequate way to work effectively
moderation	ability to lead smaller groups to reach aims
creative techniques	ability to go new and self-invented way
self-marketing	ability to show their own qualities
project-management	ability to lead big or better big unique tasks to success
team-management	ability to integrate in teams
sensitivity	ability to detect hidden attitudes of others and acting in the right way
intercultural attitudes	ability to integrate into other cultural situations and attitudes
confessing	ability to convince by arguments and not force
assertiveness	ability to be stable against not constructive opinions
self-conscious	ability to represent the own opinion
self-management	ability to structure life in the adequate systematic time slots and acting
one's initiative	ability to act and do not react
stress-management	ability to organize their own human resources to avoid personal damage
goal-orientation	ability to analyze goals and acting in this direction
decision-making	ability to make decisions fast and not wrong

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