Resolution of the
148th Senate of the HRK
on 8 June 2021
Video conference

Utilising the momentum of digitalisation:

Appeal to the federal government and states to further develop digital teaching infrastructures

HRK German Rectors' Conference

The Voice of the Universities

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I. Introduction

The digitalisation of universities has experienced a considerable boost from the COVID-19 pandemic. At many universities, thousands of courses had to be digitalised and transmitted in parallel. University members have confronted the challenges of digitalisation at short notice and demonstrated extraordinary commitment. Many federal states have supported these efforts with emergency programmes, and some with long-term programmes. As a result of the stimuli provided, there has been considerable growth in personal digitalisation expertise and important starting points for improving digital infrastructures have been identified and addressed.

As learned from these experiences, it is important to utilise the momentum of a strong desire to take action[1] and to make teaching better and more modern following the return to face-to-face higher education. The further development of digital teaching content thus promotes innovation and the competitiveness of German universities. This requires an agreement between the federal government and states, for example in the form of a programme for digital teaching infrastructures or other suitable mechanisms.

On the basis of the HRK Senate resolution "Effective framework conditions for teaching and learning[2]," this paper defines key considerations for such an agreement. Particular attention is paid to personnel requirement: It is not only specialised IT personnel who are needed, there is also a requirement for experts in media didactics and course design who work with concepts, as well as the necessary continuing education.

The paper consists of two parts. The first comprises a resolution on an agreement between the federal government and states on the promotion of digital teaching infrastructures, and the second provides a derivation, allocation and technical explanation of the requirement.

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[1] Jäckel, Michael: "Im Wartestand" ("On hold") in: DUZ Magazin 02/2021, 19 February 2021, https://www.duz.de/beitrag/!/id/1013/im-maintained.
[2] Resolution of the Senate of the HRK on 16 March 2021: "Effective framework conditions for teaching and learning," https://www.hrk.de/positionen/beschluss/detail/gute-rahmenbedingungen-fuer-studium-und-lehre/.

II. Resolution

The HRK appeals to the federal government and states to promote the further development of digital teaching infrastructure in higher education on an ongoing basis within the framework of an agreement. Benchmark figures for proportional costs can be specified for the specific requirements regarding the further digitalisation of university teaching. This calculation is based on the adoption of the concept for a digitalisation allowance from the 2019 report produced by the Expert Commission on Research and Innovation (EFI). This allowance has been calculated to be €92 per student per year[3], resulting in a total of approximately €270 million per year for around 2.9 million students.

The HRK is calling for a base allowance of around €140,000 for each of the 390 universities within the framework of the corresponding agreement. This basic allowance serves to establish the basic prerequisites for the digitalisation of university teaching, irrespective of the size of the universities. It is intended to strengthen decentralised university locations and to improve their ability to cooperate with other universities. The sum of the basic allowances to 20 percent of the total sum.

The remaining 80 percent, around €220 million, is to be distributed according to the size of the university and the number of students. Based on experiences across universities, it is expected that 40 percent of the costs will be allocated to teaching, 30 percent to services and 30 percent to the derived infrastructure. This specifically entails the following:

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[3] "EFI reviewer Uwe Cantner, economics professor at the University of Jena, puts the allowance at €92 per person per year. For 2.8 million students, universities would receive €260 million per year (...)." In: Tagesspiegel, 15 March 2019, https://www.tagesspiegel.de/wissen/digitalisierung-auch-die-lehre-an-unis-soll-digitaler-werden/24105322.html (available only in German).

Table: **Calculation of the total sum and distribution among higher education sectors**

	Propor-tion	Costs
Total sum		
Digitalisation allowance of €92 per student per year		€92
Number of students (press release 11/12/20)		2,891,547
Total digitisation allowance		**€266,022,324**
Basic amount	**20%**	**€53,204,465**
Number of universities		390
Basic amount per university		€136,422
Digitalisation allowance minus basic amount	**80%**	**€212,817,859**
Digitalisation allowance per student (reduced due to basic amount)		€74
Distribution among higher education sectors	**100%**	**€212,817,859**
Digital learning and teaching (40%)	**40%**	**€85,127,144**
Add-on for classroom teaching, asynchronous/synchronous digital teaching, blended learning (e.g. inverted classroom)		
Teaching of individual digital sovereignty (digital literacy)		
Digital literature for teaching and studying		
Interactive learning environments		
Learning and campus management systems		
Software licences, including licences for authoring systems		
Studios, makerspaces, real-world laboratories		
Cameras, whiteboards, notebooks		
Open educational resources, micro-degrees and badges, MOOCs (possibly on the basis of cooperation)		
Student life cycle: Information portals, e-assessment, study services		
Personnel for didactic support and further training (possibly on the basis of cooperation)		
Teaching support services (30%)	**30%**	**€63,845,358**
Remote access, bring your own device		
Sync and share services, web-based office tools		
Integrated communication channels for video conferences, chats		
Interactive websites and forums		
Institutional digital sovereignty (possibly on the basis of coopera-tion)		
Overarching services/platforms (on the basis of cooperation)		
Services for academic work		
Cloud services (possibly on the basis of cooperation)		
Personnel and material resources for development, provision and operation (possibly on the basis of cooperation)		
Teaching support infrastructure (30%)	**30%**	**€63,845,358**
Information infrastructure		
Comprehensive local WLAN coverage		
Increase in bandwidths		
High-availability server and storage infrastructure		
Cloud strategies and cloud services (possibly on the basis of coop-eration)		
Information security: Awareness measures, personnel for computer emergency response teams (on the basis of cooperation)		
Material resources (including for licences)		
Personnel resources		

III. Derivation, allocation and technical explanation of requirements

1. Current state

The current state of digitalisation in higher education has been documented by numerous studies, the most important of which are mentioned in the following. The current state is also being discussed at the universities.

Before the COVID-19 pandemic had even begun, in 2019 the Expert Commission on Research and Innovation (EFI) noted that although universities attach great importance to digitalisation, the processes underlying it are hampered by increasing complexity and structural underfunding, among other things. In contrast to research, EFI sees a great need for action in teaching and services. EFI stresses the fact that the digitalisation of the structurally underfunded German higher education system is a long-term challenge that requires funding on a sustained basis. As a result, the recommendation is made that educational and higher education policy-makers support universities by introducing a digitalisation allowance.[4]

Similarly, independent of the COVID-19 pandemic, the 2019 Council for Scientific Information Infrastructures (RfII) focused on the academic job market in its recommendation paper on digital skills. It essentially states that, viewed as a whole, no personnel capacities will be freed up in publicly funded research as a result of the digital transformation. The RfII calls on central infrastructure sectors to employ more academically qualified personnel in order to further improve the quality of services. The dependency on non-university, often monopolistic services is also problematic. Finally, there are calls for comprehensive collective bargaining agreements for sectors that support academia which, in view of the competition with the private sector, will make it possible to employ specialised digital personnel.[5] This can be achieved by giving more consideration to the proximity of these service personnel to research.

In 2020, student digital change makers at the Higher Education Forum on Digitalisation (HFD) published the results of a student survey conducted prior to the COVID-19 pandemic. According to the survey, most students consider the digitalisation of almost all processes relevant to the organisation of studies and teaching to be important. It is worth noting that a clear majority of students prefer not to have to use private services for study purposes. As a result, almost all students attach great importance to the protection of personal data.[6]

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[4] Expert Commission on Research and Innovation (EFI), 2019, pp. 94,104, https://www.e-fi.de/fileadmin/Inhaltskapitel_2019/EFI_Gutacten_2019_B4.pdf.

[5] RfII - Council for Scientific Information Infrastructures: Digitale Kompetenzen - dringend gesucht! Empfehlungen zu Berufs- und Ausbildungsperspektiven für den Arbeitsmarkt Wissenschaft ("Digital skills - urgently needed! Recommendations on career and training prospects for the academic labour market"), Göttingen 2019, pp. 4, 8, 12ff, 18f, 20, 24, 27, 28f,
http://www.rfii.de/download/digitale-kompetenzen-dringend-gesucht/ (available only in German).

[6] Weisflog, W., Böckel, A. (2020). Ein studentischer Blick auf den Digital Turn – Auswertung einer bundesweiten Befragung von Studierenden für Studierende. ("A student's view

The digital summer semester in 2020 was the subject of various surveys and studies. Among these was a survey of experts conducted by HIS-HE in cooperation with the HFD and published in 2020. In view of students, an expansion of communicative, professional, technical and social support services is recommended. Most importantly, teachers and staff at support institutions require an improvement of the framework conditions in conceptual, legal and personnel terms. Finally, universities are considered to have increased resilience and agility, which appears to facilitate the development of a "blended university" in future.[7]

In addition, a number of smaller studies and individual reports were published during the COVID-19 pandemic. Based on a student survey at the University of Hildesheim, it is recommended that the infrastructure at universities be expanded digitally and analogously and that advisory services be enhanced. More staff capacity is required for these counselling services, which include technical as well as psychosocial and student advisory services.[8] Other reports criticise emergency remote teaching[9], emphasise the importance of rules for online events[10], indicate that even digital natives are not equipped with powerful end devices across the board[11], refer to the new role of (digital) attendance[12] and outline the leaps and bounds in the expansion of teaching concepts based on the research-based, structurally supported use of digital opportunities[13].

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of the digital turn - Evaluation of a nationwide survey by students for students.") Working paper no. 54. Berlin: Higher Education Forum on Digitalisation, pp. 7, 20, 22, https://hochschulforumdigitalisierung.de/sites/default/files/dateien/HFD_AP_54_Studierendenbefragung.pdf (available only in German).

[7] Funda Seyfeli, Laura Elsner, Dr Klaus Wannemacher: Vom Corona Shutdown zur Blended University? ExpertInnenbefragung Digitales Sommersemester ("From COVID-19 shutdown to blended university? Expert survey on the digital summer semester"), 2020, p. 88ff, https://www.tectum-elibrary.de/10.5771/9783828876484.pdf?download_full_pdf=1 (available only in German).

[8] Anna Traus, Katharina Höffken, Severine Thomas, Katharina Mangold, Wolfgang Schröer: Stu.diCo. - Studieren digital in Zeiten von Corona, Erste Ergebnisse der bundesweiten Studie Stu.diCo. ("Stu.diCo. – Studying digitally in times of COVID-19. Initial results of the nationwide study"), Universitätsverlag Hildesheim, 2020, p. 36, https://hildok.bsz-bw.de/frontdoor/index/index/docId/1157 (available only in German).

[9] Jürgen Handke: Asynchrone Wissensvermittlung – nicht nur in Corona-Zeiten ("Asynchronous knowledge transfer - and not just in times of COVID-19"), in: Ullrich Dittler, Christian Kreidl (eds.): Wie Corona die Hochschullehre verändert ("How COVID-19 is changing university teaching"), 2021, p. 398.

[10] Michael Mair: Lehren aus dem Sommersemester 2020 der FHWien der KKW ("Lessons from the 2020 summer semester at FHWien der KKW"), in: Ibid., p. 217.

[11] Gerhard Schneider: Von 0 auf 10 in 25 Jahren und von 10 auf 100 in zwei Wochen: E-Learning an der Universität Freiburg ("From 0 to 10 in 25 years and from 10 to 100 in two weeks: E-learning at the University of Freiburg"), in: Ibid., p. 153.

[12] See, for example, Götz Fabry: Die Lehre im Zeitalter ihrer technischen Reproduzierbarkeit. Wozu brauchen wir Präsenz? ("Teaching in the age of its technical reproducibility. Why does it need to be attendance-based?") In: Stanisavlejic, Marija, Tremp, Petert (eds.): (Digitale) Präsenz – Ein Rundumblick auf das soziale Phänomen Lehre ("(Digital) attendance – An all-round view of the social phenomenon of teaching"), 2020,. Lucerne: University of Teacher Education Lucerne, http://doi.org/10.5281/ zenodo.4291793, pp. 37-40, and Alexa Maria Kurz: (Online-)Präsenz als Schlüsselkompetenz ("(Online) attendance as a key competence"), Ibid, pp. 61-63.

[13] Sönke Knutzen: Hochschullehre in einer digitalen Welt – eine Skizze ("University teaching in a digital world – an outline"), in: Antje Mansbrügge (ed.): Lernen im Hochschulzusammenhang ("Learning in the higher education context"), Hamburg 2020, pp. 95-105.

2. Framework conditions for digitalisation at universities

Independently of the COVID-19 pandemic, universities had already initiated processes and built up the foundations of expertise and infrastructure as part of a general digital transformation. Although the pandemic has illustrated that students and teachers are very much willing to confront digital challenges, it has also become clear that the framework conditions required for the continued dynamic development of digital teaching do not yet exist.

The above studies and the specific lessons learned from the COVID-19 pandemic demonstrate that, as things stand, there is a need for action with regard to the digitalisation of universities, especially in the areas of teaching, services and infrastructure. These areas tend to overlap. Individual digital sovereignty (digital literacy) can be assigned to the area of teaching, the demand for institutional digital sovereignty to the area of services, and information security to the area of infrastructure. Furthermore, there are overarching factors such as continuing education, change processes, personnel, material resources, as well as governance and culture.

While these areas can be distinguished in analytical terms, in reality they are very much intertwined. Digitalisation in each of these areas requires concepts, organisation and technology. Either way, additional personnel will be needed for comprehensive conceptualisation and implementation processes, as well as sustainable operation.

Besides the resources required for digitalisation, the legal framework conditions are also vital. The federal government and states are called upon to create tariff structures that are appropriate to qualifications, suitable regulations on teaching hours and curricular standards, legal protection for digital examinations, appropriate regulations for data protection and more science-friendly copyright legislation.

This demonstrates that the digitalisation of universities entails more than a mere improvement of the IT infrastructure. Digitalisation extends beyond pure technology and is just as much about complexity management and a format for cultural change. Universities are also drivers of digitalisation in a societal context. This concerns education, research and innovation processes, as well as new job profiles and cooperation models.

In view of the additional resources required for digitalisation, collaboration should always be considered as a potential tool. This primarily applies to collaboration between internal university departments or faculties with regard to communication services, support structures or comprehensive campus management systems. Added value can also be achieved across universities with digital teaching platforms, cooperative task forces for information security or joint development of software and information services aimed at digital sovereignty.

These interdependent factors relating to digitalisation at universities are considered to the greatest extent possible in the specific requirements identified in the following. The main focus is on digital studying and teaching and, in turn, on teaching support services and the accompanying infrastructure; the three areas overlap to some extent.

3. Specific requirements

a. Digital learning and teaching

Based on the lessons learned from the COVID-19 pandemic, the following approaches to digital studying and teaching can be considered for the return to face-to-face higher education: As an add-on to attendance-based teaching, as asynchronous or synchronous digital teaching, within the framework of hybrid teaching formats or as a gradual shift in format for the purpose of blended learning. As evidenced by the period prior to and during the pandemic, it must be possible to adjust the balance between classroom and digital teaching formats and study structures at all times. This requires a versatile set of tools and constantly available support structures.

These tools include the further development of interactive learning environments and learning and campus management systems with a focus on use and application, the provision of electronic textbooks and licences for the relevant software. Both educational support and technical equipment are essential for the flipped or inverted classroom learning concept to be a low-threshold option. The technical equipment needed to support digital teaching includes the upgrading of local lecture rooms and the establishment of studios for recording and video communications, cameras, digital whiteboards, notebooks, licences for authoring systems for the creation of teaching and learning software, and the development of interfaces between the platforms used. Makerspaces[14] and real-world laboratories[15] can also be set up, especially in technical and scientific fields of study. Generally speaking, digitalisation entails setting up new digital workplaces and learning spaces. This must be taken into account in university construction.

Open educational resources are an extension of the concept of digital learning media, which are based on cooperative development processes and can thus define and make learning more dynamic.[16] In promising configurations, resources can be used for micro-degrees and badges[17] as

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[14] Makerspaces are openly accessible high-tech workshops with access to state-of-the-art machines, tools and software, https://www.unternehmertum.de/en/services/makerspace.
[15] Real-world laboratories (or living laboratories) are a new form of partnership between science and civil society that focuses on mutual learning in an experimental environment, https://en.wikipedia.org/wiki/Living_lab, https://www.uni-ulm.de/mawi/reallabor/ (available only in German).
[16] Senate Resolution on Open Educational Resources (OER), resolution passed by the 132nd Senate of the HRK on 15 March 2016 in Berlin, https://www.hrk.de/fileadmin/_migrated/content_uploads/Beschluss_HRK-Senat_zu_OER_15032016.pdf.
[17] Micro-degrees and badges as formats of supplementary digital credentials, Recommendation of the 29th General Meeting of the German Rectors' Conference (HRK) on 24 November 2020,

well as MOOCs[18]. Given the high level of resource requirements, interdisciplinary and inter-university cooperation is key here.

The added value generated by digitisation is evident throughout the student life cycle. In the transition from school to university, digital information portals and online assessments or remote examinations can be used in the context of application and admission procedures. The same applies to the advancement of mobility and internationalisation. Digital teaching can overcome distances, language barriers, time constraints and heterogeneity associated with international teaching partnerships. The associated digital processes and platforms for the exchange of performance and module data must also be established in this regard. All in all, students expect to see comprehensive digitalisation of study services. This includes timetables and room plans, ordering teaching materials, enrolment and disembowelment for the semester, consultation hours and examinations, notifying students of examination results, as well as requesting and receiving certificates.[19] This demonstrates that administrative processes also need to be digitalised further.[20]

Support structures for both students and teachers are indispensable when it comes to the use of digital formats. Students and teachers need practical educational and professional support as well as technical support that is, ideally, available at all times. This support may be located in media centres, centres for higher education teaching, libraries or self-governance student bodies. Continuing education can also be offered in these locations. The added value of resource-saving, overarching cooperation on the one hand and the proximity of decentralised services on the other must be taken into account when deciding on the location for these support structures. The additional personnel required to further develop support should have qualifications that are academic or linked to academia and, in the interest of ensuring an efficient and stable support structure, be given moderate qualification positions.[21]

b. Digital services to support teaching
Further expansion of digital services is needed for the digitalisation of universities. A distinction can be made between digital generic IT services, digital scientific services and cloud services.[22] As is the case for digital

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https://www.hrk.de/fileadmin/redaktion/hrk/02-Dokumente/02-01-Beschluesse_/recommendation_Micro_Degrees_and_Badges_HRK_MV_24112020.pdf.
[18]The potential and problems of MOOCs. MOOCs in the context of digital teaching, Beiträge zur Hochschulpolitik 2/2014, ed. HRK, Bonn, June 2014,
https://www.hrk.de/uploads/media/2014-07-17_Endversion_MOOCs.pdf.
[19] The above refers exclusively to purely internal university administrative processes. Furthermore, standardisation is required in the communication with state examination offices (state examinations), in the BAföG application process and in cross-university administrative processes (for example, when a student teacher studies one subject at an college of art or music and another at a comprehensive university).
[20] For example, digital document management systems and electronic invoice processing are important for administrations. There is an urgent need for action as a result of the requirements of the Online Access Act (OZG).
[21] RfII - Council for Scientific Information Infrastructures: Digital skills, pp. 19, 27.
[22] Konrad, Uwe; Förstner, Konrad; Reetz, Johannes; Wannemacher, Klaus; Kett, Jürgen; Mannseicher, Florian (2020): Position paper: Digitale Dienste für die Wissenschaft (Digital services for academia), p. 7, http://doi.org/10.5281/zenodo.4301924.

teaching, there is also a need recruit staff for operation as well as maintenance and further development or service provider management. The establishment of fail-safe backup structures should also be considered for all services.

Digital generic IT services, which are particularly important for digital teaching, must be expanded. These primarily concern the transfer, storage, processing, sharing as well as the archiving and retrieval of data. Synch and share services, including web-based office tools that enable people to work on texts together in real time, are key to collaborative work. Remote access is imperative, as is the ability to use proprietary systems on campus (bring your own device). Other services include integrated communication channels for video conferencing, instant messaging tools and interactive web pages or forums.[23] In this regard, authentication and authorisation services[24] must also be further expanded.

Up to now, all of these services have been dominated by commercial web offerings, resulting in the challenge of establishing the institutional digital sovereignty demanded by students on the basis of university services in particular. The development, promotion and provision of these services should, as far as possible, take place in a manner that conserves resources, i.e. on a cross-university basis. In this context, joint offers or platforms or the involvement of service providers, provided that compliance requirements are met, are also conceivable.

The development of digital academic services that provide environments, tools and solution components for scientific work primarily pertains to research processes[25], however, it is also of relevance to students in view of theses and to teachers due to the unity of research and teaching.

For the sake of establishing cooperative service structures, the cloud service approach to self-sufficiency should also be pursued to ensure constantly available access to shared pools of configurable resources and IT services. This kind of online service enables IT resources to be used in a flexible and scalable way.[26]

c. Digital infrastructure to support teaching
The need for digital teaching and digital services is associated with secondary requirements for digital infrastructure, which in turn relies on additional resources for staff, equipment and investment.

In the case of the direct information infrastructure, the aim is to significantly expand the existing range (e-books, e-journals, databases, software, tutorials and tools for self-study to accompany lectures). Joint

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[23] Ibid., p. 12.
[24] For example, the service "DFN-AAI", which provides video conferencing services, access to national licences of the DFG and other platforms. See ibid, p. 11.
[25] This refers, among other things, to services relating to collaborative work and domain-specific academic services. See ibid, p. 12f.
[26] Ibid., p. 7.

licensing via the regional consortia of the libraries is often an option in this case.

The further development of digital teaching also encompasses comprehensive local WLAN coverage on campus, as is now expected by all students. In this regard, a consistent increase in bandwidths is also necessary to enable more working from home, higher usage figures and, not least, larger data volumes. This requires more powerful backbone networks as well as increased firewall, router and switching capacity.

Digital services are also dependent on an improvement in digital infrastructures. A powerful and high-availability server and storage infrastructure is needed. Virtual services need to be scaled for higher usage figures. Added to this are material resources, e.g. in the form of licences, and personnel resources for operation, maintenance and further development. These resources are also required for the implementation of cloud strategies or cloud services.

As digital infrastructure is increasingly exposed to real dangers and risks, such as professional cyber attacks, improving information security in the interest of cyber resilience is gaining importance. Information security requires, among other things, the establishment of information security concepts, awareness measures and the development of computer emergency response teams (CERT). Improving information security is a major challenge and can usually only be tackled through partnerships, i.e. on a cross-university basis. Above all, however, additional personnel are also required for the respective proportions of partnerships.[27]

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[27] See Information security as a strategic task for leaders of higher education institutions, Recommendation of the 25th HRK General Assembly dated 6 November 2018, https://www.hrk.de/positionen/beschluss/detail/informationssicherheit-als-strategische-aufgabe-der-hochschulleitung/.