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Digitalisierung

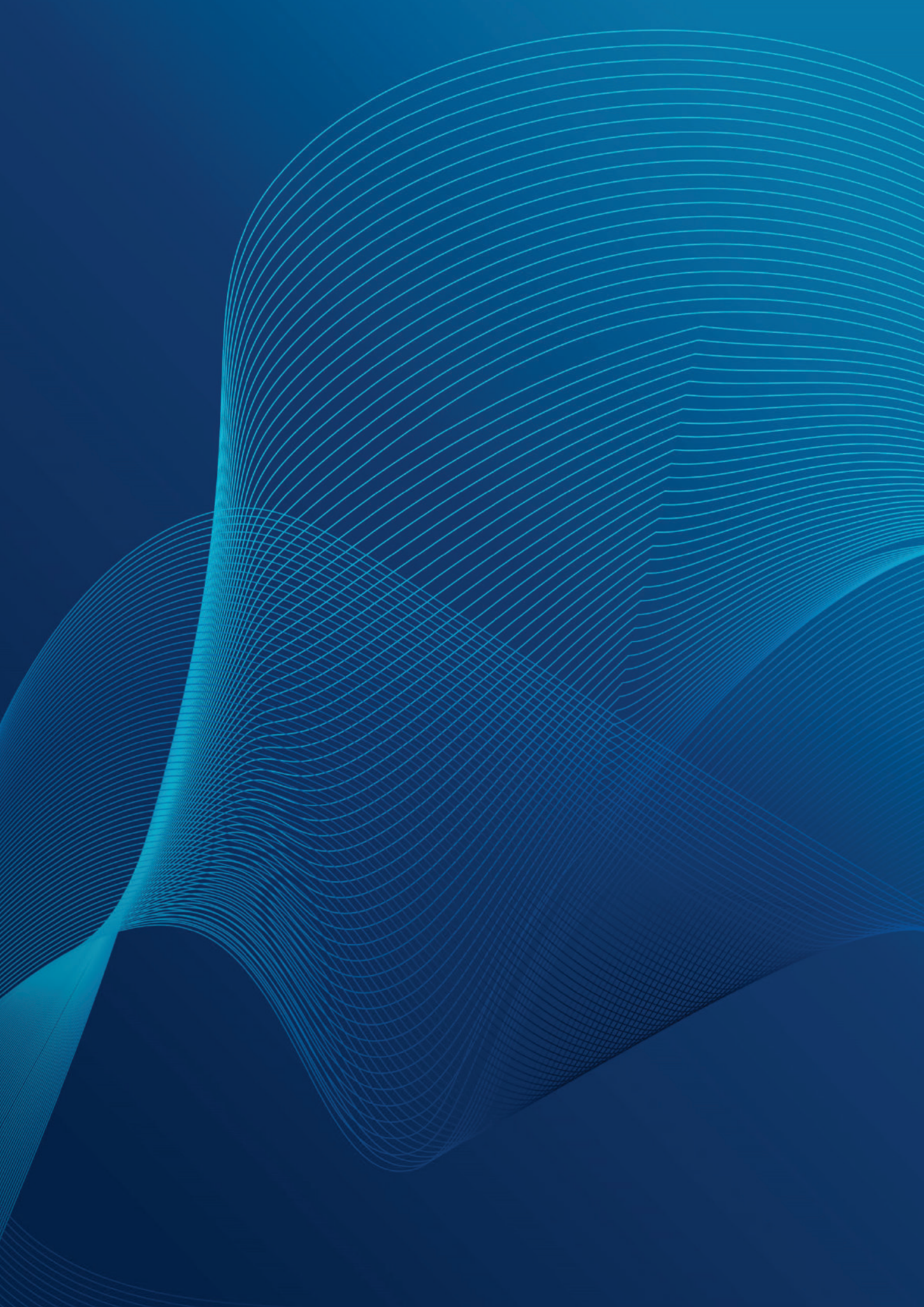
NO. 51 / DECEMBER 2019

Strategies Beyond Borders – Transforming Higher Education in a Digital Age

Book of Abstracts

In cooperation with

DAAD Deutscher Akademischer Austauschdienst
German Academic Exchange Service



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Index

Hochschulforum Digitalisierung (HFD)

Hochschulforum Digitalisierung (HFD) orchestrates the discourse on higher education in the digital age. As an innovation driver, it informs, advises and connects stakeholders from higher education institutions, politics, business and civil society.

Founded in 2014, HFD is a joint initiative by Stifterverband[1], CHE Centre for Higher Education[2] and the German Rectors' Conference (HRK)[3]. It is sponsored by Germany's Federal Ministry of Education and Research (BMBF).

Further information is available at https://hochschulforumdigitalisierung.de/en.

German Academic Exchange Service (DAAD)

The German Academic Exchange Service (DAAD) is a joint Organisation of German institutions of higher education and their student bodies, devoted to internationalising the academic and scientific research system. With the scholarship programmes, the DAAD enables students, researchers and university lecturers to take advantage of the best study and research opportunities available.

It promotes transnational cooperation and university partnerships, German studies and the German language abroad, assists developing countries in establishing effective universities and advises decision makers on matters of cultural, education and development policy.

The DAAD also represents the German National Agency for EU higher education cooperation. Since it was founded in 1925, around two and a half million scholars in Germany and abroad have received DAAD funding.

Further information is available at https://www.daad.de/en/.

[1] https://www.stifterverband.org/english
[2] http://www.che.de/cms/?getObject=302&getLang=en
[3] https://www.hrk.de/home/

Introduction

Convinced that Higher Education Institutions need strategies for teaching and learning in a digital age, the German Academic Exchange Service (DAAD) and Hochschulforum Digitalisierung (HFD) merged expertise for jointly hosting the international conference "Strategies beyond Borders – Transforming Higher Education in a Digital Age" at Allianz Forum next to the iconic Brandenburg Gate in Berlin.

HFD and DAAD support Germany's academic institutions in their strategic development through a variety of programs. In this context, digitalisation is viewed as an opportunity for more collaboration on both national and international level, creating stronger networks, and effecting a shift from teaching to learning, putting the individual learner at the centre.

Initiatives such as "Bologna Digital" have recently sketched out potential approaches towards new visions for higher education in the digital age that focus on innovation through collaboration and a learner-centred higher education that make the best use of digital technologies.

In order to discuss innovative and transferable strategic approaches on different levels and especially across and beyond borders, DAAD and HFD welcome you to our first joint international conference. We hope to set a good example of reaching more impact through cooperation and collaboration. The conference will offer a variety of contents and formats which aim at providing new insights and orientation to higher education institutions and other stakeholders on strategies for transforming higher education in a digital age.

We have received significantly more suggestions for contributions to this event than we were able to consider and are confident that we have made a good selection of outstanding examples of good practice, strategic approaches as well as strong,
learner-centered and technology-focused initiatives.

We would like to invite you to join us at the interface of internationalisation and digitalisation on the path towards actively shaping the digital transformation of higher education. We encourage you to use the examples presented in this Book of Abstract as well as the workshop results from the conference and the ideas of your joint discussions to build even stronger partnerships.

We are happy to pave the ground with you for further cooperation that go beyond institutional, regional and national borders.

Florian Rampelt
HFD

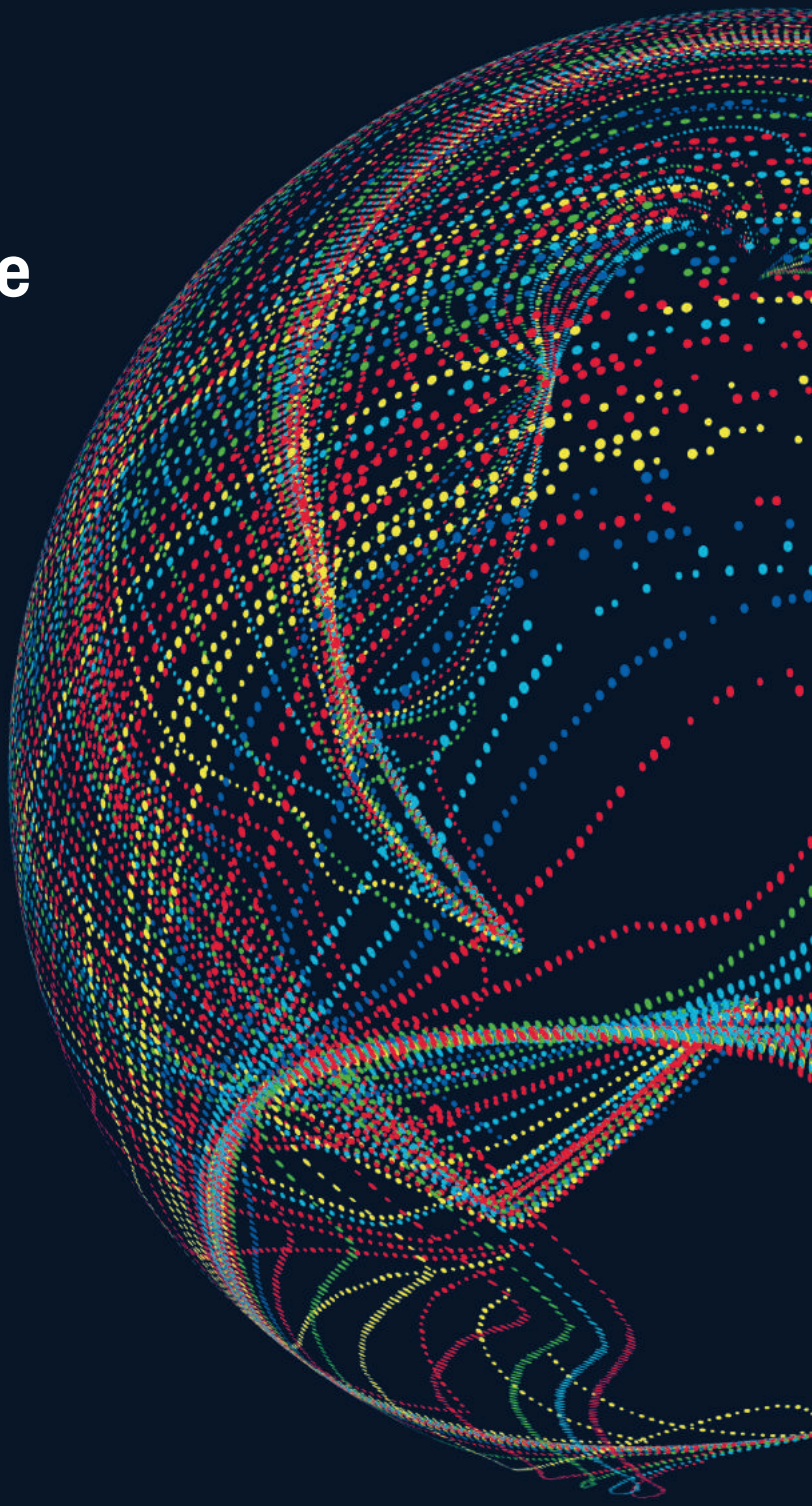
Barbara Wagner
HFD

Alexander Knoth
DAAD

Saskia Weißenbach
DAAD

The Conference in Numbers:

4	Keynotes
5	Live Demos
6	Workshops
14	Posters
37	Presentations
>350	Participants



Grand Strategy for Higher Education's Grand Challenges

Susan Grajek, Vice President Communities and Research, EDUCAUSE

The many recent advances in information technology have reshaped products, services, and professions, as well as the way we live our daily lives. Higher education is no exception to the impact of IT, although in many ways our industry has remained relatively insulated. No longer.

Higher education leaders are beginning to recognize the opportunities digital transformation affords to improve student outcomes, transform teaching, learning, and research, and foster new business models. Yet the concept is vague, the potential outcomes uncertain, and the actual work of digital transformation a black box.

A Grand Strategy approach can help college and university leaders focus their digital transformation on the highly difficult challenges that are widespread throughout higher education. This session considers science's Grand Challenge approach in concert with the politico-military concept of Grand Strategy. Together, they can help colleges and universities take a focused, long-term, and integrated approach to higher education's seemingly intractable challenges.

A European Education Area fit for the Digital Age

Themis Christophidou, Director-General for Education, Youth, Sport and Culture, European Commission

The European Education Area to be created by 2025 needs to be fit for the digital age. Technological progress and innovation are continuously changing the ways in which we learn, work and live. As traditional careers and ways of working are being transformed, higher education institutions have a key role to play in providing their students with the right skills to be successful in thriving in such societies.

Digital transformation will pave the way to the universities of the future, which will be inclusive, promote brain circulation, develop a skilled workforce, and perform cutting-edge research to strengthen EU's competiveness and capacity to tackle global challenges. In order to adapt, transformational changes are required at all levels: EU, national and higher education institution level.

At European level, the focus is threefold: to support the development of digital competences of students by teaching new subjects (such as Artificial Intelligence); to harness the purposeful use of digital technologies by digitising and standardising the management of student mobility; and to improve the quality and inclusiveness of education in Europe by employing new approaches and methods in teaching and learning (such as blended mobility, STEAM and "digital technology in the classroom").

The European Commission is paving the way for higher education institutions to become key players of digital transformation. The flagship initiatives, such as the European Universities, the European Student Card initiative and the Digital Education Action Plan, will be key to transform the universities and make the European Education Area a reality. They will be supported by the future Erasmus programme, equipping students, universities and systems to better adapt in an age of rapid digital change.

Success Factors for the Consolidation and Anchoring of Digitalisation Projects

Marcel Graf-Schlattmann, Melanie Wilde, Dorothee M. Meister, Gudrun Oevel, University of Paderborn

The digitalisation of higher education is an important strategic field that has become increasingly important in recent years. However, although the topic is of great importance and extensive funding lines exist, the process is confronted with challenges. This is shown by the fact that successful digitalisation projects are not consistently consolidated and anchored.

The project „Qualitätssicherung in der Digitalisierungsstrategie", funded by the German Federal Ministry for Education and Research, addresses this issue and investigates actor constellations as well as success and failure factors in the consolidation and anchoring of digitalisation projects into a digitalisation strategy. Therefore, we interviewed 15 key actors at German universities and developed organisation-sensitive concepts to describe the phenomena.

Crucial for a successful process is the acceptance of change and the identification with the university and the process. This goes far beyond the necessary acceptance in classical change management, since change in German universities can hardly be planned and controlled hierarchically, but must be motivated intrinsically. This is a specific challenge for the implementation and continuity of projects. Projects aim to achieve innovations beyond daily business, which also means that third-party funded projects are only loosely coupled with the actual work.

Change management for the digitalisation of university teaching should therefore aim to promote the connection between innovation and routine work. Instead of externally financed projects, which create innovations for digitalisation but are poorly linked to the university itself, one could use internal project pools with small funding amounts. This offers lecturers the opportunity to test out innovations in their teaching in small steps. This has several effects on the change process. The visibility of the digitised teaching as well as the lecturer is promoted, which helps to create a reputation and to develop demand-oriented formats that are easy to implement. This potentially raises the visibility and acceptance of digitalisation within the university as well as its benefits and the identification.

This approach is part of the collective willingness to change, an organisation-sensitive concept we developed for change management in universities. Based on the realisation that structural specificities in higher education must be considered more, the concept describes the interaction of six variables around the social acceptance of change. The commitment of the actors is crucial for success. This requires not only the involvement of all status groups, but also giving the actors the

opportunity to make changes adequate to the discipline's culture by providing them free space and opportunities, as well as a supportive enabling culture.

As a result a large number of dynamic, loosely coupled individual processes unfold, which has to be synchronized – into a (situation-appropriate) balance – by the action variables of "transparency and visibility" and "exchange, adjustment and networking" to a university-wide process. On the one hand, this makes change itself possible and, on the other hand it creates a common direction of development.

Furthermore, an individual and general benefit of the change must be visible and ensured in long term. This is supported by variables mentioned above and by a "quality-conditions-management" in the sense of functioning infrastructures and offers of didactic and technical advanced education as well as guidance.

New Frontiers of Digital Learning Platforms: A Workshop about Digital Education Ethics

Claudia Lemke, Berlin School of Economics and Law;
Kathrin Kirchner, Technical University of Denmark;
Gert Faustmann, Dagmar Monett, Berlin School of Economics and Law

For several years, digital technologies have been changing education dramatically. The technology impact on education will increase even more in the near future. To give an example, the EdTech market that includes all forms of technology-enhanced education is a highly attractive investment segment for diverse venture capitalist firms and not just a wide variety of different educational start-ups and diverse applications (HolonIQ, 2019).

Furthermore, Digital Learning Platforms (Faustmann et al, 2019) provide lifelong learning experiences with personalised courses, social interaction and collaboration, based on data-driven learning and teaching models. As a disruptive innovation for the education industry, they open the doors to an easy and payable access to different kinds of education for everyone. These positive effects of education democratisation are in fact limited by market power and competitive advantages by a few big education companies. As a consequence, they are able to transform education into a "Netflix Model of Education" (Horvath, 2019). This means a plannable and consumable education like an on-demand event. Digital Learning Platforms fulfil this vision perfectly by providing such learning experiences in an apparently convenient way. In reality, the learners are not more than merely users and education not more than a service, both feeding the value of the business model. From an economic perspective, this is inevitable as it is the way the platform economy functions (Parker et al, 2016). Such business models combine an extremely large active user base with a vast IT infrastructure and highly focused user-centred services (McAfee & Brynjolfsson, 2017). As a result, Digital Learning Platforms are not only stipulating the structures and content of education, but also payment models and user access. Education, formerly a more or less public asset, is now transforming into a commodity with a defined value that is influenced by market transactions.

Isn't it now the time for a new way of thinking about the purpose of technology-enhanced education? Surely, we need a digital ethical discussion about the design and usage of digital technologies for education. Ethics is at the very least a common understanding for values and practices about the morals of human beings and their behaviour in society. Our definition of digital ethics builds on Floridi's work, which addresses it as "… the branch of ethics that studies and evaluates moral problems relating to data and information, … algorithms … and corresponding practices and infrastructures … in order to formulate and support morally good solutions" (Floridi, 2018, p. 3).

In a similar way, we perceive Digital Education Ethics as a multi-dimensional perspective about values and aims of digital education. Such a framework encompasses dimensions like Society, Economy, Institutions and Individuals.

The major aim of the workshop is twofold: to define and discuss which elements influence these dimensions, and to determine both the relationships between the elements and the dynamic of the whole framework, based on the experiences of the participants too. Our target is to come up with the design of a trustworthy digital-driven education, based on common ethical standards.

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Strategy Workshop: Digital Credentials and Recognition

Jochen Ehrenreich, Raimund Hudak, Svenja Wiechmann,
Baden-Württemberg Cooperative State University Heilbronn;
Florian Rampelt, Marie Ullmann, Stifterverband für die Deutsche Wissenschaft e.V.

While Open Learning and MOOCs are not new, several recent developments merit a re-evaluation of institutional strategies towards open learning recognition, unbundling of education and digital credentialing. Standards on Digital Credentials are emerging, such as the European Digital Credential Infrastructure of the European Commission (European Commission, 2018). Guidelines for Open Learning Recognition are beginning to reach consensus (Rampelt et al, 2018). Most people would agree on the importance of Future Skills (Kirchherr et al, 2018). Learners rightly expect their institutions to adapt to the new digital possibilities and to offer flexible learning pathways. Employers value graduates who – in addition to their degree – have proven skills and competences in fields like Design Thinking, Online Marketing, Data Mining or Artificial Intelligence.

Workshop participants will analyse the key drivers of this development in a World Café setting. The key drivers are: digitisation, changing labour market demands, increased student mobility and globalisation. Participants will then apply those drivers to their own institution's setting, while also considering learning settings outside their institution that might emerge, to come up with future scenarios for education in 2030, answering questions like: *How do these trends affect the university's strategy? What are the implications for virtual and physical student mobility? What are the implications of drastically increased student mobility on curriculum design? What kind of institutional culture will impact future scenarios of education in 2030? How will administrative processes have to be adjusted? What kind of technical systems will be in place?*
What are the legal implications? Who will have ownership of credentials?
Which is our desired policy scenario and how can we make it happen?

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Strengthening Competencies in Artificial Intelligence

Mike Bernd, Cornelia Gamst, Lavinia Ionica, Dana-Kristin Mah, Florian Rampelt
Stifterverband für die Deutsche Wissenschaft e.V.

With the "Artifical Intelligence (AI) Strategy", the German Federal Government set a framework for a holistic political design of the further development and application of artificial intelligence in Germany. A central educational initiative is the pilot project "AI Campus - The Learning Platform for Artificial Intelligence (in German: "KI-Campus – die Lernplattform für Künstliche Intelligenz")[4].

The AI Campus was launched in October 2019 and is funded for three years by the Federal Ministry of Education and Research (BMBF). The project will be implemented jointly by Stifterverband, the German Research Centre for Artificial Intelligence (DFKI), Hasso Plattner Institute (HPI), NEOCOSMO and mmb Institute.

The pilot project aims to promote a responsible and well-informed use of AI technologies. Building on this, the aim of the AI Campus is also to get more people interested in the topic of AI and in entering this future-oriented occupational field, thus countering the shortage of skilled staff. Therefor the digital platform intends to provide students and lifelong learners with skills in the field of AI. The AI Campus targets groups and individuals from all subject areas and professions, also those not specialized in Computer Science or AI so far. Courses and content will be available in German and (later) English.
All educational resources, but also all technologies used are supposed to be open source.

For the AI Campus, own high-quality learning programmes (Massive Open Online Courses / MOOCs, but also Micro-Content) will be developed and existing courses will be curated and integrated into a learner-centred ecosystem. During the conference, a competition will be launched to fund Higher Education Institutions (HEIs) and other stakeholders to develop educational resources for the AI Campus.

The workshop focuses on the following questions:

- *Which AI content and which formats are most needed?*
- *How can students and lifelong learners use the content on the AI campus?*
- *How can lecturers develop and use learning content on the AI campus?*
- *How can different stakeholders cooperate with the AI campus?*

The workshop addresses all interested target groups of the conference.

[4] https://ki-campus.org/

Digital Credential Strategies in Education

Hans Pongratz, Matthias Gottlieb, Technical University of Munich

Digitalization is changing higher educational institutions (HEI) profoundly. Therefore, the way we issue and manage academic credentials is changing, too. This workshop discusses the need of institutional digital credential strategies for HEIs, prerequisites, stakeholders, and dissemination strategies.

We invite participants to help us discuss, collect and examine based on clarification of terms and an overview of various national and international initiatives, projects and standards, the intra- and inter-university handling of digital credentials. Theory concentrates on the explanation of the effect of certifications (Löbbers & Siegfried, 2018). An issuer, recipient, and content characterize a certificate, which proves specific qualifications. The identification of the certificate characteristics has to deal with asymmetric information between the issuer and the interested third party. A digital credential has to deal with the certificate characteristics and to be constant over time while the ecosystem is continuously evolving. Thus, it has three stakeholders: the owner, the issuer, and a third party interested in the credential.

Digital credentials are prototypical examined in singular higher education institutions (Durant & Trachy, 2017), and first international, inter-university approaches, such as the Digital Credential Consortium (https://digitalcredentials.mit.edu/) are coming up. On the technical layer these implementations vary from local, proprietary databases to the use of public blockchains.

Within the workshop, we will define goals, analyse existing issues with its strengths and weaknesses, derive and discuss success factors and develop strategies for higher education institutions to get ready, evaluate, and cope with Digital Credentials. Concrete use cases, like the Erasmus+ exchange program for students and the status of the Platform for International Student Mobility (PIM) of the BMBF will be addressed, too.

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Students as Innovators in Strategy Processes on Digitalisation in Higher Education

Alexa Böckel, Yvonne Rouwhorst, SURF; Jakub Grodecki, European Student Union

The workshop "Students as innovators in strategy processes on digitalization in higher education" aims at sharing ideas and experiences and developing formats on how students' opinions can be integrated in innovation processes. Student representatives could receive a larger role in decision making processes in institutions that focus on digitalisation and innovation for higher education institutions. These organizations, such as SURF in the Netherlands, are reflecting the possibility of integrating the target groups – students and teachers – in the development of their services in order to receive innovative ideas and feedback on planned actions and strategies.

Therefore, we would like to address the following questions in order to exchange insights from the participating organisations:

- *Which experiences have organisations made in reference to student participation formats?*
- *How are the participation formats designed?*
- *Does the integration of students' opinions lead to better or more innovative results?*

In this workshop, Alexa Böckel from SURFnet (the collaborative organisation for ICT in Dutch education and research) and last year #DigitalChangeMaker and Jakub Grodecki from the European Student Union will guide you through a knowledge exchange process while Yvonne Rouwhorst from SURFnet will provide insights from the Dutch perspective. We'll exchange ideas on student participation formats in different steps. At first, we will map the participating organisations and their current experiences from working together with students on digitalisation topics. Then we dive deeper into the different participation formats, their characteristics and how they are assessed by the participating organisations. At the end of the first phase, we'll have created an overview of already applied student participation formats with evaluations from the organisations that made use of them. The second part of the workshop is about discussing the advantages, disadvantages and barriers of student participation with written discussions. Also, we'll develop ideas how future formats can be designed.

In the end, the workshop participants have an overview of already existing participation formats, their advantages and disadvantages and why the participation of students in decision making processes on digitalisation could help them to develop innovative ideas.

Concept of an Open E-Learning Cooperative in European Higher Education

Paul Jerchel, Beuth University of Applied Sciences

Co-operatives are often among the most long-lived and largest companies in their countries whereas banks, housing associations, food distributors and car sharing providers ensure that basic needs are met at stable prices. In doing so, they work more democratically and through their "bottom-up" control often more sustainable than competing companies, which might be a step to commons organisations (Ostrom, 2015). Despite the high degree of innovation in the sector, functioning eLearning infrastructures are part of the basis of academic teaching in order to enable a solid and up-to-date basic study. With their central position, the task must therefore be to optimise the process, which is too often costly and time-consuming for individual universities, in a way that is acceptable to all parties involved.

The presentation discusses the concept of a cooperative, international university association for the joint development of digital infrastructures, in particular the eLearning sector, whose strategic feasibility and long-term potential should be evaluated. The author sees this as an opportunity to intensify the digital transformation through shared budgets with widespread impact and the possibility of considerable financial and capacity savings.

The form of the European Cooperative Society (SCE) seems to offer a suitable framework for the cross-border development and implementation of eLearning technologies and can thus usefully complement existing programmes at European level in order to bring about real changes at the more than 3000 universities of the European Union.

The resulting changes in the development and implementation process of digital infrastructures would lead to the simplified cooperation between universities and their members, whose requirements could be adapted in the future in open development environments. The resulting tools for digital learning and teaching as well as university management would thus also be an important element of medium-term development aid in countries of the Global South, which might find themselves facing similar challenges in the medium term.

The presentation will outline the organisational design conceived so far and possible stakeholders and will deal with their internal and external communication and possible sales structure. The author – and student – hopes that questions and comments at the conference will strengthen the concept and institutional feasibility to offer an answer to the "17 theses of digitisation in higher education" (HFD 2019). Expressions of interest after the end of the conference are welcome!

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Driving Innovation Together: Developing Edubadges for Micro-Credentialing

Janina van Hees, SURF

In the Netherlands, SURF is the collaborative organisation for ICT in education and research. More than 100 education and research institutions in the Netherlands work together in the SURF cooperative. SURF is a driver of technological innovation in close cooperation with the higher education institutions. In this session, we'll look at how this collaboration takes place in practice, illustrated by the example of the edubadges project.

In the edubadges project, SURF is working on a national infrastructure that enables all Dutch higher education institutions to issue open badges for their students. Badges are visual, digital certificates which serve as proof of certain skills or knowledge a student has mastered. As Dutch higher education is developing towards a more modular, flexible system, edubadges could become an important instrument in making this flexible system a new reality.

17 institutions are currently taking part in a pilot phase with the experimental edubadges infrastructure that SURF has developed. Each participating institution is looking at edubadges from their specific use case and issues a number of badges. In doing so, each institution needs to answer the key questions: How do I want to position edubadges in the educational context at my institution? How will the edubadges blend in with the 'regular' educational process, both didactically and in an organisational sense? Should we create series of badges, in which certain badges are stacked together to reach higher levels? How do we distribute rights and responsibilities for issuing badges? And finally: What should our edubadges look like, in visual terms?

SURF is collecting the experiences from the piloting institutions, formulating lessons learned, keeping track of the list of desired functionality, and improving the infrastructure as much as possible. However, the technological pilot leads us to questions on a strategic, systemic level: How will micro-credentials fit into our educational system? Do we need to adapt the system to incorporate them? Do we have a joint vision on this? Other actors than the pilot participants and the technological experts are needed to answer these strategic national questions. The Acceleration Plan is an important driver in this debate.

There is a close connection between these strategic national questions and technology. For instance, if we jointly decide to move towards a modular education system in which micro-credentials are issued that are transferable between institutions, then this will require certain metadata, such as ECTS points, collected and displayed in the badge. Also, it may be desirable to include a certain design element to distinguish micro-credentials which derive from accredited educational paths from badges that certify extra-curricular activities, not falling under the regular national quality control scheme.

In 2020, the experiences of the pilot, in combination with the larger debate about micro-credentialing, will need to lead to a joint decision about the continuation and scale-up of the national infrastructure for the issuance of badges, being built by SURF.

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German Higher Education Institutions' Strategies in the Age of Digitalisation

Tina Ladwig, Christiane Arndt, Hamburg University of Technology (TUHH)

We would like to give an insight into a four months research project on strategic planning in higher education in Germany with a special focus on the topic of digitalisation. Due to the growing number of strategic activities of and plans by German HEIs and the ubiquitous topic of digitalisation in education, a research project was undertaken in order to examine how HEIs address the topic of digitalisation in their strategies and what goals they set in their strategic plans.

We empirically approach this topic by exploring the political context of HEIs – namely the 16 federal states and their strategic agendas on higher education and digitalisation – and publicly available (digital) strategic plans. Since the 16 federal states serve as the context for the analysis of the strategic plans of HEIs, in each federal state an online search was conducted on:

- Formulated cross-departmental digitalisation strategies of the federal state governments
- Formulated digitalisation strategies of the federal state governments concerning HEIs and the academic missions research and teaching (with a special focus on knowledge and technology transfer and open-access)
- Higher education development plans (federal cross-HEI and HEI-specific)

The strategic plans of the HEIs with special interest in digital strategic plans were acquired through their websites. We used the data base of the Hochschulkompass (www.hochschulkompass.de) in which all HEIs in Germany are listed (n=396). We then focused on the public (n=240) and ecclesiastical HEIs (n=39).

Using qualitative content analysis we aim to find the key ideas expressed through HEIs strategic documents. We would like to present and highlight differences among HEIs' strategic visions within and between federal states in Germany, regarding the structure and the contents of these strategic documents.

One the one hand we present 16 case descriptions of the federal states that offer a diverse range of approaches and strategies in Germany. Whereas some federal states have a range of formulated strategies on all of the searched topics, some focus on specific topics only.

On the other hand our main findings also show that for the HEI-strategies, it could also be assumed that there are differences between HEIs and the publication of digitalisation strategies due to the HEI-types, sponsorships and authorities. In addition to the 39 ecclesiastical HEIs, none of the four HEIs with different authorities than the Federal State Ministry of Science, the 57 Universities of Arts as well as the six Universities of Education in Baden-Wurttemberg or the two Cooperative Universities has a publicly accessible digitalisation strategy.

Our study is one of only few about strategic plans and digitalisation in HEIs in the European context. The results of the study will provide a deeper understanding of the strategic view of HEIs in Germany regarding their role in the digital age. It will also reveal first findings about context-driven and context-based differences or similarities in the strategic visions of the German HEIs and thus provide a basis for further research projects in Germany and other European countries.

Strategic Approach to Establishing a Successful E-Learning Environment at Universities

Tilo Wendler, Angela Weißköppel, HTW University of Applied Sciences Berlin

The challenges of the digital transformation are highly visible in many sectors of economy. Consequently, companies must adapt to this trend, because having a good product or patent with a unique selling point is no longer enough to survive on the market.

In the field of education one can observe a broad spectrum of strategic approaches and scenarios that include digital technologies. Especially private education providers benefit from the opportunities offered by digital technologies. They transform their business models from non-communicative postal to internet-based platforms. Although the quality of their digital solutions varies, the expectations of their potential customers result in a growing and thus strong pressure for change. In view of this situation, public education providers as universities need to adjust, too. Within the university sector it is undisputed that digitalisation will considerably affect teaching and learning as well as research in the future just as all kinds of working processes. Therefore, there are already many new initiatives, projects and players, which want to shape the process of building a digital future. However, an analysis of used procedural models, defined goals and the target groups in question shows less commonalities between universities as one might expect regarding the similarities of the offers. The different profiles of the universities and their independence actually lead to diverse approaches.

The HTW Berlin is the largest university of applied sciences in Berlin with almost 14.000 students. It offers over 70 study programmes in the areas of technology, computing, business, culture and design. Subjects range from classical disciplines such as mechanical engineering, automotive engineering and business administration to new and innovative study programmes such as facility management, economic policy and game design. Because of the rich diversity of subjects, HTW has developed an interdisciplinary profile.

Taking into account the digital transformation in the education sector, the innovative environment in Berlin and the great national and international demand of prospective students puts pressure onto universities to change. Accordingly, the HTW is recognising these demands and faces them with widespread commitment and taking necessary steps forward. The university board encourages the teaching staff to create a digital learning environment and establishes various mechanisms to promote projects in this respect.

After a critical review the authors show how the connection between strategic change, general organizational conditions and incentive systems can promote further development of teaching in the digital age.

The presentation will discuss the following aspects:

- status quo of university in relation to the digital transformation of learning and teaching,
- strategies, structures, processes and resources to promote digital transformation,
- concrete implementation measures at HTW Berlin,
- (teaching service centre, relaunch of internal strategic funding, third-party-funding etc.),
- lessons learned and best practices
- (awaken interest of committed experts, demonstrate added value, use student feedback, trade-off between decentralized structures and cost-efficient support),
- summary and next steps.

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Acquire Interdisciplinary and Digital Competences for the Quality Development of Teaching

René Krempkow, Humboldt University of Berlin

The goal of the project for competence assessment is the conception and implementation of a method for the acquisition of interdisciplinary and digital competences for students within the quality development of teaching and study programs at the Humboldt-University of Berlin (HU). The conception and implementation takes place in close coordination with the Vice Deans of teaching.

The background is that there are repeated complaints from universities about the lack of competences of students. For example, the President of the German Rectors' Conference, Peter-André Alt, reported in June: "in terms of text comprehension and writing skills, there was critical feedback from the universities". Reading and writing longer texts are harder for students; there has apparently been a significant deterioration over the past five years - it said. Some critics, such as the Ulm psychiatrist Manfred Spitzer, see for example reading and attention disorders also in connection with a "digital dementia" promoted by increasing digitization of everyday life, which affects cognitive and social skills.

At the same time, more than 85% of all universities call the teaching of skills for a digital world as an important part of their digitization concept. However, it turns out that the digital qualifications of their own members of the university are perceived very differently (Gilch et al., 2019). In addition, this topic is likely to gain importance in educational policy not only in Germany, but also in other European countries, as the activities on the EU Qualifications Framework Digital Competences (DigKomp) show.

However, a collection according to DigKomp to the current state of knowledge is still at no university in German-speaking countries in regular use. To examine the possibility of recording such competences, and also possible correlations between interdisciplinary and digital competences are included in this process, this is currently being tested at the HU by the Quality Management department as part of a pilot study with online student surveys.

The current status for the compilation of interdisciplinary competencies is that a survey instrument that has been used for a long time in nationwide graduate surveys and has been repeatedly developed in accordance with the EQF and DQRH (KMK, 2017) has been adopted (Plasa et al., 2019). Digital competences were based on the EU Qualification Framework of Digital Competences DigKomp2.1 (EU, 2017) for piloting.

It comprises a total of 20 individual aspects in five dimensions. In addition, some key issues (not foreseen in the Digkomp) have been developed to assess knowledge inventories (criteria that explain the reliability and credibility of information from the Internet). The survey instrument was piloted at the HU in selected courses in the summer semester of 2019; first results are available this autumn.

For a German version of this abstract, see here:
https://hochschulforumdigitalisierung.de/sites/default/files/dateien/Krempkow_DE.pdf

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Aligning Digital and Internationalisation Strategies to Promote Global Digital Learning

Regina C. Brautlacht, Bonn-Rhein-Sieg University of Applied Sciences

Our society is going through a rapid digital transformation that affects businesses, governments, organisations, the telecommunication industry, and education. How we access information and work have changed significantly all over the world. Digital tools have a great impact on our work processes, the speed at which we can collaborate with people around the world and how we gather and create new knowledge. Recent research has indicated that leaders need to commit for digital transformation to take place in the workplace (de la Boutetière et al, 2018). These new technological developments have also had a great impact on higher education. Universities are challenged by these developments and have had to realign their traditional "brick and mortar" teaching methodologies to incorporate digitalisation to offer new learning environments that reflect the digital world. Universities need to rethink their internationalisation strategies to include digitalisation. New digital learning formats can offer more international discourse, collaboration, and research among partner institutions. Digitalisation policies should be included as part of the global initiatives that help students, faculty and administrative staff to gain even more exposure in different learning communities worldwide. The main idea is that digitalisation is an integral part of the solution to manage issues in higher education and should not be seen as a separate one. (Orr et al, 2018)

This case study aims to provide an insight into how Bonn-Rhein-Sieg University of Applied Sciences in Germany has committed itself to encourage a digital transformation process to take place within its organisation and to realign it with its internationalisation strategy. In 2017, the Commission for Teaching and Learning founded a Core Team Digitalisation for Teaching and Learning to support the Commission in dealing with its own digital transformation processes. First, it formulated its own digital strategy for teaching and learning. Furthermore, it identified those stakeholders within its organisation that were so-called "digital champions". These champions drive innovation in learning and have built a foundation for a community of practice, where digital transformation can take place. This community was ready to address and work on issues related to many digitalisation topics, including international collaboration, capacity building, supporting new learning environments, infrastructure challenges, and e-assessment. Another important step was expanding its internationalisation strategy to include digital learning. This strategic alliance brought forth the need to appoint a Commissioner for Global Digital Learning to begin a set of initiatives to align the universities digital and international strategies and develop a university-wide programme to encourage a mind-set that includes digital learning as an inherent part of its international activities.

To begin this transformation the focus is now geared towards providing more international exposure to students, faculty and university staff. The diverse student population should get the opportunity to participate in different digital learning scenarios to not only become digitally fluent but to become confident in global communication and collaboration settings. This talk will present the envisioned development stages and planned incentives as well as highlight the benefits and the challenges foreseen.

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Virtual Collaboration: Lessons Learned across the Globe

Kristi Julian, Middle Tennessee State University; Regina Brautlacht, Hochschule Bonn-Rhein-Sieg University of Applied Sciences; Wendi Hulme, Conestoga College; Lurdes Martin, Polytechnic Institute of Viseu; Bryce Massey, Middle Tennessee State University

The expanding global society creates greater opportunities for students in business. These opportunities are met with an increasing number of variables that change the context in which students must operate in order to be successful. Student experiential experiences prepare students to successfully engage in an evolving world influenced by globalization, human needs, and technology. Business practice is often deliberately structured to maximize local business opportunities. This means mitigating risks, being responsive to the legal environment, and practicing within the context of local customs and sensibilities as they impact the delivery of goods and services.

Balancing joint goals without compromising identity need to be well planned. In order to have a long lasting and rewarding collaboration, institutional strategies and goals need to be inclusive. In this online team collaboration, students learn culturally appropriate business etiquette, rituals and attire, appropriate deference to business hierarchy and appropriate engagement. Students gain knowledge about global and cross-cultural issues that are relevant to different communities, countries, continents and humanity in general working against misconceptions and generalizations. Students learn examples of factors that may influence business practice and digital skills within a global market and vary based on context and location, even within the same continent. Due to the virtual team dynamic, students demonstrate analytical and critical thinking skills in working collaboratively with people from different cultures and with different values.

In this virtual collaboration project, students from the United States, Canada, Germany and Portugal learned to use various technologies and new online tools to communicate and collaborate together and carry out joint research with students. Digitalization plays a major role as students utilize relevant forms of collaborative strategic software. With the implementation of these strategies, students acquired 21st century skills and competencies to prepare them for the global workforce. We are able to integrate this virtual exchange into each countries curriculum without having to adjust the specific country requirement. Interdisciplinary and international collaboration must provide enough academic freedom to ensure each institution can address program goals and mission. This interdisciplinary project promotes global communication between native and non-native speakers and promotes international discourse on multiple perspectives. Students discuss global issues and reflect on how to resolve them using digital synchronous and asynchronous tools. Students develop digital and media literacies parallel by promoting collaborative problem solving in technology-rich environments. The student engagement provides new insights and orientation perspectives to this ongoing virtual project. Finally, we will share the didactical and organizational lessons learned from five consecutive projects since 2016.

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European MOOCs for the Labour Market

George Ubachs, European Association of Distance Teaching Universities (EADTU); Catherine Mongenet, France université numérique (FUN)

According to recent sources, many European countries are not going to reach attainment targets set for either higher education completion or for lifelong learning. That's a worry when you consider that 40% of European employers face problems with recruiting employees with the right qualifications.

So even though the workforce is in real need of continuous learning opportunities – the current education and training offer is structurally not enough.

The EMC-LM project is addressing this specific challenge by combining the world of education and training (universities, MOOC platforms) and the world of work (Public Employment Services, companies, sectoral organisations).

Objectives set for our knowledge alliance are:

1. To make a validated state of the art analysis and to create a framework defining possible roles of MOOC platforms, universities, employment services and companies/sectors in organising MOOCs for digital continuous education and training, facilitating the flow and exchange of knowledge for employability, innovation and entrepreneurship;
2. To strengthen the European MOOC platforms by sharing expertise and by collaboration impacting on the development, delivery, use and recognition of European MOOCs for CE, CPD/CVT;
3. To empower universities, employment services and companies in (co-)developing, (co-)delivering and using MOOCs for CE, CPD/CVT in order to integrate MOOCs and digital education and training in current offerings EU-wide;
4. To create a framework for the recognition of MOOC awards and micro-credentials for use in academia and on the work-floor;
5. To create an increased visibility and accessibility of European MOOCs for an accelerated and sustainable use of MOOCs for the EU labour market (CE, CPD/CVT) by universities, employment services, companies and individual learners European-wide;
6. To contribute to national and EU policies and strategies to support the organisation of MOOCs and continuous education/ continuing professional development/ continuous vocational training in European universities as complementary areas to degree education.

To achieve the objectives outlined above we involve individual learners and learners who are collectively served by public employment services, universities or companies, MOOC platforms and higher education institutions.

Next we address employment services, companies, social partners and decision makers at different levels (EU, national) to ensure coherent policies in the use of MOOCs in different countries.
In concerted actions and dialogue we strengthen the relevance and connection of MOOC-based offerings and short learning programmes for the labour market.

The project has a direct relation with online continuous education policies aiming at scalable, high quality and efficient provisions for continuous education/ continuous professional development in European countries, which will be illustrated.

Partnership:

- EADTU (Coordinator)
- Futurelearn
- France université Numérique
- Telefonica-MiriadaX
- MiriadaX-University of Foggia
- Open University UK
- Opcalim (food-related companies and industries in France)
- Anpal (employment service, Italy)
- VDAB (employment service, Flanders/Belgium)

Implementing Learning Analytics in Higher Education for Supporting Students

Clara Schumacher, Dirk Ifenthaler, University of Mannheim

Higher education is confronted with high dropout as students face several difficulties in organising and self-regulating their studies. Digital learning environments provide opportunities to support students. Learning analytics systems use various data sources for eliciting, analysing, and optimising learning processes and learning environments plus educational decision-making (Ifenthaler, 2015). However, implementation of learning analytics faces several challenges with regard to the IT infrastructure, the preparedness of staff and students, the organizational change, and privacy concerns (Tsai & Gašević, 2017). The data relevant for learning analytics are spread over a variety of systems (Rubel & Jones, 2016). Integrating these data in real-time and enhancing them with survey data without impairing privacy is challenging.

This presentation will introduce the design and development process of LeAP (Learning Analytics Profiles) developed as a plug-in for the open source learning management system ILIAS (Klasen & Ifenthaler, 2019). Therefore, learner's willingness to use certain learning analytics features and their perceived learning support through these features were investigated (Schumacher & Ifenthaler, 2018). Furthermore, technological and organisational effort for implementing the features were analysed and evaluated against the educational value (Schumacher et al., 2019). Based on these analyses features were developed and implemented. Current features offered are for example self-assessments including feedback, a learning analytics dashboard showing use or performance related to learning outcomes, materials and self-assessments, a feature for setting own course goals with related material, and prompts providing hints to the students. The implementation process was evaluated using qualitative and quantitative instruments focusing on learners' perceived support and benefits plus their usage of the features and additional feedback.

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Open Educational Resources in Distributed Learning Infrastructures

Olaf Zawacki-Richter, Victoria Marin, Melissa Bond, Carl von Ossietzky University Oldenburg; Svenja Bedenlier, FernUniversität in Hagen

Open Educational Resources (OER) have the potential to support increased higher education access at a lower cost to rural, remote, lower-socio economic students, alongside lifelong learners and time-poor workers who require upskilling (Bossu & Meier, 2018; Orr, Rimini, & van Damme, 2015). The German Ministry of Education and Research (BMBF) has funded the interdisciplinary project 'Digital educational architectures: Open learning resources in distributed learning infrastructures – EduArc' (Learning Lab, 2019), a partnership between the University of Duisburg-Essen, the German Institute for International Educational Research, the Leibniz Information Centre for Economics and the Carl von Ossietzky University of Oldenburg, in order to explore the development of disseminated learning infrastructures and enable national access to digital education resources.

In order to produce infrastructure that is aligned with international developments and trends in higher education digital transformation, nine comparative country studies have been commissioned, alongside Germany, to be undertaken by members of the Centre for Open Education Research (www.uol.de/coer), namely Spain, China, Japan, Korea, Canada, South Africa, Turkey, USA and Australia. The country studies focus on digital transformation across the macro, meso and micro levels (see Figure 1), and focus in particular on the infrastructure for disseminating OER in higher education, including repositories and meta-data standards. The studies also focus on national, state and institutional policies; quality assurance mechanisms and key actors; and how change (in terms of funding, managing and promoting infrastructure) is promoted and occurs at all three levels.

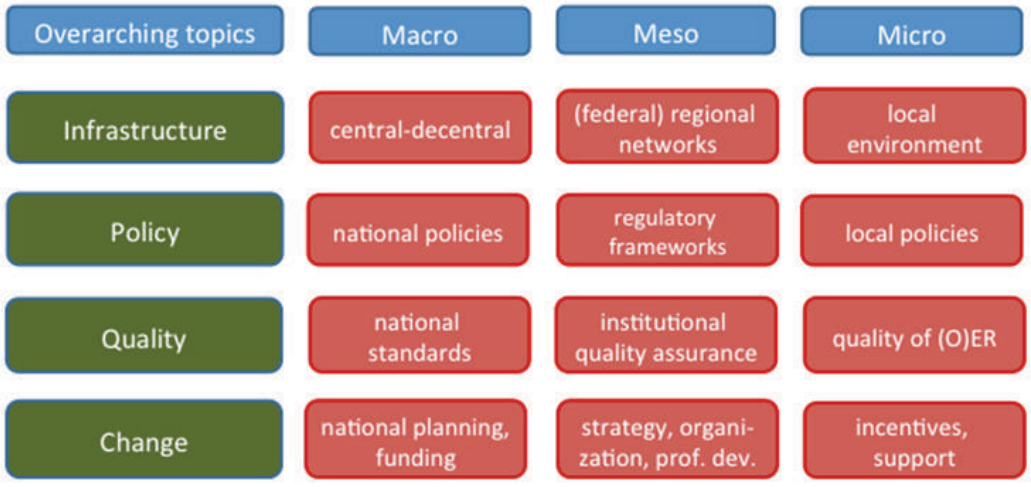

Figure 1: Country study foci

To date, the macro studies have been completed. In terms of Infrastructure, Spain, China, Japan

and Korea have national repositories, including OER, although they are not commonly used in Japanese universities. Canada and USA have decentralised infrastructure, with companies retaining intellectual property rights. All governments have recommendations and funding for digital transformation, however the majority of action is left to individual states and institutions. Spain, Korea and China have national standards for digitalisation, labelling, quality and/or metadata standards, with the onus on institutions in other countries.

The next stage of this research, the meso level, is currently underway.

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Higher Education Beyond Borders: Off-University e.V.

Julia Strutz, Aysuda Kolemen, Tuba Çekiç, Off-University e.V.

Off-University is a virtual network which creates new strategies to uphold and sustain academic life and knowledge threatened by anti-democratic and authoritarian regimes. It is a collaboration initiative with an innovative online teaching and learning platform. Off-University was established for and by academics from Turkey yet addresses itself to academics all over the world: academics who have been purged from their institutions, forced to resign, who are legally and politically persecuted and even imprisoned because of their opinion and research.

Off-University is a facilitator fostering networks of collaboration among higher education institutions (HEI) and at-risk scholars. We are committed to a world in which critical research can be conducted anywhere, by anyone, and knowledge is produced and disseminated freely.

Off-University enables researchers purged from universities to continue teaching and research. It breaks the barriers to education and welcomes interested and critical students from around the world to participate in its online courses. It provides virtual mobility for politically persecuted scholars and students from many countries and facilitates a platform where academic and intellectual exchange can take place without borders and censorship. Over the course of the past two years, Off-University has collaborated with nine universities in Germany and two in the US to organise a total of 18 online courses led by 15 at-risk scholars.

Off-University has two main missions: (i) establishing networks and collaborations in academia and (ii) developing innovations in online teaching and learning.
As a networking initiative, Off-University establishes three types of networks.

1. Individual to individual:
    a. Scholar to student: Networking persecuted academics living in undemocratic polities with students from all around the globe without having to leave their home countries.
    b. Scholar to scholar: Building networks between scholars who are in different countries to conduct tandem teaching and co-author online courses.
2. Individual to institution: Networking persecuted scholars from authoritarian states with universities in Europe (e.g. HU Berlin, LMU Munich, Potsdam University) and North America (e.g. New University in Exile Consortium hosted by the New School of Social Research)
3. Institution to institution: Collaborating with institutions founded by or for at-risk scholars and/or students to create common initiatives (e.g. Migration Matters and the Sharing Perspectives Foundation).

Off-University prioritises innovation in online teaching and learning to make higher education accessible by:

1. Developing a web platform that makes better use of technology for virtual exchange opportunities while ensuring full anonymity of the students
2. Providing training and support to lecturers on digital learning methods and tools.
3. Encouraging institutions to adopt their systems to online learning methods

Off-University aims at fostering an online community with a non-violent and non-hierarchical higher education culture based on peer-learning. One of the main goals of the initiative is to advocate online research collaborations.

Pathways of Learning as the Centre of Higher Education Provision

Dominic Orr, Kiron Open Higher Education / University of Nova Gorica

Even with the advent of distance and online modes of learning, higher education is broadly shaped by two limitations: (1) the difference between being 'in' and being 'out' of a higher education institution, i.e. mainstream higher education erects high administrative hurdles to entering a full learning programme (e.g. enrolling for a full programme of study, calling for standard entry qualifications, and only recognising learning 'in' higher education, not non-formal or informal learning); (2) the linearity of learning, i.e. the general idea that the foundational blocks of learning post-secondary education continue sequentially until a full programme of a Bachelor and perhaps even a Master course is completed, after that learning can be additive in smaller blocks, but generally does not increase the value of a person's formal educational profile. This makes higher education exclusive to certain population groups (there are no higher education systems in the world, which fully reflect population diversity of the country they are based in) and leads to the increasing criticism that what is being learnt is outdated as soon as the graduate leaves the 'institution' higher education.

Flexibility of provision of learning which is not based on a common path of linearity (like climbing a ladder), but spiral shaped (interchanging spheres of depth) and which is not based on fixed content ('knowledge canons') is a challenge for higher education. However, openness of provision, unbundling of higher education programmes and closer, more individualised support of learners by educators are all being facilitated through digital solutions.

Figure 2: Higher Education pathways

The AHEAD study, which the author led as senior researcher at FiBS Research, was commissioned by the German government to forecast what the university landscape could look like in 2030. In a turn away from the usual practice, which often focusses on changes to the institutions of higher education, the study started out by rethinking possible learning pathways. The research team, aided by background research, an international advisory board, and various public events, eventually sketched out a future for higher education made up of four distinct learning pathways through higher education that will shape future provision (named after common toys for ease of recall) that we expect students to use in 2030:

- Tamagotchi: A closed ecosystem built around the individual student, who has just left school
- Jenga: Higher education as a solid foundation of knowledge, which is built on and expanded through flexible modules later in life
- Lego: A course of higher education determined individually by the student, who picks and mixes – with advice from universities and service providers
- Transformer: Higher education for people, who come to higher education much later in life, bringing with them their own professional identity and life experience, which frames their studies

The presentation will discuss these pathways and highlight the consequences of embedding each of them fully in our concept of student-focused higher education.

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How Are Digital Technologies Changing Higher Education's Disruptive Role within Regional Innovation Systems of Knowledge-Based Economies?

Filipe de Castro Soeiro, University of Applied Sciences Europe GmbH

The role of digital technology (DT) over higher education systems (HE) regarding the creation and the reinforcement of innovation networks (IN) at regional and global levels is raising its importance for knowledge-based economies. Firstly, the research focus on the understanding of the core dimensions of regional innovation systems (RIS) within a large scope, as the European one, supported by the design and the development of an explanatory model. Then, the nexus causality analysis of the framework pays specific attention to learning and absorptive capacity mechanisms shared by various key stakeholders that collaborate to create network advantages within the higher education system, while capitalising on sharing of social capital (SC), generating knowledge spill over (KS) and digital technology transformation among them. Digitisation and knowledge creation, diffusion and utilisation show to be major strategic tasks for higher education institutions and higher education policy with impact on innovation and entrepreneurship.

The overall direction of the research study follows a research strategy which reflects the interpretivist perspective, based on research mixed methods (MM), which include collecting, analysing and integrating quantitative data and qualitative research. Thus, the identification of the core dimensions of RIS (independent and dependent variables), as well as the design of the model's architecture which includes the map of the mediatory variables, recurs to statistical analysis methods and artificial neural networks techniques. The results of the empirical model suggest that Keynesian policies which are exclusively focused on enhancing market potential, demand sophistication and governmental R&D investment activities show lack of effectiveness, especially when the quality of economic agents is not good enough. In addition, the research brings empirical evidence that by improving regional absorptive capacity, university R&D investments and university-entrepreneurial start-up and corporate linkages is one of the most well-balanced and short-term growth strategies for regions, especially when relatively low level of digital industrialisation and disposable income occur.

These findings provide further understanding how digital technologies are changing higher education's disruptive role within regional innovation systems of knowledge-based economies and reinforce the idea that European Commission may improve innovation and higher education policies. Suitable specialised regional strategic approaches are needed at institutional, national and European level. Higher education institutions must revise existing strategies; develop new ones and new forms of cooperation and competition with the key stakeholders that constitute the ecosystem to produce societal innovation and growth impact.

Last, but not least, the research study analyses the inter-influence between the main components of higher education systems, namely pedagogical models (PM), instructional design models (ID), content curricula (CC) and learning management features (LM), and the key dimensions of regional innovation systems, with the aim to support innovation and prototyping university strategies for higher education and map best practices and development of skills in the digital age.

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Towards a More Flexible Higher Education System

Ulrike Wild, Wageningen University & Research

Every student is unique, and society increasingly needs professionals who are well equipped to take charge of their own learning pathways. The current educational system in which the course pathway is determined by the institution will need to change. By offering more choices, in terms of content, schedule, location, and the defined package, learning pathways can be tailored to fit the individual needs of a student better. A more flexible higher education system is one of the thematic zones in the Dutch Acceleration plan for educational innovation with ICT. Eighteen Dutch higher education institutions (HEIs) are jointly working on concepts to make higher education more flexible. ICT is of central importance in this.

Challenges to a flexible system are found in all layers of the system from local to national to European: may it be administrative, policies, funding or culture. In order to structure the discussion, we developed a concept of four flexible student-pathways:

1. **Student path 'at your own pace':**

   The student is enrolled in a specific programme at an institution and can complete the programme at her/his own pace. They can combine their studies with other significant activities, such as a job, a start-up, or caring for family members.

2. **Student path 'Off the beaten track':**

   This student path fosters mobility across educational and institutional boundaries to maximise the student's control over the progress of their study programme. Students can follow a (substantial) part of their programme in another course of study, faculty or institution without any practical obstacles. Mobility between universities of applied sciences and research universities can be an explicit part of this.

3. **Student path MyDiploma:**

   The 'MyDiploma' path dispenses with the idea of a predefined training programme. The form and content of the programme are determined by the student's needs, unlike the conventional approach. Working in short cycles, the student composes their own programme based on their personal and professional development, with guidance by the educational institution.

4. **Student path Modular learning:**

   The student signs up for modules instead of a full programme. These modules can also be part of a regular programme to ensure the necessary level. If a diploma is desired, this series of modules could be rounded off with an obligatory thesis module with predefined requirements.

On the basis of these four concepts, the 18 participating Dutch HEIs are now looking into possibilities to bring them into reality. There is a wide array of experiments and pilots: from producing modules for professionals, making courses flexible so that they can be taken not just once a year, to opening up courses within consortia of HEIs and realising a seamless administrative system to accommodate the exchange of students.

By running the pilots, local challenges and thresholds will be solved and challenges on a national level, for instance a policy and infrastructure that will allow micro-credentialing and other flexible forms of education, will be addressed. As a result, we will be able to learn and move towards a more flexible higher education system.

An Analytical Framework Model of Teaching and Learning Processes

Christina Gloerfeld, FernUniversität in Hagen

The discussion about digitisation, the associated challenges and changes put universities under pressure not only to meet the changing conditions but also to use the potentials for their own further development. Social and political pressure as well as increasing competition in the education sector requires strategic planning of measures and development (Dittler & Kreidl, 2018; Seufert et al, 2015), which becomes visible in digitisation strategies and the integration of digital media into teaching and learning. A current study on digitisation in higher education shows, that only 14,5% of the institutions already have a digitisation strategy, while 30,9% are working on it, 40,9% are planning to and 13,6% doing neither (Gilch et al, 2019, p.65f.).

In the presentation, an analytical framework model is introduced that can serve as a tool to describe the starting situation for strategic university planning in the area of teaching and learning processes (Gloerfeld, 2019). Such an assessment is the basis for adequate action planning, revision, formulation and, if necessary, adaptation of set goals at different levels - for the entire university, faculties, etc. It is thus part of strategy development, e.g. of digitisation or media strategies along classical lines such as: where do we stand? Where do we want to go? How do we get there? And where do the others stand?

The analytical framework model depicts the formal structure of the complex teaching and learning processes in eleven constituents and provides dimensions to describe it systematically. By examining the individual components, goals, evaluation and control, contents, methods, media, teachers, learners, context (conditions), participation, disturbances and relationships, not only can goals be formulated more concretely, but the didactic orientation is made visible and thus accessible to a targeted examination and control. The theoretical basis for deriving the framework model along the lines of semantic and dimensional analysis (Kromrey, 2009) is formed by six general didactic approaches: critical-constructive didactics by Wolfgang Klafki, learning-theoretical didactics by Paul Heimann, Gunter Otto and Wolfgang Schulz, cybernetic didactics by Felix von Cube, critical-communicative didactics by Rainer Winkel, dialectical didactics by Lothar Klingberg and systemic-constructivist didactics by Kersten Reich.

Looking at the components closely and contrasting the findings with current trends reveals further potential and conflicts. For example, the main advantages in integrating digital media into teaching and learning is growing flexibility, while at the same time standardisation of processes might limit it (Gloerfeld, 2019). Furthermore, digitisation enables a huge variety of teaching and learning methods, interactivity and participation, but automated assessments, personal learning assistance and tracking systems require defined interactions.
The development of the model and, in particular, its application in the collection and evaluation of data are presented, as well as approaches for the strategic planning based on it.

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The Role of Networks and Collaboration in Pakistani Higher Education

Maryam Rab, Izzah Meyer, British Council Pakistan

Active and structured research, especially when competing in a post-industrial world, is critical to the process of discovery and innovation, which in turn is equally critical to the socioeconomic progress of countries.

Recognising the shortcoming of the Pakistani higher education sector, in 2018, the British Council Pakistan in collaboration with the Higher Education Commission Pakistan launched the Pakistan UK Education Gateway. The purpose of the Gateway is to share good practices, improve standards, encourage joint research and publications, capacity building, and other similar initiatives – all geared towards improving access to and quality of higher education in Pakistan.

In line with this, British Council's research unit (REMU) led a series of studies focussing on higher education and research, digital globalisation of knowledge and higher education, and women in higher education leadership, all three of which signposted towards the huge potential of the higher education sector in Pakistan, and highlighted the urgent need to unleash the opportunities within. Research networks and collaborations was a common theme emerging from all the research reports whether it was forming women academics support network, working towards developing research councils or looking at networks and communities of practice and instances of collaboration or competition in addition to known impact on quality of Higher Education or looking at the digital flows of ideas and knowledge exchanged between countries with respect to its impact and interaction with higher education systems, institutions and communities.

The recommendations ranged from launching a world-leading digital communication and collaboration platform to drive research quality and innovation, to deepening the research collaboration relationships with international universities in order to infuse global innovations and best practices into the Pakistan research system, and to promoting mentoring and other practices to develop research capabilities of women by explicitly developing and supporting mentoring and collaboration practices and enabling their dissemination through technology.

This paper looks at the research recommendations in the context of networking and collaboration, and its significance and role in improving the quality of teaching, learning and research in Pakistani universities. Furthermore, it highlights good practices especially around digital platforms, online access and other structured networking platforms.

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Where Digital Innovation Meets Policy-Making: How Erasmus Without Paper is Shaping Higher Education in Europe

Victor Aguilar, Stefan Jahnke, European University Foundation

Earlier this spring, the European Commission announced that as of 2021, the Erasmus Without Paper (EWP) standards would become gradually mandatory for the +5,500 holders of the Erasmus Charter for Higher Education (ECHE) (European Commission, 2019a). Three decades after the first Erasmus exchanges took place, digitalisation is finally taking hold in European higher education.

The decision, ground-breaking for a programme whose procedures had remained largely unchanged for over 30 years, does not come out of the blue. EWP had been in the making for the past five years before its official launch took place in Ghent in December 2018. Built and tested by universities, the EWP digital infrastructure gives higher education institutions across 34 European countries – each with their own legislation, education standards and varying degrees of autonomy – the possibility to seamlessly and securely exchange electronic information related to student mobility across borders and between information systems. In practice, this will translate into smoother and faster procedures for the nearly 400,000 higher education students and trainees that go abroad every year with the Erasmus programme, reduced administrative burden for thousands of international relations offices, and fewer barriers to student mobility.

Education remains the exclusive competence of Member States, limiting EU action to support and complementary measures (European Union, 2007). In the world of higher education, where universities have a large degree of autonomy in the recognition of qualifications, skills and diplomas, and a say in regional and national policy, the situation is even trickier, resulting in a multiplicity of stakeholders that can stall even the most ambitious efforts at policy reform – the Bologna Process included. Despite this complexity, EWP has managed to spur institutional change among higher education institutions and shape the structure of one of the largest EU funding schemes. Today, around 1,500 universities (over a quarter of all ECHE holders) are connected to EWP and can benefit from exchanging student information with each other.

The effects go beyond the Erasmus programme. Like any other disruptive technology, the introduction of EWP has opened new –in some cases unforeseen– possibilities and paved the way for other digital solutions to enter the game, crossing over sectors, business industries and policy domains. Currently, the European Commission, through its Directorates for Education (DG EAC) and Connectivity (DG CONNECT), is spearheading the ambitious European Student Card Initiative, an effort that amalgamates several digital projects in the field of higher education (European Commission, 2019b). If successful, it will not only boost up student mobility across Europe, but also strengthen the Digital Single Market, ascertain student rights, make the Erasmus programme more

inclusive, cost-efficient and sustainable, and set international standards for the secure exchange of electronic information.

EWP is the result of a sustained effort and continuous dialogue between higher education stakeholders in Europe, including universities, students, service providers and national and European authorities. The evolution and expansion of EWP will continue to respond to the needs of the higher education sector. Today, it stands as an example of how bottom-up action can trigger top-down change across borders. Technology, when done right, can reach where governments fall short of.

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SLiCE – Scenario-Based Learning in Cooperative Environments

Stefan Ludwigs, RFH - University of Applied Sciences Cologne

SLiCE stands for cooperative, distributed laboratory use between Rheinische Fachhochschule Köln (RFH) and its international university partners, here University Multimedia Nusantara (UMN) in Jakarta, Indonesia. At its core, RFH laboratory facilities are used remotely by the students abroad in a teaching context. Examples are the programming of an automatic bottle filling system, the control of a robot or the programming of microcontrollers within a corresponding experimental application scenario.

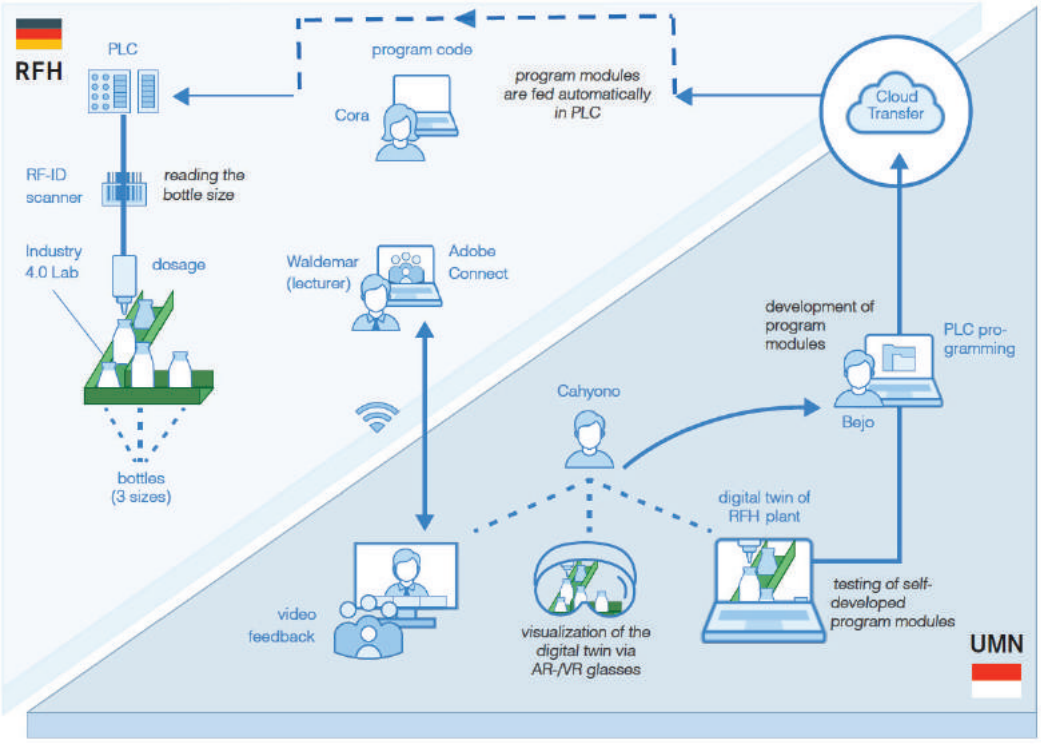

Figure 3: Plan of learning environment

This work is integrated into a practical and job-oriented scenario consisting of online lectures and exercises, which the students of both partner universities also carry out together in a self-learning mode and which prepare them for the practical implementation of the experiment described above. This experiment is therefore staged as a time-based challenge in which transnational student groups have to form in order to solve technical problems with high precision in the shortest possible time. They are not only supported by their subject teachers, but also coached by experts from cooperating companies to secure the practical relevance.

At the technical level, the program development and control computers abroad are networked with those of the RFH systems. A video transmission secures the visual return channel to the foreign students and communication and instruction takes place in a Virtual Classroom (currently Adobe Connect). In addition, a "digital twin" of the RFH system is made available to the students of the partner universities via Virtual Reality.

Figure 4: Impression from the laboratory

This scenario just described is the practical core of a project module jointly conducted by the partner institutions. This in turn is part of a successively intensified, curricular entanglement, which finally should lead to a double degree. The project will be implemented in close consultation and collaboration with companies, who can get involved in the course of studies in the following way: using the expertise of scientists, becoming a practice partner, fostering talents, promoting academic activity.

Tri-National Online Module CSR: Innovations in Collaboration, Teaching and Learning

Marie Brechbühler Pešková, Bern University of Applied Sciences; Sabine Hoffmann, Niederrhein University of Applied Sciences; Iris Humala, HAMK University of Applied Sciences; Martin Wenke, Niederrhein University of Applied Sciences

Sustainability according to the 17 Sustainable development Goals (SDGs) of the UN as well as the contributions of the business sphere to sustainable development within the framework of Corporate Social Responsibility CSR is a global task. Because only international coordination and cooperation will bring about significant and rapid changes towards sustainability, such internationality must also be brought into University education.

The paper presents a tri-national teaching module, so called COIL (Collaborative Online International Learning), which is carried out exclusively online as cooperation among three partners. It reports about the process of collaboration for planning and carrying out the pilot module run in spring 2019. It is shown, how the quality and intensity of the constructive communication among the supervisors and the members of the module supporting team has promoted the development of the online module. In this context, the challenges of planning and implementing a completely new module thematically for the exclusive online implementation are also addressed. Furthermore, the paper discusses the development of skills that students and staff need for the digital age: a) cross-sectional and subject-specific skills on sustainable development and CSR, b) skills for the digital age: online interaction skills that strengthen the know-how of people from diverse backgrounds & online presentation skills. It is described, what the student s' contributions during the whole module were, which instruments they utilized to carry out individual assignments using new digital tools (e.g. Screencast-o-matic presentations), what the outcomes of the qualitative group project works were and how the students' feedback looked like.

Based on the discussion of outcomes of the recently completed pilot of the CSR module, it is concluded that students reached the desired competences and that the pilot increased the speed of integration of sustainability into the curricula of the three participating institutions. The paper concludes with a summary of the evaluations of the teachers and the future integration in the curricula of the participating universities.

The contents are useful for all those who plan to teach the topic of "CSR strategy, management and consumer behaviour" in an overall context, taking into account the necessities of international cooperation and considering intercultural differences.

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Peer-to-Peer Strategy Development

Barbara Wagner, Florian Rampelt, Stifterverband / HFD

Higher education institutions (HEIs) need strategies to deal with the digital transformation of higher education. Contemporary higher education must necessarily provide a clear understanding on how digital technologies can enrich the student experience.

Amongst other activities, HFD offers peer-to-peer consulting services to German higher education institutions. This peer-to-peer strategy consulting is a developmental tool geared to universities that want to actively shape the digital turn in higher education and strategically reinforce the digitalisation of teaching and learning. Accordingly, it is addressed in a targeted manner to university leadership and each university's individual profile and goals. Central to this free-of-cost program are so-called peer experts, who accompany the university by sharing their own experience in the strategy process.

On the basis of a detailed self-reflection of the university, strategic approaches are developed in workshops on site together with the respective HEI, clear goals are defined and prioritised and the implementation of concrete measures is initiated. The strategy consulting also involves an exchange of experience between all participating universities.

From 2017 to 2019 more than 100 different higher education institutions from Germany applied for the opportunity to participate in the program, 22 have been selected to participate between 2017 and 2020. When selecting universities, particular emphasis is placed on a variety of types of universities and strategic challenges.

The contribution at the conference presents the elements of HFDs peer-to-peer consulting as well as the overarching findings from the first two years.

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Future Skills - Results of the International Future Skills Delphi Survey

Ulf-Daniel Ehlers, Baden-Württemberg Cooperative State University Karlsruhe / European Association for Institutes of Higher Education (EURASHE)

Research on future skills is the current hot topic of the day with fundamental changes in the job market due to a number of powerful drivers. Unlike many other studies, the results presented from this Delphi survey are taking a broader approach and go beyond digital skill demands in order to present a first model of future skills for future graduates. It is part of an overarching research project on "next skills" and collates opinions from an international panel of almost 50 experts from higher education and business. The term "future skills" is defined as the 'ability to act successful on a complex problem in a future unknown context of action'. The future skills model divides future skills into three interrelated dimensions, each containing an array of several skill profiles: the subjective dimension, the object dimension and the social dimension. Within these three dimensions, sixteen skill profiles have been defined, each containing further subskills.

The results from this Delphi survey indicate a shift from academic education and teaching to active learning of choice and autonomy, leading to a fundamentally different learning experience within a close or mid-term timeframe. The dimensions of future learning in higher education will comprise structural aspects as well as aspects of pedagogical design of academic learning. In general, experts estimate structure changes to become relevant much later than changes related to academic learning design. Four key drivers or "pillars of change" in the higher education market can be described, each having a radical change potential for HEIs and mutually influencing each other.

1. An emerging focus on future skills radically changes the current definition of graduate attributes in higher education.
2. Higher education increasingly becomes a multi-institutional study experience.
3. Students build their own personalized curriculum.
4. HEIs turn towards providing offerings for lifelong higher learning services.

The Delphi survey made a point to view future higher education from a students' perspective and envisioned future learning experiences. Four scenarios for future higher education can be described as gravitation centres of organizational development: (1) the future skill university scenario, emphasizing graduates' future skill development rather than knowledge acquisition, (2) the networked multi-institutional study scenario, multiple institutions providing a study program, (3) the my-university scenario, where students can build their own curricula based on personal interests and (4) the lifelong higher learning scenario, stretching higher learning way beyond initial higher education.

Success Factors for Networks in the Age of Digitalisation

Stefanie Brunner, Peter England, Carl von Ossietzky University Oldenburg

In the digital age, university executives are facing a special strategic challenge: in which networks should my university participate, in which cooperation should it engage? Which offers can my university (still) provide itself, but where is cooperation worthwhile? Not every network, not all cooperation works equally (digitally) productively. It is therefore of essential strategic importance to be able to identify good cooperation and networks. The crucial question is: Which factors make for a well-functioning cooperation and a useful network?

From the practical experience gained in the joint project "eCULT - eCompetences and Utilities for Learners and Teachers" (a cooperation of 13 universities and 2 associations in Lower Saxony to promote the quality of teaching through the use of digital tools, funded by the German Federal Ministry for Education and Research), we identify success factors for well-functioning networks and cooperation. Every day, digital and web-based tools are used for collaboration within the network, e.g. for the agile creation of joint products and services, for the cross-location coordination of joint activities, for the coordination of joint proposals or for the documentation of project results of cross-university teams and working groups.

In the presentation, we present the conditions for successful cooperation in the digital age. Fundamental questions are: *How does collaboration in networks change under the conditions of digitisation? Which skills and competences are needed to lead digitally supported cooperation to success? Strategically decisive is, among other things, the examination of the profile of one's own university: Where do we stand as an organisation? Where do we want to go in the future? What competencies do we have in-house? What else do we need to bring to the table?*

At the end of the input we will present concrete methods to identify an effective, valuable and promising cooperation - and provide the tools for the next steps.

Social (Tele-) Presence for the Virtually Engaged Teaching and Learning: What Ethnomethodologial Analysis of Social Interaction Can Tell Us

Keiko Ikeda, Don Bysouth, Kansai University

Our KU-COIL (now it is IIGE) aims at building IIGE international network, and one of the purposes for the network is to run a program called Applied Global Studies. This has been proposed together with Michigan State University, Malmo University, Western Washington University, and i-BAVI as well as Kansai University. For KU, this AGS program is one scheme for virtual exchange model embedded multilateral certificate program. With the Ministry of Education grant for 2018-2022, the strategies to develop partnership with US institution are priorities for many Japanese universities.

For IIGE, that is also the case, however, we are inclined more to establish multi-lateral advanced partnership within the IIGE network. The key for future design of online module building is engagement in one's learning process. There needs to be a design which leads learners to stay engaged, stay in connection, to sustain their community of virtual teaching and learning.

Defining a University's Value Offering as Part of Digital Strategy Development

Jerome Goerke, bbw University of Applied Sciences Berlin

Today's digital technologies are providing universities with an unprecedented ability to attract recruit and train talented students from around the globe. Although arguably positive, this development is nevertheless one that runs parallel with the expectations of those 'born digital'—young students who may simply expect that digital components be embedded within their course curriculum. When viewed in light of the rapidly growing trend of e-learning, and the fact that hybrid jobs, those that combine 'core skills' with digital skills, are expected to become the norm in the digital economy, there is now growing pressure on universities to stay relevant to bright and talented individuals in the digital age. Universities are therefore confronted with the challenge of attracting new talent and continuing to develop individuals into independent and critical thinkers, but to do so in an economic environment that is increasingly global, digitized and rapidly altering its shape through the impacts, both current and expected, caused by automation.

Fortunately, there are several ways in which a university can provide students with the skills and networks that will support them over the course of a working lifetime in the digitized economy. It starts with implementing structures and strategies designed to develop and strengthen international collaborations at an inter-institutional level, as well as at a faculty level. Once in place, strategic networks can be drawn upon to implement digital collaboration activities such as virtual exchanges, hybrid exchanges (combining both the physical and virtual), international student-teach-student activities and, if appropriate, collaboration activities on MOOCs that incorporate some or all of the above. These collaborations can be carried out using real or hypothetical settings starting from intermodular level through to the intra-institutional level if they form part of a university-wide digital strategy.

The presentation will begin by looking at some examples of network development initiatives that have been undertaken at the intra-faculty level at bbw University of Applied Sciences in Berlin. The presentation will then discuss the steps that led to the successful exchange initiative "International Process Simulation Challenge" while detailing the processes university management might consider when formulating an over-arching digital strategy. Here, particular focus will lie on developing each aspect of the strategy in terms of clearly defined student outcomes instead of digitization for digitization's sake—a process that is closely aligned with thinking from the perspective of the university's distinct value offering. The focus of final part of the presentation will be on the establish-ment and roles of the Digital Development and Exchange Unit (or locally named equi-valent) tasked with overseeing the implementation and management of digital strategies.

Avatar-Based Teaching and Learning in the Project MyScore

Heribert Nacken, Hani Sewilam, Anja Fitter, RWTH Aachen University

In the course of the DAAD project MyScore, which is funded by the BMBF for three years, the teaching and research area Engineering Hydrology of the RWTH Aachen University develops, implements and evaluates application possibilities of VR-scenarios of avatar-based teaching and learning. At the end of the project, they are made available as an open educational resource (OER). Since 2017, the Faculty of Civil Engineering at RWTH Aachen University has been offering the basic English-language course Sustainable Management - Water and Energy (SUMWE). The aim of the programme is to enable engineers of the future to understand the global challenges in a holistic and sustainable way. On this basis, they should develop approaches to solutions that are implemented and supported in and by society. The aim is to train socially responsible engineers whose competence actually encompasses all three dimensions of sustainability (ecology, economy & social affairs). The approach also focuses on the goal of building an integrated, interdisciplinary scientific landscape and supports the impact of the internationalisation of universities to the highest degree. A cosmopolitan approach and the aspect of sustainability anchored here in a special way are further arguments in favour of expanding the programme. The degree programme addresses essential tasks in the provision of services of general interest for society: water and energy against the background of sustainability.

The content of the modules at RWTH Aachen University is in line with the digitisation strategy of RWTH Aachen University. A blended learning approach is assumed throughout, whereby students can also take up to 5 CP per semester at other universities by participating in Massive Open Online Courses. The topic "Avatar based Teaching and Learning" will now be added to the teaching. The students experience and manage realistic career perspectives through role plays in VR scenarios. For example, they have to assert themselves in "disruptive scenarios" at citizen information events where they face a group of citizens with their digital avatars. In such scenarios, the prospective engineers can train realistic soft skills (e.g. maintaining composure in heated situations).

The lecture will give an introduction to the topic of avatar-based teaching and learning and present the four different teaching and learning scenarios that will be developed and implemented in the course of the project work.

Transfer of Teaching Innovations: a Collaborative and Efficient Blended-Learning Approach

Judit Tuschak, Universität Bayern e.V.

The digital transformation of teaching at higher education institutions (HEI) requires instructional and technical skills from HEI-teachers. They need knowledge about digital instructional methods and when, how and why to use them. But the provision of knowledge about a method, may it be presented as ideally as possible, will not change teaching habits, with the exception of particularly adventurous and dedicated teachers. To enable and encourage the transfer of digital methods into broad daily practice the provision of (theoretical) knowledge needs to be supplemented by on-site training.

Time resources of HEI-Teachers and instructional trainers are very limited. A new collaborative digital approach currently discussed by ProfiLehrePlus could address these limitations to further the digital turn. ProfiLehrePlus is the network of HEI-teacher-training-institutions of all Bavarian universities.

The proposed ProfiLehrePlus approach is based on a flipped classroom concept. Theoretical content about digital and analogue teaching skills is provided by online-modules. These modules are supplemented by on-site discussions, training and feedback sessions. The overall concept and the online-modules would be developed and generated by a single Bavarian HEI-teacher training institution, but would be hosted centrally for access by all Bavarian HEI-teachers. The corresponding complementary on-site training would be developed and conducted by the local teacher training institution.

The proposed concept requires a well-established network based on expertise and trust: despite differing conditions and requirements at each HEI, all teacher-training institutions need to contribute their own online-modules into the network and use online-modules of their partners. For efficiency this requires harmonization in structure and design of online-modules, coordination and a common understanding of required content. ProfiLehrePlus presents such a network, but in theory this approach is scalable to a national or international level.

This workshop aims to present the proposed approach and to discuss its implications and potential. It also aims to explore options for national and international collaboration using this approach.

"Data in the Disciplines" – Curricula Development at Bielefeld University

Meike Vogel, Juliane Theiß, Bielefeld University

The University of Bielefeld is constantly developing its study programmes, with a particular focus on core competencies. In the last few years, the university implemented a large federal-state funded programme ("richtig einsteigen.") to strengthen the students' literary and mathematical skills. Our aim is to embed the teaching of those skills in the regular curricula. In order to prepare and empower students for the digital age, the University has decided to place a particular emphasis on competencies that are necessary in the digital world and will be even more in the future. Even if these offers will be provided by the different departments, the University will facilitate the development and integrate the offers in the central quality management system.

One of the most important digital competencies of the future is data literacy. Data literacy describes the set of skills and competencies that is required to deal with data in a planned manner and to consciously use and question them in the respective contexts. Across all sectors and disciplines data literacy is the prerequisite for shaping the digital transformation. Therefore, Bielefeld University aims at integrating data competencies in the curricula of all disciplines and to raise awareness for the importance of data competence. For this purpose, the project 'DatKom' was initiated in early 2019 as a new component of the programme "richtig einsteigen". A multi-faceted and interdisciplinary team developed an innovative concept for anchoring data competencies as a teaching and learning objective throughout Bielefeld University.

In a first step, lecturers from several departments developed a data literacy module ('Data Literacy – cultural technique of the 21st century') which will be open to all undergraduate students from October 2019. One part of the module is the interdisciplinary lecture entitled 'Big Data is watching you! How to deal with data in the modern world.' From a multidisciplinary perspective, students will be given an overview of the role of data in science, economy and society including data protection and data ethics. In hands-on-sessions, students will be equipped with tools for data analysis and visualisation and will take first steps in coding to gain a deeper understanding of the transformation from data into knowledge. To complete the data literacy module, participants of the lecture can choose from a variety of connecting courses offered by different faculties to expand on their knowledge and advance their practical data skills. The commitment of seven lecturers from various disciplines and three speakers from local business and administration to participate in the data literacy lecture as well as the registration of more than 190 students (as of early September 2019) reflect the need for data empowerment from the perspective of professors, experts as well as students from all disciplines. The contribution will focus on the question of how the project tries to anchor data literacy in the regular curricula, both on the level of the discipline and on the interdisciplinary level.

Contribution of Online Platforms to the Communication of Scientific Topics to Arab Students

Ghmkin Hassan, Okayama University / Damascus University;
Mohamad Al Kadi, Osaka University / Damascus University

In recent years many online learning platforms have emerged. Those platforms are providing educational materials using the most available technologies. Some Arabic platforms also have created which targeting Arabs students across all Arabic countries. Although many studies showing that learning a foreign language can foster analytic thinking of students, many limitations still present when the whole scientific subjects are taught in foreign languages instead of the native languages. Moreover, many reports and studies are showing improving the outcomes of the education system by using native languages in the teaching. In the case of Arabic countries, although all countries share the same official language, Arabic, they differ from each other by the language used in education institutions and universities. For example, Arabic is using in Syria, English in Egypt, Lebanon, Jordan and Arab Gulf countries and French in Arab African countries. However, students in all of those countries have the ability to learn and interact using the Arabic language. Furthermore, using the Arabic language and online platforms side by side may gather Arabic students' beyond countries borders and providing more interactive environments where creative minds can meet and discuss. This strategy could benefit from recent technological resources to improve education and training in the digital age.

To test the impacts of the online learning platforms and social media on delivering information and teaching materials, we designed and gave a free online course in one of the most growing subjects in biological science, Stem cells, using the Rwaq platform designed to give free online courses using the Arabic language. The choosing of the subject was because of a lack of information in the Arabic language on this area. Along with this course, we also create social media platform called Bio-Arabic (Pharmacy & Biotechnology) to deliver recent studies and fundamental subjects in this field using Arabic language. As a result, we succeed to deliver a complete online course to more than 2500 students from different Arabic countries. The students attended the free online course, interacted and discussed with each other and with modulators using social media platforms and Rwaq platform. Moreover, a Pharmacy & Biotechnology page on Facebook became now the biggest Arabic page gathering more than 59.000 students from all Arabic countries where they have a chance to discuss, following and reading all advances in Biotechnology sciences in the Arabic language.

We believe that using online courses and social media could help to overcome some of the barriers in HEIs and could be used to make more effective strategies for teaching in the digital age.

Shaping the Next Generation of Europeans - Young Universities for the Future of Europe (YUFE)

Daniela Trani, Maastricht University; Tobias Ernst, Kiron Open Higher Education gGmbH

The Young Universities for the Future of Europe (YUFE) is a top-scoring European University alliance, selected by the European Commission to develop and implement one of the first models for a European University. YUFE consists of eight young research intensive student-focused universities and six specialised associated partners from across Europe. The YUFE partners share a dedication to the European spirit and commitment to build an education system that is open, accessible and inclusive, founded on the principles of open science, social responsibility and putting students at the forefront.

Being a multi-campus European University in the making, YUFE will inspire a new generation of citizens to actively participate in academic, civic and professional opportunities. YUFE will do so by offering truly European study programmes based on seamless mobility between learning environments at home and abroad. For staff, YUFE will be a means of developing their careers within a European environment. Students, researchers, innovators and professionals from other types of organisations and sectors will collaborate in knowledge-creating teams to tackle societal challenges. Workers in the YUFE regions and beyond will take up opportunities to upgrade their skills and universities and cities will work together to build strong and resilient communities. The YUFE European University will enable prospective students to compile their curricula, choosing from programmes offered at each of the eight YUFE universities. To allow access to all systems and facilities of these universities, the alliance will introduce a YUFE student card, valid at all participating universities. The official language of YUFE study programmes is English, but students who spend a period at a university in another country are encouraged and supported to learn the language of their host country. When they have successfully completed their studies, students receive a European diploma that will be valid anywhere in Europe. The diploma will not only acknowledge students' academic performance, but also acknowledge their effort in mobility, language learning, professional training, job shadowing and community volunteering.

To guarantee accessibility for as many students as possible, YUFE is preparing to set up a virtual European campus. Part-time students or interested citizens who want to follow a single virtual or physical course can also make use of the YUFE offer. For full-time students studying at one of the partner universities elsewhere in Europe, YUFE will develop housing solutions that facilitate cultural exchange, mutual support and integration with the local community. For example, an option YUFE is considering is furnishing special homes where students can live for free during their stay and in close proximity with local residents. They will be given the opportunity to contribute to the community in their neighbourhood, and to foster a culture of mutual support in all YUFE cities and communities. YUFE students will be immediately immersed in the local and regional society and will thus be the catalyst for further European integration.

Mapping the Development of MOOCs in Higher Education

Hongmei Sziegat, University of Tübingen

This study presents an overview of the development of MOOCs in higher education in a global context. It conceptualises the operation and business models of MOOCs in higher education. It assesses the impacts of MOOCs on digital innovations of higher education from the social-cultural, economic, pedagogic, and technological perspectives, based on the disruptive innovation theory (Bower & Christensen, 1995; Christensen, 2003).

With discourse analysis, it reveals the disruptive power of MOOCs to innovate higher education from the perspectives of essentialism and instrumentalism (Hamilton & Friesen, 2013; Storme et al., 2016). As a vehicle for massive societal change and widening access, MOOCs have the potential to open up higher education to the masses. MOOCs also speed up a move towards a globalised system of higher education as well as a trend of transnational virtual mobility of students and the virtual internationalisation of higher education.

With the MOOC evolution, MOOCs bring pedagogic and technological innovations in higher education and changes in the physical design of the campus to facilitate blended learning. MOOCs may transform higher education institutions' traditional teaching models and organisational structures and break their monopoly over courses and credits. Although ICT plays an important role in digitalising higher education, educators are the mainstream to innovate higher education in response to the hype of the "technologisation" of education and "technological solutionism" (Storme et al., 2016). The sustainable development of MOOCs needs to integrate MOOCs with digital pedagogy and ICT into on-campus teaching and learning in the digital ecosystem of higher education.

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Dutch Acceleration Plan

Jort Diekerhof, Charlotte Heystek,
Josephine Verstappen, The Association of Universities in the Netherlands (VSNU)

The Dutch education sector organisations of The Association of Universities in the Netherlands (VSNU) and The Netherlands Association of Universities of Applied Sciences (VH) together with the collaborative organisation for IT in education and research in The Netherlands (SURF) launched the Acceleration Plan for educational innovation with IT in 2018.

The Acceleration Plan for educational innovation with IT, works on the opportunities digitalisation offers the higher education sector in The Netherlands. Its mission is to create collaboration in and between the participating educational institutions, in regards to digitalisation. The programme started in January 2019, bringing together 39 universities and universities of applied sciences to work together on educational innovation with IT.
The programme runs for four years, until 2022, with the aim to:

1. Improve job market connection
2. Flexible education
3. Smarter and better learning with technology

The programme's steering committee, consisting of board members of participating institutions, defined seven focus areas:

1. Facilitating professional development for lecturers
2. Better connection to the labour market
3. Making education more flexible
4. Towards digital (open) educational resources
5. Evidence-informed educational innovation with ICT
6. Secure and reliable use of learning analytics
7. Acceleration of educational innovation with EdTech

In these areas, the teams consisting of experts in the particular fields of the participating universities define the national (IT) products that will be delivered by the end of the programme. These national products are things that are necessary or more efficient when they are organised on a national level, but should always severe the innovation on the level of universities. Although the programme is centrally headed, the strategy is to work bottom-up. In our presentation we present the structure and lessons learned on the first year of this program.

Teaching Professionals for Effective Use of Digital Opportunities

Ronald Spruit, Avans University of Applied Sciences; Kim Schildkamp, University of Twente; Marian Kat-de Jong, Avans University of Applied Sciences / SURFnet

Lecturers are the key to innovation in education. They deserve space, support, and opportunities for personal growth, especially when it comes to effectively using technology in their daily classroom practices. A wide range of new ICT opportunities for educational practices currently exist, such as anonymous digital peer feedback and assessment, and flexibility in time and place for courses and exams. The question is: How can we make sure all our lecturers – and not just those enthusiastic frontrunners – are well equipped, both in skills and in opportunities, to use ICT in their educational practices in an effective manner. This topic is one of the thematic zones in the Dutch Acceleration Plan for Educational Innovation with ICT. Over twenty Dutch higher education institutions (HEIs) are jointly working on solutions for professional development and facilitation of lecturers on innovation, using ICT, in education. In our first year as the zone 'Professional development and support of lecturers' of the Acceleration Plan, we have identified four initiatives to work on:

1. An integral approach to facilitation and professional development of lecturers. We are developing a 'motion sensor'. This is an instrument institutions can use to determine how they can strengthen teacher professionalization and facilitation within their institution at the different levels of their institute.
2. Professional development strategies. We are developing an overview of evidence-based examples of various forms of professional development (e.g. professional learning community, online support, and support by a coach). This overview will be accompanied by implementation advice. This advice is partly based on experiments undertaken within the Acceleration Plan (tried and tested). The first experiment will focus on digital peer feedback. Furthermore, we are developing a profile and training programme for education support staff.
3. Inspiring examples of innovative education with ICT. We are gathering inspiring best practices of educational innovation with ICT. We will present this in a way for lecturers to use when working over their own courses. These will eventually be presented in an interactive digital environment where lecturers can add resources, examples, and experiences.
4. Sector-wide anchoring of professional development with ICT. We are starting a nationwide conversation: Do current professional development options for lecturers (for example the University Teaching Qualification (BKO) and University Teaching Skills Qualification (BDB)) suffice with respect to educational innovation with ICT? In what ways can we best support our lecturers? How can the Ministry of Education (OCW), Association of Universities (VSNU) and The Netherlands Association of Universities of Applied Sciences (VH) help to create space for lecturers within the current structures? Or do we require new structures?

Strategies for Developing Library Networks for Transforming Higher Education in a Digital Age

Gafar A.F. Ibrahim, University of Nyala

The theme of Strategies Beyond Borders – transforming higher education addresses globalisation of ideas and plans for teaching and learning. Academic libraries have experienced pioneering digitalisation initiatives in higher education. They are the most significant institutions, according to Hart and Kleinveldt (2011), which provide information for research and development. Early computer networks used for bibliographic data exchange such as Illinois Library and Information Network (ILLINET) have preceded the internet of today (Lacroix, 1987).

This study examines Bergman's (2012) approaches of pragmatism and phenomenology that dominate theories of information seeking behaviour. Hence revisiting library policies and strategies are essential for enhancing collaboration in university curriculum design, research, teaching and learning in a digital age (ALA, 2001). Focus on individual learner and student-based teaching styles to make possible a shift from teaching to learning remains a great challenge for academic institutions that have poor access to information (IEE, 1997). Access to library material through enriched online catalogues enables transformation of higher education programs (British Library, 2007). Implementation of technical measures for facilitating support and interoperability of digital library protocols linked to social media platforms fulfil requirements of the new generations of information seekers (Sarip and Yahya, 2009). And recent advancements in artificial intelligence in regard to search and retrieval predict potential development of library 4.0 applications (Gil, 2019). Protection of intellectual property and advocacy for inclusion of the disabled people in access to digital information is a fundamental library task for building knowledge societies (Scheffler, 2019). Information literacy standards should be re-examined to promote student experience.

French Business Classes Go Digital

Aloisia Sens, Trier University of Applied Sciences

How to motivate students in Higher Education to learn Business French while focusing on spoken language? Using the examples of French A2 and B1 language classes at the Trier University of Applied Sciences, Environmental Campus Birkenfeld, the lecturer will illustrate how students are moved into the centre of the learning process in order to do justice to contemporary teaching and learning methods and to cope with 21st Century skills.

Have you ever dreamt of moving to Paris for an internship and live in the studio of the famous designer Carlos Pretaporter? For the students of the French A2 language courses at the Environmental Campus, this dream has come true. During a virtual internship created with the OpenOLAT learning management system, the students have to perform six business-related tasks. At the A2 level, which certifies elementary language skills, the online activities organised by the lecturer focus on revision and consolidation of previously acquired knowledge as well as on language learning in a professional context. Business-related subjects are introduced traditionally or by using the flipped learning method in the classroom context. The online tasks are solved using information and communication technology tools such as Padlet, Voicethread, or Glogster, and have to be completed by a specific deadline. Students play against each other, and points are distributed for individual achievement during the mission. Students can collect extra points through bonus activities such as intercultural quizzes like, for example, Kahoot. Personal progress is tracked weekly and featured in a so-called "high score" table.

In French Business B1 Courses, telecollaboration takes the centre stage. Together in tandems with French students of the partner university “Institut Mines Télecom d’Albi-Carmaux”, the German students have to collaborate on different tasks while using videoconference tools such as Zoom. Applying different ICT tools, they have to present a final result of their collaborative work, and intercultural differences have to be pointed out and discussed in the forum. In synchronous sessions with all participants moderated by the German and French lecturer, these intercultural differences are highlighted in order to prepare the participants to cope with the demands as future employees in our globalised society. Thus, the two great challenges of digitalisation and internationalisation which determine European Higher Education Program are combined in this course.

Designing a Platform for International Student Mobility

Hans-Joachim Feil, Capgemini Invent

Capgemini attended the Strategy Beyond Borders Conference to introduce the Platform for International Student Mobility (PIM), a project. The aim of the project is to overcome shortcomings within back office processes, which concern and inhibit student mobility. Within the aim of the Bologna Process, German universities goal is to increase international and European study programmes and study exchanges. As of now, the German outbound mobility goal, which is set at 50%, has not yet been reached. The lack of digitally supported back office processes within German universities, which leads to slow and inefficient processing times can be identified as one obstacle. To solve this problem, the Federal Ministry of Education and Research has initiated this project, which will benefit not only student applicants but also university examination boards and administration offices.

The vision of the PIM project is to develop a conceptual and technical framework for a platform that will focus on digitising back and front office processes within the structure academic recognition. The platform will support German universities to increase international student mobility, as well as German students' outbound mobility. In simplest terms, PIM is meant to enable easy access to, storage, and management of data. The three main processes the platform will focus on improving to achieve this is the submission of academic transcripts, the validation and digital processing of academic transcripts, and the provision and maintenance of information relevant to the recognition of academic transcripts. The project has focused and orientated itself on international best practices and benchmarks, while adhering to the international organisational and technical standards, There are ELMO, the data student exchange standard, and furthermore EMREX, which was developed by several European institutions and is now the basis of the working digital infrastructure in Norway and Sweden and Erasmus Without Paper (EWP). In the same time PIM has to integrate the national initiatives of digitizing Public Services defined by the German Online Access Law (Onlinezugangsgesetz/OZG).

The project is meant to run until the end of the year 2019 and is now in the transformational planning stage, guided by the specifications book. During the transformation stage the development of operator models, derivation of governance structure and resource planning will be carried out. Currently, the specifications book is being drafted and the central functionalities of the platform are being piloted with several universities.

Electronic Lab Notebooks

Bert Zulauf, Nina Knipprath, Heinrich-Heine-University, Düsseldorf

In times of digitalisation, the most common type of laboratory documentation can still be found on paper: in the lab notebook. The lab notebook is the constant companion of the researcher, no matter whether he changes the laboratory or the working group, or conducts his research at another location for some time. Some researchers treat their laboratory book as personal and private property and are reluctant to hand it over. After it has been completely filled with everyday research life, it is usually stored either in a box at the researcher's home or in the corner of some filing cabinet of the faculty. Even with laboratory books that are still in use, it is technically no easy task to decipher personal manuscripts and to place glued-in printouts in the right context. Much knowledge is lost over time; many experiments are conducted again and again wasting valuable time that could instead be used to build on existing insights and to focus on innovation. All this can be achieved with the use of an electronic laboratory notebook (ELN).

Electronic laboratory notebooks are a perfect tool for international collaborative laboratory work. They are in no way inferior to the classic paper form as the general principles of scientific work are followed, outcomes are documented and exchanged, and results can be consistently doubted. In addition, all work steps are logged on the basis of data records, data deletion is not possible, immutability is guaranteed by time stamps and all this is digitally searchable from different locations and across various experiments. With the right handling a quality gain is achieved and additional work in a laboratory community can be prevented. Organisational aspects of everyday laboratory life can be structured more efficiently and can be automated accordingly. Thus errors can be avoided and collaborative work can be carried out more transparently across many different locations.

We are aware, that it will be difficult for some scientists to break out of their old habits. That is why young students at the beginning of the curriculum are the point at which to start changing these habits. In this way, young academics, who will have to work with certain standards in research and speak the same electronic language as soon as they work together in an international context, are already taught to use the right tools from the very beginning.

Within our research data management cooperation "FoDaKo" with the Bergische Universität Wuppertal and the Universität Siegen, we at the Heinrich-Heine-University Düsseldorf have found out in discussions with scientists that an efficient usage of the ELN has to be taken into account already during the construction phase of the laboratory rooms. Nowadays a separate PC workstation is usually already provided in the laboratory. However, the interfaces from laboratory equipment to the ELN must be established and through the Digital Natives everyone brings a piece of digitalisation with their own device into the laboratory. We are in active exchange with our Paris ELN contacts and are trying to build up a community especially within NRW but also throughout Germany, in order to fathom the needs of the researchers and to steer the joint cooperation of the infrastructure facilities in the direction of ELN.

ZeDoLa – Database for Grade Recognition

Ulrich Schäfermeier, Hannah Möhring, Bielefeld University of Applied Sciences

As a higher education institute, the facilitation and extension of student mobility plays a major role in the fostering of internationalisation, cultural competences and cosmopolitan spirit. Students who have studied abroad return with multifaceted international experiences. With their new global skills and academic knowledge, they contribute to a more open intercultural community at home. To ensure that students gain the most out of their experience abroad, they need to be supported optimally and not burdened with administrative challenges - not only before and during, but also after their stay when they would like to have their grades recognised. A typical grade recognition process involves the request for grade recognition by the student to the Registrar's Office of their home university (Studierendenservice). This office will then contact the Examination Office of the relevant faculty and repeat the request, asking for grade recognition. Then, the Examination Office will turn to a lecturer who specialises in the particular field of study so that s/he can make a decision. This decision is forwarded to the faculty, then to the Registrar's Office and back to the student. If these decisions are regarded in isolation, the practice of treating students with similar courses the same is either disregarded or not performed as well as it could be. The German Higher Education Act demands that the same content of courses needs to be treated the same: When a grade for a specific course has been recognized successfully in the past, the same procedure should produce the same outcome when another student would like to have their grade recognized, with the same or similar course requirements (Fachhochschule Bielefeld, 2017).
ZeDoLa (Zentrale Dokumentation von Leistungsanerkennungen) is a database used at Bielefeld University of Applied Sciences that facilitates the grade recognition process for students' test performances at partner institutions when they return to their home university. If the afore-mentioned standard recognition process has run its course for a particular subject and grade once, and the decision about a particular test result was evaluated and successfully recognised, administrators working at the Registrar's Office of Bielefeld UAS document the decision in ZeDoLa. This decision becomes a reference for scenarios in which students would like to get a similar grade or course recognised. Rather than involving the faculty, Examination Office and lecturers in the process again, the Registrar's Office can refer to this database entry, thus reducing the administrative effort to reach a decision. Rejections (negative decisions concerning grade recognition) are also recorded, with an explanation why the recognition was denied. For each entry, it is possible to upload and attach a document to clarify the grading decision. The idea is to create anonymous cases for particular grading scenarios. With ZeDoLa, the grade recognition process is not only expedited but results in a transparent and standardised procedure across the university.

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Interdepartmental Cooperation and Development of Digital Strategies for the Internationalisation of Universities

Dominik Baumgarten, Stefan Karsch, Humboldt University Berlin;
Alexander Heinz, King's College London

In order to meet the increasing demands of digitalisation, new inner-university networks and forms of communication have to be created. Universities aren't digital companies, therefore technologies as well as their applications need to be established and coordinated, cross-institutional strategies must be arranged to compulsively cover the academic and administrative claims. The ability to build and manage inner-institutional project teams is as essential to delivering success as any of the other material (financial resources, technical equipment) and immaterial prerequisites (technical information, academic expertise, dedication and enthusiasm).

The program "International Mobility and Cooperation through Digitalisation" launched by DAAD has provided the impulse for creating entirely new mechanisms of planning and, if the proposal will be successful, program implementation in HU. We are proposing to present HU's model for an inter-institutional task force. We would like to explore to what extent this model can not only support an ambitious project for the use of digital technology to foster internationalization.

The proposal submitted by HU for DAAD's program has two core elements: using digital learning technology to market the combined expertise of HU and international partner universities in a given subject area, in this case classical archaeology, to universities around the world that do not have the relevant resources in that area. Similarly, HU proposes to enhance its academic reach to more international partners by way of expanding its course offerings for visiting students from around the world through the addition of digitally communicated content that reflect individual students' learning needs and partner universities curricular requirements. Altogether, HU wishes to use digital learning to enrich the portfolio of its international linkages, increase the number of international students who can participate in HU's courses and thereby enhance visibility and reputation for HU.

HU's response to DAAD's call for proposal involves a number of stakeholders at HU: HU's International Department is in charge of overall strategy development for the project. The bologna.lab, an initiative from the "Qualitätspakt Lehre", has in the past already facilitated the promotion of digital tools and methods for teaching and learning in various programs around the university, scholars from HU's well-renowned Winckelmann Institute for Classical Archaeology deliver the academic expertise and innovative teaching tools with the use of AV and VR technology. The chair in Computer Science Education / Computer Science and Society provides guidance and orientation with regard to the methodology of digital teaching and learning.

The breadth of actors involved in the project as well as their unusual constellation has led HU to reflect on new forms of inter-university collaboration and governance. HU has come to acknowledge that for a successful approach to digital learning, not only do we need to better understand the technology but we also need to revisit the mechanisms for creating new and up-to-date course offerings.

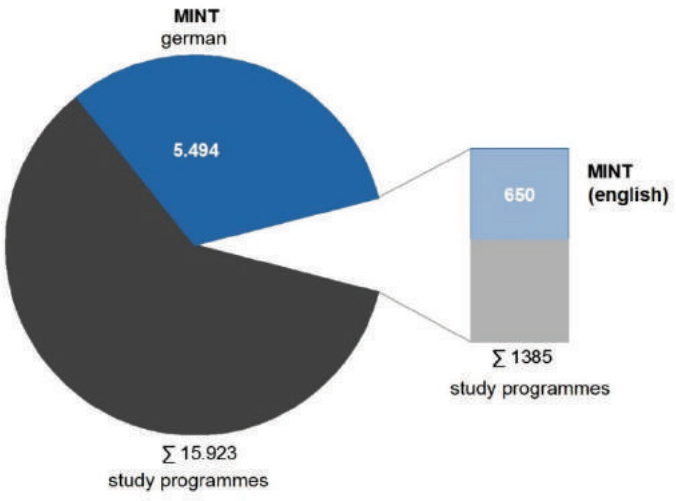
The contribution provides a "backstage tour" of the application process, discussing the "stumbling blocks" and lessons learned of the preparation phase as well as the unexpected and fruitful synergies that have already emerged from the application team's collaboration to date.

Lecture Translator

Raphael Morisco, Andreas Sexauer, Sebastian Stüker, Karlsruhe Institute of Technology

With the Lecture Translator (LT), the Karlsruhe Institute of Technology (KIT) is embracing the trend of speech recognition and translation within the tertiary education sector. Services in the context of automated speech recognition and machine translation are becoming increasingly common. With Amazon Alexa and Google Home, they are increasingly pushing the market for end customers. The Lecture Translator as an application within the framework of the internationalisation of universities fulfils the specific requirements in the context of a German university and can fill a gap. The focus is on improving internationalisation. The system has been set up and continuously optimised since 2012. The Lecture Translator is used in KIT lectures as an automated simultaneous translation service. This is based on the research of the Interactive Systems Lab at KIT. The system offers the possibility of using a transcription of the lecturer's lecture with simultaneous translation into several languages in a live session. The Lecture Translator at KIT is used to provide access to German-language courses of study for international students.

In accordance with its umbrella strategy 2025, KIT primarily offers German-language Bachelor's and Master's degree programs at the Bachelor's and Master's level, in which English-language courses are integrated. The aim is therefore to provide targeted support for international students and to attract talented young people to Germany. To this end, first-year students from abroad must not only be convinced to study in Germany, but must also be supported in the further course of their studies and motivated to stay after graduation. This also corresponds to the general picture in Germany. According to data from the HRK Compass, 90% of all study programs in Germany are offered in German.



Source: (n.d.). Retrieved June 11, 2018, from https://www.hochschulkompass.de/home.html.

In this context, it can be seen that knowledge of German is necessary for the integration into the

Figure 5 Own representation, based on data from HRK Higher Education Compass, 2018

place of study and work in Germany. Even with a basic knowledge of German, these degree programmes represent a challenge for international students. This means that a large proportion of the degree programs are not accessible to international target groups. A large-scale conversion of the degree programs to the English language is currently not to be expected, would discriminate against German citizens, does not meet with general acceptance and requires additional qualification of the lecturers. The Lecture Translator is a contribution to better tap this potential with regard to the internationalisation.

A particular advantage of the system operated by KIT over alternatives from the private sector is the consideration of data protection aspects and the specific trainability and adaptation of the service (vocabulary, language model, language style) to the respective domains of the lectures in order to increase the quality of the translation service.

The continuous optimisation process is closely linked to the endeavour to use the Lecture Translator more and more in lectures and seminars. The aim is to develop a guideline for the introduction at universities as well as an operating and billing model for service provision. This is intended to open up this IT infrastructure for machine speech recognition and translation to the entire university landscape in Germany.

The contribution of the Lecture Translator at the Strategy Beyond Borders Conference is to present the general potential of the Lecture Translator and to present and demonstrate the state of the art live.

Clearing the Rocky Path: Digital Solutions for an International Student Journey

Wolfgang Radenbach, Anne Sennhenn, Dirk Lanwert, Chahira Nouira, University of Göttingen

Since 2010 the University of Göttingen has been providing students with comprehensive digital services to support their experience abroad and its staff with easy access to digital infrastructure to facilitate all processes aligned with international student mobility. Emphasis is put on a successful preparation of the semester abroad (1.) and an easy recognition process after returning to Göttingen (2. & 3.) These services use standard software, to ensure transferability.

During a live session, the following digital services mainly from the student´s perspective were presented and participants had the opportunity to explore and try them out:

1. The right choice of modules during an exchange semester is often a challenging decision process combined with the uncertainty of the possibility to transfer the abroad-achieved credits after returning to the home university. Therefore, the University of Göttingen has been providing students with a comprehensive and easy-to use database, merging information on all credit transfer records since 2010. Worldwide open access is provided through the universities data platform "FlexStat". Data is collected automatically as part of the recognition process. Thus, every academic achievement is recorded, which makes the process transparent.
2. To make the process for recognizing credits achieved abroad as easy as possible for all students and lecturers involved, we have established an electronic workflow, which allows covering all steps required. Students just need to fill out a single form. All necessary information is collected at once and in a structured way. Students do not need to identify responsible persons, like module managers, examination committees, etc. themselves. The electronic form automatically passes the application through all necessary steps until the data is finally written into the student's electronic examination record. Students who prefer counselling are always welcome to schedule an appointment with their study program coordinator to fill out the form together.
3. Great achievements have been made in driving digital transformation in Higher Education Management to enable an international student journey; however, transcripts are still mostly paper documents.

Supported by DAAD in phase 1 of the IMKD project and by BMBF the University of Göttingen became part of the European EMREX-network and is, in cooperation with RWTH Aachen developing procedures for the electronic exchange of academic achievements.

Establishing these open standards with partners in Europe and beyond will further foster international student mobility according to the student journey:

- The transfer of the data can be initiated even after returning home. Digital transfer can be run any time from any place.
- Data is electronically signed; therefore, it is easier to ensure authenticity.
- Through functioning interfaces, data will be automatically passed to the electronic workflow described in section 2. There is no need for students to enter data again, further decreasing administrative hassle for them and increasing, the quality of the data.

Insights were provided into the practical implementation of these solutions that are easily transferable, in order to enable interested organizations to implement them similarly.

Contribution of 3D Simulation for Learning and Training in Universities

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3D simulation benefits are unanimously recognised. It offers rapid experience acquisition, learning and management of dangerous and/or difficult situations, which needs to be reproduced under real life conditions. For several years, many fields (aviation, driving…) have been using 3D simulation and its benefits to train their learners. Moreover, the simulation impact has evolved considerably since the development of virtual headsets, which increase the immersion sense and offer more realistic experiences.

Given the high success of this technology in industrial and public sectors, the medical sector is also joining the trend and requests various virtual training simulators. Thus, surgeons can now learn to handle the scalpel virtually as a guarantee care safety. The simulators cost remains unaffordable for public universities, especially Algerian universities. These latter, can be used to cover the lack of practice, which is experienced by some teaching fields, especially those of electrical, electronic engineering and architecture.

In this context, our contribution is part of the conference topic of innovation in teaching and learning. It is based on a 3D simulator tool presented in a live demo. It is dedicated to students in electrical engineering and those of architecture. These two areas are chosen based on their complementarity in the field of sustainable energy and efficiency. To create this simulator, we used Unreal engine (game engine) and Autodesk 3DSmax (3D computer graphics program).

Moreover, the existing tools —peculiarly those made for energy efficiency— are specific to the contexts of their design. For example, heat loss calculation software, which helps architects dimension walls, considers only the standards and climates of the countries that designed this software. Thus, we notice that there is a lack of tools adapted to the Algerian norms and climates. Besides, the machines needed for real tests in electrical engineering are expensive and represent a mortal danger for untrained users.

Our 3D simulator incorporates the installation and configuration of photovoltaic panels on an inclined roof of a dwelling. It offers more advantageous simulations and results than the ones given by the usually used software (MATLAB, SCILAB, TRNSYS …). Moreover, architecture and energy efficiency fields consider the parameters of both physical and social environment of the studied context. In this regard, our 3D simulator can easily integrate and setup these architectural parameters.

The results obtained from our simulator are of great importance to the different users (students of electrical engineering), because they are more realistic and very close to the real context. As future works our 3D simulator will be also tested for students of architecture and environment. Furthermore, we propose to integrate in our simulator a feedback based on deep learning to treat facial expressions. The goal here is to have an objective measure of the user's emotion valence. Hence, an indication of the user rate of apprehension regarding the use of our simulator in his learning/training process.

Our results demonstrate 3D learning simulators interest and usefulness for students of different fields. Moreover, our contribution shows the possibilities of adapting this learning tool to the local context. It shows also the possibility of integrating new settings as architectural parameters, the advantages of multidisciplinary case studies and the ever increasing technology evolution.

Innovation by Virtual Reality in International Collaborative Teaching

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Armin Brysch, Kempten University of Applied Sciences

Extended Reality is the emerging technology in many applications, both in industry and at the consumer side and affordable devices become available for teaching scenarios.

In this demonstration of educational technologies, we are presenting two application scenarios of collaborative, international teaching in VR that exploit two distinct advantages of VR technology. The first advantage of VR is the sense of presence that stems from the immersion into the virtual environment. Students from different places join together in a virtual telepresence environment and interact with each other, solving exercises and discussing their progress. As the VR technology isolates the students from their surroundings, their engagement is much higher than in a 2D telepresence scenario and thus the efficiency of the collaborative learning approach is increased.

In our scenario, students from France, Spain, and Germany have joined together in a virtual telepresence environment that was provided by technology from Arthur Digital using HTC Vive equipment at their respective locations over a thousand kilometres apart. In the virtual environment, the students are able to perceive each other as avatars which are animated with the information provided by the VR equipment, i.e. the head movements (VR goggles) and the hand movements (controllers, outside-in tracking). The students can teleport, examine and move objects, create whiteboards, and write on them. They can import objects into the environment and add annotations to objects as text or voice.

The task is to learn vocabulary in different languages, including correct pronunciation and to play through a short commercial selling sequence. The corresponding goods and the market place is setup at the beginning and the students discover the names of the goods that are annotated in English, both in written as well as spoken form. The self-awareness in the VR and seeing the other students' reactions immediately created a natural social interaction. They rapidly engaged into the scenario, exchanging not only about the objects in English language but also teaching each other the vocabulary in their native language much in the same way as it may happen when on vacation. After the experiment, the students reported that they enjoyed the conversation and that they learned the vocabulary with ease.

In the second scenario, a different advantage of VR compared to conventional teaching is exploited: The possibility to visualize in immersive 3D space. A higher education learning nugget was implemented in 3D-VR using Unity as a software development platform and again the HTC-Vive. The mathematical topic of homogeneous coordinates is interactively explained. The student manipulates the position of points and straight lines in the VR environment and observers the direct

relationship between the 2D and the 3D coordinate system in real time. The direct interaction and the free choice of viewpoint by teleportation engage the students.

Both teaching scenarios will be presented. While the students benefit from collaborative international VR-education, new concepts are required and the implementation is time consuming. This calls for international collaboration on providing such VR learning nuggets. Further work will include the formal evaluation of these VR learning nuggets.

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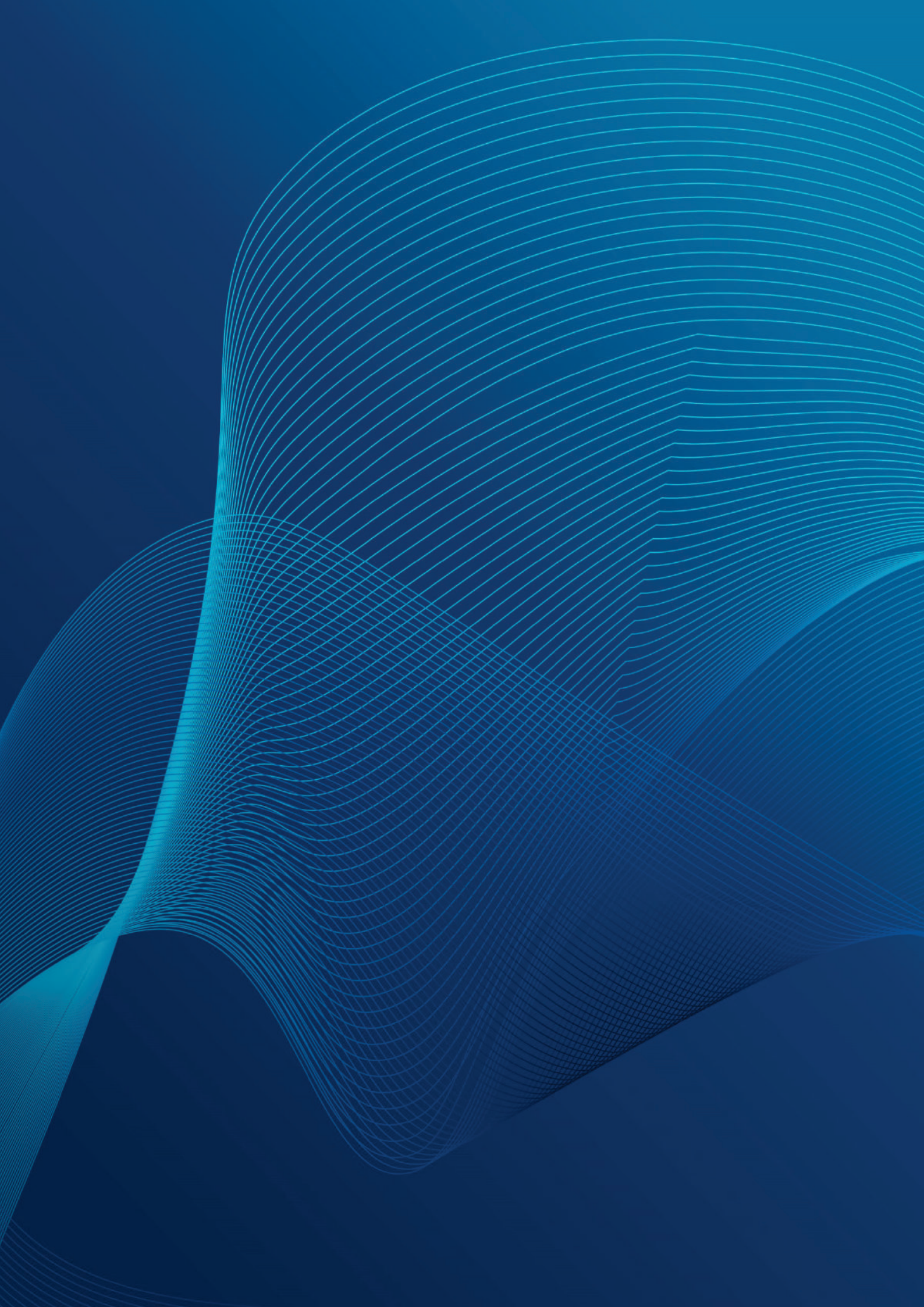

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