GUAF

Global University Associations Forum

Similarities and Differences in the Digital Transformation of Higher Education

Perspectives from Africa, the Arab region, Asia, Europe, and the Americas

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This report has been established by synthesizing the main observations and findings from the regional reports, led by EUA and CAHE. Authors of the regional reports provided a major contribution by reviewing and commenting in several rounds

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Introduction

The Global University Associations Forum (GUAF) brings together major university associations from around the globe. In 2024, GUAF dedicated a working group to the issue of digital transformation. The purpose was to compare the developments in digital transformation in higher education, with a focus on learning and teaching, and also in light of the developments during and after the Covid-19 pandemic.

This report has been developed based on the regional and national reports submitted by GUAF members, which share the state of play and major developments in their regions and countries (see Annex for regional and national reports). Universities around the globe acknowledge the need to further explore blended and online learning to meet growing demands for flexibility and accessibility. However, the challenges faced in implementation, such as technology access, infrastructure development, and educational strategies, vary significantly across different regions and countries. As the title suggests, the report presents the similarities in the approaches taken and the challenges encountered in the ongoing digital transformation. There is considerable convergence in general trends and directions, but there are also some marked differences. For the details and references of the initiatives mentioned, please refer to the regional and national reports in annex.

Our joint work on the topic started in 2023; the regional and national reports were produced in autumn 2024, and therefore represent the situation at that point in time. As digital developments are fast, and due to the recent emergence of generative artificial intelligence (AI), there is constant evolution on this topic .

Table of contents

Introduction	**4**
Glossary	**6**
Executive Summary	**8**
1. Digital learning and teaching	**13**
1.1) Blended learning: the new normal	**13**
1.2) Enhancing capacity for online learning	**15**
2. Lifelong learning and microcredentials	**17**
3. Certification of learning	**18**
4. The growing use of AI	**20**
5. Student learning assessment	**23**
6. Equity and inclusivity: *addressing the digital divide*	**26**
7. Quality assurance	**27**
8. Capacity building	**29**
8.1) Building digital learning environments	**29**
8.2) Support for students and faculty	**31**
8.3) Improving digital infrastructure	**34**
8.4) Challenges experienced with digital infrastructure	**36**
9. Collaboration with industry	**37**
10. Regulatory frameworks and legislation	**39**

Glossary

AArU	Association of Arab Universities
AAU	Association of African Universities
ACE	American Council on Education
ACU	ASEAN Cyber University
AfriCAS	African University Capacity Assessment Framework
AI	Artificial Intelligence
AICTE	All India Council for Technical Education
AIU	Association of Indian Universities
ASEAN	Association of Southeast Asian Nations
AUN	ASEAN University Network
AUN-Dx	AUN Digital Transformation initiativety Network
AUNILO	AUN Inter-Library Online
AUN-QA	AUN Quality Assurance
AUN-TEPL	AUN Technology Enhanced Personalized Learning
CBSE	Central Board of Secondary Education
CII	Confederation of Indian Industries
DigCompEdu	European Framework for the Digital Competence of Educators
ECTS	European Credit Transfer and Accumulation System
ESG	Standards and Guidelines for Quality Assurance in the European Higher Education Area
GER	Gross Enrolment Ratio
GUAF	Global University Associations Forum
HEIs	Higher Education Institutions
ISTE	International Society for Technology in Education
MOOC	Massive Open Online Course

MoU	Memorandum of Understanding
NAAC	National Assessment and Accreditation Council
NCBS	National Credit Bank System (Thailand)
NCERT	National Council of Educational Research and Training
NEP	National Education Policy (India)
NETF	National Education Technology Forum
QA	Quality Assurance
RTE	Right to Education
SWAYAM	Study Webs of Active Learning for Young Aspiring Minds
UGC	University Grants Commission (India)

Executive summary

How has the COVID-19 pandemic impacted digital approaches to teaching and learning at universities? This was one of the issues discussed at the Global University Associations Forum (GUAF) in 2023, at a time when the World Health Organisation had recently announced the end of the pandemic, and universities had resumed face-to-face activities on campus.

All of the associations felt that the experience of the COVID-19 pandemic has significantly affected universities. The immediate impact was of course negative, as the pandemic disrupted higher education institutions' normal functioning and caused significant hardship for students, staff and leadership. However, there were also some positive outcomes, as it required institutions to rethink and reorganise their higher education model, not only with regard to education, but also research, innovation, governance and management. Universities were forced to abandon their established approaches, for example by pivoting to online provision and open-book examinations. This led to a reflection on how to make institutions more resilient and capable of guaranteeing continued provision in times of crisis, and also on how to innovate in learning and teaching. Some changes are already visible, but it remains to be seen in the medium to long term whether they will be maintained and how exactly they might impact the student experience and the way that higher education institutions (HEI) operate.

To explore these issues more systematically, GUAF set up a dedicated working group.. On the basis of regional and country reports from the different partners, the group compiled a joint report presenting the similarities and regional differences in the state of play, and also strategies and priorities for further change.

The main findings are presented below:

Blended and online learning are universally recognised, as they allow greater flexibility and accessibility of learning, which is a priority in all regions, albeit under very different circumstances.

All associations confirm that **blended learning** has become more common. This development is the result of ongoing pedagogical and didactic change and innovation, the growing presence and use of digital media, and broader societal and economic transformations. There was no indication that the importance of the university as a physical campus-based institution has diminished or will do so in the future. But its role and functioning may change.

One possible development is that universities increasingly boost access and flexible provision through **online education**, in response to the increasing demands of learners who are not, or not regularly, on campus. For some countries and regions, such as Europe and the USA, the primary goal of online provision is to reach out to sub-groups who cannot attend regular on-campus classes (e.g. people in the work force, those with certain disabilities or mature learners). In addition, online learning can help people to undergo upskilling and retraining or to change careers, and it can help mitigate the effects of ageing populations and decreasing demographics. For some regions, it is also important as it can also boost the enrolment capacity and thus help to increase the numbers of school graduates accessing higher education.

Generally, it was found that digitalisation had improved prospects for **lifelong learning**. All associations confirmed the link to social and economic development, and in particular skills needed for the labour market. **Non-degree education** and **micro-credentials** seem to be on the rise globally. This may mean a change in the mission of HEIs.

While changes due to digitalisation have been unfolding, **artificial intelligence (AI)** has also arrived: all eight regions anticipate that AI will have a major impact not only for society and the economy, but also for higher education, particularly with regard to learning and teaching provision, and for the way in which HEIs function. Given the opportunities, but also the risks, that AI presents, HEIs have a responsibility to prepare graduates and society at large to use AI in their professional and private lives.

The easy availability of digital technologies, in particular generative AI, has highlighted the pressing need to rethink learning provision. To take the example of **student learning assessment**: while this has been a key issue in the context of learning outcomes for many years, technological developments are now forcing HEIs to replace or redesign certain assessment formats and approaches. For example, essay writing as a means of assessment has declined with the emergence of generative AI. On the other hand, the use of AI in assessment is becoming more common, subject to rules and regulations.

Mainstream and regular use of AI is still uncommon, but experimentation is occurring globally; its use varies widely among and within regions and countries due to availability issues or a lack of infrastructure, funding and policy support, legal restrictions, and ethical and cultural concerns. North America and China seem to be the most advanced regions, whereas in Europe the legal framework requires a very cautious approach, and other regions are still building the necessary infrastructure.

AI has also the potential to boost education provision, particularly participation and inclusion, and better-quality and more flexible student-centred learning. There are considerable concerns, however, due to the ethical challenges involved and the many other known and unknown risks. There are grave concerns over generative AI's reliability, given its tendency to hallucinate, inherent biases and ethical issues, and academic integrity. Where it is used, attentive human oversight is required.

There is unanimous acknowledgement that digital solutions can help to **foster equity and inclusion**. However, all the associations agree that this process is by no means automatic. Rather it requires dedicated policies and investments, if it is to avoid widening existing social inequities and creating new ones. All eight regions confirm that they face issues related to the digital divide and educational inequality, and are working on various measures to address these challenges. In Europe and the USA, inclusion efforts particularly target populations with disadvantaged backgrounds. In Africa, India, and Latin America, they are often focussing on infrastructure and widening participation and access.

Due to the more systematic and regular use of digitally enhanced education over time, and the strong push during the COVID-19 pandemic, in all regions, quality assurance (QA) is becoming a core issue for HEIs and QA agencies. In Africa, ASEAN, and Europe, QA of digitally enhanced learning and teaching is also being addressed at the regional levels, as part of existing regional QA approaches.

All eight regions emphasise the need for **capacity building**, in various respects:

- It is vital to create a robust **digital learning environment** to foster students' digital skills, literacy, and academic integrity. This offers major opportunities for peer-to-peer learning and cooperation, sharing practices and resources within and between institutions, and also across countries and regions. This requires guidance on enforcing institutional standards capacity building, and investment. Governments as well as university associations and networks will have an important role to play in this process.

- It is equally important to further develop **support and training for students, staff and faculty**, despite tangible progress made since the COVID-19 pandemic. This is a priority for HEIs and university associations. In some regions, governments have provided support by funding new teaching and learning centres or upgrading existing ones. While individual regions face their own unique challenges, HEIs in all regions are hindered by limited staff and financial resources.

- Digitalisation requires robust **infrastructure**, and this was made particularly apparent by the COVID-19 pandemic. The choice and quality of applications for learning and teaching have significantly increased, but this also comes with relatively high costs, problems with interoperability and data privacy, and technological dependency on commercial products and services. Despite some shared challenges, this is clearly one of the areas where the disparities between and within regions and countries become very tangible with regard to the existence, accessibility and quality of the internet, and HEIs' capacity to purchase and maintain hardware and software.

When describing the **main challenges** experienced in their systems, HEIs unanimously emphasise the importance of further developing digital infrastructure. All of the associations also confirm the need to strengthen top-level design and strategic planning for their regions, actively developing digital campuses, integrating smart technologies into teaching and learning, and enhancing data security to accelerate the digital transformation of higher education. All associations are concerned about costs and sustainability. They are facing the realities of an insufficient and unreliable internet and electricity supply, as is the case in Africa, India, and Latin America, or are concerned about growing dependence on monopoly providers of software and services, and interoperability issues, as is the case in Europe and the USA.

This is also reflected in the **collaboration between HEIs and industry**, which is in many respects both an opportunity and a necessity, making it possible to align educational programmes with evolving skills needs, foster research and innovation in digital technologies, and contribute to broader technological and economic development. The COVID-19 pandemic expanded the range of technical solutions and services that are better adapted to HEIs' specific needs. However, there are major concerns about HEIs' dependence on commercial IT industry in terms of security, sustainability, ethics, and costs, and also the restrictions that this can entail for interoperability.

The emergence and widespread use of social media, cloud computing, big data, and AI technologies, and challenges related to cybersecurity, data privacy, and data information resources, also require changes to **regulatory frameworks and legislation**, which all associations confirm to be already underway. A common concern is how to ensure that the university sector's interests are properly represented in any legislative reforms made, and how to guarantee effective legal compliance checks, given the current pace of technological change. These challenges leave HEIs in a somewhat uncertain situation.

All of these issues are presented in the report, with some reference to the current state of play and any developments made in the different regions. For the latter, a full account is provided in the regional reports, which can be found in the annex.

Given the shared interests and concerns of HEIs and the continued impact of digitalisation on higher education, GUAF's work in 2025 is closely focused on AI. A GUAF report on the issue will be published in due course.

1. Digital learning and teaching

Digital learning and teaching methods represent a transformative shift in education, characterised by the integration of technology to enhance instructional practices. This section examines the various approaches, including blended and online learning models, and highlights their roles in fostering student engagement and accessibility. As higher education institutions (HEIs) adapt to the challenges of a digital age, they tend to develop different approaches due to the varying regulative frameworks and educational demands in their national and regional contexts, availability of technological resources and infrastructure, and pedagogical strategies, all of which influence students' learning opportunities and experience.

1.1 Blended learning: the new normal

The Covid-19 pandemic greatly accelerated the digitalisation of education, significantly advancing the use of online education at universities. Though the end of the pandemic brought a rush back to campus, some changes have been maintained in education provision and in administration and management. All eight regions report the increasing importance of blended learning approaches: while the digital transformation continues for most institutions, they still consider physical campus and physical presence to be indispensable. However, the combination of bottom-up exploration, institution-level and system-level steering seems to be quite differently accentuated across different countries and regions.

In the **United States of America (USA**), according to the 2021 Fall Term Pulse Point Survey of College and University Presidents conducted by the American Council on Education (ACE), 59% of institutions offer predominantly in-person instruction with some online components, while 50% also state that virtual provision has increased compared to pre-Covid 19 pandemic levels.

In the **Arab region**, blended learning is seen as an opportunity to enhance flexibility of provision, while maintaining the benefits of interaction with students and personalised support, which allows students to balance education with personal and professional commitments.

Across **Africa**, universities recognise the need for new teaching and learning models as a way to reform higher education and respond to demographic and infrastructural challenges.

In the member countries of the **Association of Southeast Asian Nations (ASEAN)**, universities continue to modernise by integrating technology use in their education provision. The ASEAN University Network (AUN) has been actively participating in this transformation, with initiatives that promote digitalisation and enhance educational quality across the region. One notable effort is the AUN Digital Transformation (AUN-Dx) initiative, which aims to establish quality standards in institution information and communication technology systems and management.

In **China**'s HEIs, blended learning has become the new norm, with large-scale integration of online and physical presence.

In **India**, the pandemic prompted a re-evaluation of traditional models and a rethinking of learning and teaching strategies. The sudden transition to online and hybrid modes of instruction highlighted the need for innovative approaches to pedagogy, curriculum design, and student engagement. Consequently, there has been a concerted effort to integrate technology more effectively into the educational framework, ensuring that learning remains accessible, inclusive, and resilient in the face of future disruptions. This period of introspection and adaptation has paved the way for a more flexible and forward-thinking educational landscape. The regulatory bodies have made provisions for online learning in a gradual manner. Universities that meet certain standards are being allowed to offer online programmes.

The case of **Latin America** is complex and diverse: some HEIs have made significant technological advances and have now implemented hybrid and continuous education; others are still in the early stages of digital development and capacity building. In all institutions, however, the Covid-19 pandemic clearly accelerated the transformation process.

Europe experienced a rapid and extensive expansion of digital education approaches. Although blended and online education models were already in use at most HEIs, the pandemic significantly accelerated their enhancement and mainstreaming. With the end of the pandemic and the return to campus, European HEIs continue to explore online, onsite and blended provision with a focus on more flexible and interinstitutional learning provision.

1.2 Enhancing capacity for online learning

While the HEIs continue their education provision on campus, and with different degrees of blended provision, their engagement in diverse forms of online provision in collaboration with national and international initiatives is also continuing and increasing.

Africa faces challenges such as limited access to technology, inadequate internet connectivity, and power shortages, which hinder digital education development.

In the **USA**, the National Center for Education Statistics stated that distance education courses and programmes provide students with flexible learning opportunities: about 9.4 million students (61% of all undergraduate students) were enrolled in at least one distance education course and 4.4 million students (28% of all undergraduate students) took distance education courses.

In the **Arab region**, online courses and digital resources are being scaled up to accommodate larger numbers of students at relatively low additional cost. This reduces the need for physical infrastructure and, in turn, lowers operating costs.

In **ASEAN** countries such as Thailand, Malaysia, Indonesia, and the Philippines, significant strides have been made in digital education provision, especially regarding self-paced programmes and blended learning, supported by the introduction of national credit bank systems. Thailand's Ministry of Higher Education, Science, Research and Innovation has established the National Credit Bank System (NCBS) , integrating records from Thai Massive Open Online Course (MOOC) Academy, the country's largest national digital learning platform. In line with national strategies, the MOOC Academy promotes lifelong learning and offers free courses to over 2 million learners. It also collaborates with the ASEAN Cyber University (ACU) project. The ASEAN University Network (AUN) supports this collaboration by advising the ACU Board and ensuring alignment with regional goals. The AUN Inter-Library Online (AUNILO) facilitates resource sharing and networking among AUN Member Universities. In tech-enhanced, personalised learning, the AUN Technology Enhanced Personalised Learning (AUN-TEPL) promotes AI and digital-powered learning, and collaboration on capacity building, online course exchange, digital resource sharing, and education research. AUN-TEPL has signed a Memorandum of Understanding (MoU) with the MERLOT, providing a platform dedicated to sharing digital resources. As of 15 June 2024, over 400 ASEAN university faculties are on **MERLOT**, with over 44 materials authored or submitted by AUN-TEPL members.

China has enhanced the development of MOOCs and international online learning platforms. The National Smart Education Public Service Platform, launched in 2022, now has over 97,000 multilingual MOOCs, creating a global, open, and inclusive digital learning service system.

In **Europe**, in addition to the longstanding offer of open universities, conventional HEIs have gradually increased their online education provision, but in different forms and with changing trends. More recently, however, it seems that the continuous growth of MOOCs that started in 2012-13 may have come to an end, likely due to the rise of non-degree education (including micro-credentials), which is also provided in online and blended models. It is still too early to assess how regular degree education is impacted by digitally enhanced provision and also by the enhanced attention and recognition given to non-degree education. While the end of the Covid-19 crisis heralded a general move back to campus, exploration and experimentation with blended and hybrid provision in Bachelor and Masters continues and is subject to changing institutional and national regulations.

Since 2016, **India** has made significant progress in promoting digital education and online courses through the University Grants Commission (UGC). As part of the "Digital India" initiative, the UGC established regulations for online certification courses in 2018, aiming to enhance the accessibility and quality of higher education. By 2020, the number of students enrolled in digital courses had surged, with platforms like SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) offering over 2,000 courses and attracting more than 10 million learners. This initiative has not only democratised education but also ensured that students from diverse backgrounds can access quality learning resources. The government's commitment to digital education is further reflected in the allocation of ₹8,000 (approximately $1.1 billion) in the 2021 budget for the development of digital infrastructure and online education platforms. These efforts underscore India's dedication to leveraging technology to create a more inclusive and resilient educational ecosystem.

Although **Latin American** HEIs have invested significantly in digital education as part of modern education, their governments have prioritized investments in other areas, due to social and economic problems, national security and above all, migration. This has resulted in a significant technological gap between public and private HEIs.

2. Lifelong learning and micro-credentials

Digitally enhanced provision can help to overcome physical distance and enable asynchronous, self-paced, and self-directed learning. As a result, it opens up new avenues for lifelong learning and continued professional development. In recent years, this has led to an increase in the offer of non-degree education through micro-credentials and micro-certificates in all regions, as well as greater attention at policy and higher education institutional levels.

In the **USA**, ACE evaluates non-collegiate training and education programmes, including online offerings, to determine their equivalency for college credit recommendations. ACE collaborates with Credential Engine, which works to increase the transparency and recognition of these credentials to support lifelong learner mobility and success. Furthermore, through the Alternative Credit Project, ACE has united 58 traditional and non-traditional education providers to increase acceptance of alternative credit. It has also reviewed and provided credit recommendations for 104 low-cost and free general education digital courses across more than 20 subject areas.

In the **Arab region**, the Arab Universities Consortium emphasises the importance of lifelong learning by offering modular courses, micro-credentials and flexible learning pathways to meet learners' diverse needs. This approach primarily targets adult learners who want to update their professional knowledge and skills, or pursue career advancement or change, but also learners seeking personal development. In addition, students use these offers to broaden and advance their knowledge and skills within and beyond their discipline. This means that learning becomes a more continuous process, adaptable to the changing needs of labour markets and individual learners.

In **Southeast Asia**, the AUN has been actively advancing micro-credentials, primarily through its ASEAN Cyber University Project (ACU). This initiative supports the development and delivery of short, flexible, and quality-assured online learning opportunities across ASEAN universities. The ACU Project encourages the institutional adoption of micro-credentials that respond to dynamic learning demands and evolving labour market needs. The project also aligns with the ASEAN Digital Masterplan 2025 and supports ASEAN's broader goals in creating interoperable and learner-centred digital education ecosystems. In 2024, the AUN conducted a regional survey targeting students and faculty to assess readiness, perceptions, and institutional barriers related to micro-credentials.

3. Certification of learning

Certifications help validate competencies in using digital tools and designing effective online learning experiences. Efforts are being made to standardise and expand these programmes to ensure broad accessibility and relevance. Challenges include varying levels of access to training resources, regional disparities, and the need to continually update programmes to keep pace with technological advancements. Investing in talent development and certification is key to improving educational quality and fostering innovation across the region.

In **Africa**, the AAU has launched initiatives on quality assurance (QA), credentialing, and assessment of student learning, but faces challenges in digital education, including lack of infrastructure and skills.

In the **USA**, non-degree education is growing rapidly. ACE, which has championed expanding access to postsecondary learning to non-traditional learners for many years, strives to increase the transparency and recognition of non-degree credentials and to support lifelong learner mobility and success. ACE also evaluates non-collegiate training and education programmes for college credit recommendations.

In the **Arab region**, AArU is exploring innovative e-assessment methods and emphasizing the importance of lifelong learning with modular courses and micro-credentials.

In **ASEAN**, the AUN has been driving talent development and certification through regionally coordinated quality frameworks and digital transformation initiatives. One example is the AUN-QA Training and Certification pathway, which equips faculty and academic staff with competencies in QA processes, including those applicable to online and blended learning contexts. These certifications, widely recognised across ASEAN, support professional advancement and cross-border mobility by ensuring that staff meet regional benchmarks in educational quality and institutional effectiveness. ASEAN is exploring the use of digital credentials through initiatives such as common frameworks and pilots. These efforts have clear benefits for students and institutions, and fosters collaboration with industries in the context of higher education.

China and **India** place high importance on talent development and certification systems.

In **China**, the Ministry of Education and eight other government departments have implemented the "1+X Certificate" programme, which has now developed over 18,000 vocational skill standards. The Ministry of Human Resources and Social Security has certified more than 127,000 digital technology engineers, while the National Credit Bank of Vocational Education has stored over 372 million learning achievement records.

In **India**, there is a strong emphasis on secure, verifiable digital credentials stored on trusted platforms. This is a welcome development as it makes qualifications more recognisable, prevents fraud, and offers numerous advantages for learners and institutions, which also perceive this as a way to promote themselves and employers. Digital credentials also foster collaboration with industries, ensuring graduates have the skills employers seek, and promote smoother transfer of credits between institutions, benefiting students seeking to continue their education elsewhere. Surveys confirm that students are very keen to do micro-credentials in addition to their degrees, as they see it as a way to enhance their skills and employability prospects.

In **Europe**, the European Union has placed strong emphasis on micro-credentials as part of the digital and green transition and in view of the shrinking workforce. This has brought increased focus on non-degree education, encouraging HEIs that already provided such programmes to enhance their offer more strategically, and prompting others to introduce them. In some systems, national platforms have emerged. The Bologna Process concluded that its existing instruments can extend also to micro-credentials, which contributed to diminish uncertainties regarding QA and recognition. In addition, the EU is working to develop a European framework for digital credentialing for university diplomas and possibly also micro-credentials. Digital credentials are already a reality in some HE systems, for instance in the Netherlands.

In **Latin America**, credentials are crucial for building a skilled workforce capable of leveraging technology in teaching and learning. Initiatives are focused on providing professional development opportunities for educators, such as training programmes and certification courses that enhance digital skills and pedagogical approaches.

4. The growing use of AI

All eight regions recognise the significant opportunities presented by AI. They anticipate that it will bring major changes for society and the global economy, but also for higher education, particularly with regard to learning and teaching provision. Higher education has the responsibility to prepare graduates – and society at large – to use AI in their professional and private lives. AI could also change education provision, and this clearly a cause for optimism with regard to enhanced participation and inclusion, better quality education, and more flexible student-centred learning. However, it is also a cause for concern due to the ethical challenges involved and the many known and unknown risks. Experimentation is occurring globally, though to differing degrees between and within regions and countries due to availability or lack of infrastructure, funding and policy support, legal restrictions, and ethical and cultural concerns. Overall, it seems that mainstreaming and regular use are not yet in place in all regions.

In **Africa**, some international initiatives are addressing AI in higher education through investment in AI literacy and education, ethical AI research and innovation. This is helping to ensure inclusivity and equity in AI-driven decision-making, and so on.

In the **USA**, discussions are highly focused on the research and computing capacities of colleges and universities, as these are the cradle of the research enterprise and workforce, and talent development for the future. However, there is less reflection on how AI applications affect the organisation of universities. To address this blind spot, in 2024 ACE held a briefing in Capitol Hill on "Higher Education and AI: How AI Can (and Will) Support Campuses and Students." It announced plans to explore the launch of the Global Data Consortium intended to facilitate collaboration rather than competition or an arms race. Additionally, individual universities and university networks are developing their own initiatives, exploring pedagogy, curriculum development, and services to address the AI-related needs of their communities.

In the **Arab region**, AI technologies such as ChatGPT have been integrated to provide personalised feedback, tutoring and support to students. AI is also being used in the context of learning analytics, to track student progress, and to identify and overcome problems in learning provision and design.

In **Southeast Asia**, universities are increasingly exploring and adopting AI technology. To complement their efforts, the ASEAN University Network Technology-enhanced and Personalized Learning (AUN-TEPL), and AUN Digital Transformation Thematic Network (AUN Dx) have been established, to ensure the integration of advanced AI tools into ICT infrastructures

and facilitate capacity building for educators. The 4th AUN-TEPL Symposium in 2024 on "Advancing the Frontiers of Technology-enhanced Personalised Learning through Generative AI" provided a vision of learning in an AI-driven world. It shared effective strategies for leveraging the affordance of AI and navigating the challenges to enable capacity building, curriculum integration, and a personalised student experience and learner-centric assessment choices.

China is also building an "AI + Education" innovation ecosystem, advancing the application of generative AI in teaching and the development of the National Education Big Data Center to empower a new smart education paradigm.

In **Europe**, there is broad consensus that AI in education and academia is of increasing importance and needs to be harnessed to prepare students and society alike. There is also shared concern over how it can be used responsibly and ethically in education, research, and management. Even so, universities are continuing to experiment with AI in teaching, research, and management, often in combination with research. A growing number of institutions have adopted institutional policies or guidelines, or plan to do so, as many students and teachers are already using generative AI. However, more regular and mainstreamed use is yet to come. In addition, there are marked differences between national systems, individual institutions, and disciplines. For example, in STEM fields, AI is gradually becoming a part of the curriculum in research processes. But there are concerns regarding data quality and ethical safeguards, and also doubts whether these challenges can be solved to enable meaningful large-scale application of personalised learning through AI.

In **India**, universities are exploring methods to integrate AI into teaching, learning and assessment. It also plays a central role in the National Education Policy 2020 (NEP) as a means to achieve the ambitious target to raise the Gross Enrolment Ratio (GER) in higher education from the current 27% to 50% in 2035. In pursuance of the NEP 2020, the National Council of Educational Research and Training (NCERT) has introduced a new National Curriculum Framework for School Education including an introductory course on AI at secondary level. Following a decision of the Central Board of Secondary Education (CBSE), its affiliated schools introduced AI as a subject in class IX (from 2019-2020) and in class XI (from 2020-2021). AI-powered virtual classrooms, tutoring systems, and educational platforms are also seen as a means to enhance learning beyond geographical boundaries, reaching marginalised populations and democratising education in Tier 2 and Tier 3 cities.

The use of AI in **Latin America** is growing rapidly across various sectors. Governments, businesses, and educational institutions are increasingly adopting AI to address challenges in areas such as healthcare, agriculture, finance and

education. AI is also being used to enhance public services, improve efficiency, including through data-driven decision making. For instance, AI applications help optimise crop yields, diagnose medical conditions, and automate customer service. Efforts are also being made to address ethical concerns and regulate the use of AI. But these developments are seemingly less pronounced than in some other world regions, due to limited infrastructure, lack of skilled professionals, and digital inequality. Latin America's AI ecosystem is still developing and unevenly distributed across the region. Countries like Brazil, Mexico, and Argentina are leading in AI development, with their governments launching national AI strategies and investing in research and innovation.

5. Student learning assessment

While student learning assessment has been a key issue in the context of learning outcomes for many years, the emergence of digital technologies, in particular AI, has highlighted the pressing need for assessment methods to be revisited and reformed. Assessing student learning in a digital context is of course pivotal for improving learning design and provision. But technological developments also require replacing or at least reconceptualising certain assessment formats and approaches. For example, essay writing as a means of assessment has declined with the emergence of generative AI.

Therefore, in all regions it has become increasingly important to show innovation in reforming assessment methods, as well as in the related areas of ethics and academic integrity. For example, while AI solutions for assessment are becoming more common, there are major concerns about inherent biases. Attentive human oversight is required to ensure responsible use.

By exploring innovative assessment tools and techniques, the discussion highlights the importance of providing timely feedback and fostering a culture of continuous improvement. Ultimately, effective assessment practices are essential to ensure that digital learning environments meet the diverse needs of learners and promote their academic success.

In **Africa**, the Association of African Universities has launched several initiatives to enhance the assessment of student learning across the region. These efforts focus on learning outcomes and competencies, including the launch of a competency-based assessment framework for African universities (African University Capacity Assessment Framework – AfriCAS), microcredentials, digital badges and the provision of faculty training on assessment. The AAU also engages with ed-tech companies to develop innovative assessment tools and learning analytics, and to inform instruction and improve

student learning outcomes by developing online learning platforms for student assessment and learning analytics, among others. Additionally, it has initiated a Pan African initiative for comparing student learning outcomes, and encourages research on assessment.

In the **USA**, learning analytics play a vital role in creating personalised approaches to student learning assessment and support in digital environments. Some institutions are using predictive analytics to estimate student progress in courses and majors, while others are combining data with digitally mediated teaching, to prescribe interventions. At the same time, survey results suggest that the use of learning analytics data among institutional leadership is still limited. The rise of AI-assisted tools such as ChatGPT poses new challenges for assessing student learning outcomes: In traditional assessments focused on recall and summarisation, AI easily provides answers to students. In response, institutions are exploring authentic, multimodal assessments that require original thought and complex performance.

In the **Arab region**, digital exams are used to assess students' performance through secure, proctored online exams and project-based assessments that demonstrate the practical application of knowledge. Institutions are exploring adaptive testing and use AI-based tools to create personalised assessments that adapt to the learner's level of proficiency.

China is exploring the use of information technology to improve results assessments, strengthen process evaluation, and provide a value-added assessment. The goal is to enhance learning by providing students with the necessary support and personalised learning paths, and to move away from the traditional focus on scores. AI and big data platforms are perceived as a means to improve the scientific accuracy and objectivity of educational assessments, and to predict student learning habits, in order to provide personalised learning suggestions and prevent students from failing courses.

In **Europe**, there has been a shift toward e-assessment over many years, including at institutions which did not specifically prioritise digital learning. One motive is no doubt the rationalisation of assessment processes in view of large student cohorts. More important, however, are pedagogical innovation and the concepts of learning outcomes and student-centred learning. These are longstanding policy priorities, both in the EU and in the Bologna Process, underpinned by the credit system (ECTS) and the shared European QA rules (ESG), and are therefore key aspects of course and curriculum development. The emergence of generative AI tools, along with the Covid-19 pandemic and the challenges of conducting closed-book examinations remotely, have further fuelled debates and initiatives on assessment. This has led to greater emphasis on "fraud proof" assessment methods, resulting in, among others, a ban on the use of digital technology during

assessment, e.g. by emphasising oral examinations and written examinations with paper and pencil. More innovative and meaningful methods of assessment (constructive alignment) are also being explored, e.g. assessing learning through coursework, or problem-based learning, sometimes by including AI. Overall, the role of digital technology and AI remains ambiguous, as they have the power to boost education and assessment but are also a potential vehicle for fraud. In addition, there is strong concern over inherent bias. Therefore the EU data privacy rules and the AI Act, prohibit or at least restrict the use of digital and AI technologies. The strict data privacy rules and ethical concerns might be the reason why learning analytics are less widely used than in other regions. There is also growing concern about a flourishing international fraud industry, fuelled by AI, offering assistance in the form of plagiarism to both academics and students.

In **India**, institutions put a strong focus on learning outcomes, beyond rote memorisation, and emphasise skills like critical analysis, problem-solving, and effective communication. This includes open-book exams encouraging students to use digital technology and AI to form their own conclusions. AI-powered adaptive testing is being explored to customise the assessment experience for individual learners based on their performance and learning needs. In addition, Indian universities are studying the potential application of AI for detecting plagiarism in student work. Its use of text analysis and machine learning techniques can also generate feedback on student work, for essays or written responses. There is also strong interest in research work on the use of AI in education, as evidenced by various national and international conferences on the topic.

Digital assessment of student learning in **Latin America** is emerging as a tool to modernise education and improve evaluation processes. Digital platforms enable more flexible, efficient, and scalable assessments, offering real-time feedback and personalised learning paths. These tools are increasingly used to track student progress, particularly during remote learning due to the Covid-19 pandemic. Brazil and Mexico are leading efforts to integrate AI in education, but other countries often still lack the infrastructure and resources to fully benefit from these tools. Ethical concerns around data privacy and fairness in AI-based assessments are also key considerations as the region moves forward.

In **Southeast Asia**, the AUN has actively been enhancing assessment practices through digital tools and quality frameworks. Under its AUN-QA mechanism, the network promotes the use of clearly defined learning outcomes and constructive alignment in both face-to-face and online modalities. The network also supports the integration of assessment within broader QA frameworks, recognizing the importance of student-centred and outcome-based education in the region. Additionally, the Technology Enhanced Personalized Learning network (AUN-TEPL) facilitates collaboration among universities to pilot AI-

supported and data-informed assessment models that can personalise feedback and monitor learning progress.

6. Equity and inclusivity: *addressing the digital divide*

> **Digital solutions have the potential to foster equity and inclusion, but also to widen existing social gaps and create new ones. All eight regions face issues related to the digital divide and educational inequality, and are working on various measures to address these challenges.**

In **Africa**, governments see digitalisation as a major opportunity to increase access and participation through digital education, in particular for underserved populations. HEIs are trying to mitigate equity challenges through a host of measures, ranging from general measures to ensure that digital education is accessible for and inclusive of all students, regardless of location, disability, or socioeconomic status, to digital literacy and skills training, and a focus on AI biases. But significant challenges remain, among them rather obvious ones, such as limited access to technology and internet connections, and insufficient electricity supply.

The digital divide in the **USA** impacts learning among low-income and minority students due to a lack of reliable connectivity and devices. ACE's Education Blockchain Initiative aims to address this, along with other initiatives designed to promote equal access to digital education.

ASEAN is working on enhancing digital skills and literacy to address the digital divide and educational inequality through initiatives that improve digital infrastructure and promote collaboration and resource sharing among member universities.

Through policy initiatives like the "Education Informatization 2.0 Action Plan," **China** has implemented the National Education Digitalization Strategy (2022-2025), establishing a two-tier digital education platform system at both national and local levels. The National Smart Education Platform has aggregated over 90,000 high-quality digital resources. Through the "MOOCs Westward Initiative," more than 40,000 courses have been delivered to central and western regions, achieving a 96% resource coverage rate in rural schools. In 2023, course sharing between eastern and western universities in China increased by 63.5% year-on-year, effectively narrowing the educational digital divide.

In **Europe**, there is no doubt that students (and staff) vary widely when it comes to their skill levels and ability to harness technology and infrastructure for the digital transition. However, it would seem that digital technology is boosting inclusion, equity, and diversity in higher education, with digital learning being of particular benefit to mature students and those who work part-time or are self-employed. The Covid-19 crisis proved that the problem is less a digital divide than a social one. That said, there are still problems with internet access, in particular in rural areas. Higher education institutions also face challenge when purchasing and maintaining hardware, and financing licenses and access for all students.

In **India**, the "high-risk" classification of AI in education needs to be carefully considered in the context of country's persistent digital divide and digital poverty. Many students lack access to reliable internet connectivity and devices, which raises concerns about whether they will truly benefit from AI-powered educational tools and devices. Without proactive measures to bridge this gap, digital education provision could inadvertently widen the disparity in educational opportunities.

Equity and inclusivity in **Latin America** face significant challenges due to the digital divide and digital poverty. The digital divide causes disparities in access to technology and internet connectivity between different socio-economic groups, urban and rural areas, and countries within the region. Digital poverty exacerbates these issues by limiting access to essential digital tools and resources. Efforts to address these challenges include government initiatives, NGO projects, and private sector investments aimed at improving infrastructure, expanding internet access, and providing affordable technology. Promoting digital literacy and inclusivity is crucial for bridging gaps and for ensuring that all individuals can benefit from digital advancements. Some progress has been made, but addressing the digital divide remains a complex task requiring continued focus on equal access and targeted support for underserved populations.

7. Quality assurance

> **While digital education can widen access and participation, and improve the quality of the education experience, it requires changes in QA. In all eight regions, external and internal QA focused mainly on campus instruction, as the provision of digitally enhanced and distance education, though not uncommon, was not usually mainstreamed. Due to its more systematic and regular use over time, and the strong push during the Covid-19 pandemic, adapted QA has become more relevant, and has been pursued in all regions, albeit in different ways.**

In **Africa**, the Association of African Universities has launched several initiatives on QA in higher education institutions (HEIs), such as the Harmonisation of African Higher Education Quality Assurance and Accreditation Initiative, and African Standards and Guidelines for Quality Assurance. These initiatives support HEIs and national QA agencies, promote quality culture among them, and encourage distinctly African approaches to QA and accreditation through pilot exercises.

In the **USA**, there has been a drive to extend and adapt the existing robust QA approaches for in-person instruction to online and hybrid models, on various fronts and through a number of initiatives. For example, accreditation agencies have increasingly integrated online learning into their regular institutional review criteria and processes. At the same time, voluntary QA frameworks have proliferated, filling gaps and providing more specific guidance for digital teaching and learning.

In the **Arab region**, standards for digital education programmes are being developed and enforced to ensure they meet QA criteria. Other measures include implementing secure and reliable online assessment methods to prevent cheating and ensure fairness; utilising monitoring technologies and rigorous verification procedures to maintain academic integrity; and updating the regular review and digital education practices based on feedback and performance data.

As part of the QA of education in **ASEAN**, the AUN-QA conducts institutional and programme assessments for HEIs and other higher education development activities, which are also adopting digitalisation. For instance, AUN-QA's 2024 International Conference addressed the theme 'Embracing AI Integration, Database Utilization and Future-Ready Quality Culture'. The conference explored innovative strategies and forward-thinking solutions for how AI can elevate higher education quality development and assurance.

In **China**, ensuring quality in digital education is paramount. China has established quality standards and educational service rules based on principles of openness, fairness, and justice. Documents such as the 'Several Opinions on Strengthening the Teaching Management of Online Open Courses in General Higher Education Institutions' emphasise data privacy, resource management, and mental health support. Institutions like Tsinghua University, Zhejiang University, and Sichuan University have dedicated platforms to ensure the quality of digital education..

In **Europe**, final responsibility for quality of learning and teaching lies with the HEIs. European HEIs and external QA agencies adhere to the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), which are

also applicable to digital learning and teaching provision. Excluding open universities specialised in distance and flexible learning provision, while most HEIs have already established digital learning and teaching in the last decade, this was not a prevailing trend, and was therefore not a reflection of QA practices. As digitally enhanced learning has become more common and mainstreamed, partly due to the Covid-19 pandemic, it has become a primary focus for institutional QA and QA agencies. In addition, the ESG are currently undergoing a review, with one of the goals being to give more explicit consideration to digitally enhanced provision.

In **India**, several regulatory bodies have taken measures to ensure quality of digital learning, including the University Grants Commission, All India Council for Technical Education, and Quality Council of India. These bodies establish guidelines for online learning platforms, covering aspects such as content creation, faculty training, student support, and programme accreditation. They also mandate online platforms to follow regulations for content delivery, examinations, and student support, and lay down guidelines for infrastructure, faculty expertise, and curriculum standards. Accreditation bodies such as the National Assessment and Accreditation (NAAC) and National Board of Accreditation have developed standards for QA in digital education.

In several countries in **Latin America**, there is ongoing work to implement robust QA frameworks that monitor teaching practices, curriculum relevance, and student outcomes. These frameworks often involve accreditation processes, external reviews, and internal evaluations to maintain consistent academic standards. As a consequence, accreditation standards are under revision to include online programmes and digital resources.

8. Capacity building

8.1 Building digital learning environments

> **All eight regions recognise that creating a robust digital learning environment is key to enhancing students' digital skills, literacy, and academic integrity. This needs investment, capacity building, and guidance on enforcing the establishment standards and on sharing approaches and resources. This entails an important role for governments as well as university associations and networks.**

In the **USA**, frameworks such as the ISTE Standards for Students provide a roadmap for the knowledge, skills, and mindsets needed to thrive in a connected world. In addition, some universities are offering a comprehensive suite of openly licensed, employer-validated 21st-century skills curriculum, video content, and digital badges.

In A**SEAN**, some countries provide funding programmes and support projects for awareness raising and capacity building, which target educational institutions along with governmental services, enterprises, and other sectors, to enhance digital literacy, security and effectiveness. At the regional level, the AUN Digital Transformation (AUN Dx) provides a "one platform, one protocol" framework specifically for HEIs, to enhance ICT capacity building, standardisation, cost-effectiveness and cyber security, in order to protect digital learning environments, foster trust, and enhance accessibility.

In the **Arab region**, the Association of Arab Universities (AArU) promotes digital developments through tutorials, best practice manuals, workshops, regular training programmes, curriculum integration, competence, and resource development, to ensure that all graduates and faculty are well prepared for the digital economy.

China is actively advancing the development of a digital literacy education system. Leveraging the "National Digital Literacy and Skills Enhancement Platform" to conduct systematic training programmes, the country has selected 78 universities and enterprises as the first batch of training bases. Concurrently, through the Teacher ICT Application Competency Improvement Project, China is strengthening faculty development to comprehensively enhance digital literacy and adaptability among both educators and students.

In **Europe**, universities are concerned about costs, but also technology lock-in, which implies a financial risk as well as posing a threat to quality, safety, and sustainability. The Covid-19 crisis and the emergence of generative AI tools such as ChatGPT highlighted the need to further improve student assessment in line with learning outcomes, but also the broader risks of academic integrity (including students), and generally the need to reconsider the changing ways and methods of working in academia and its numerous fields and disciplines.

India has developed a National Strategy on usages of AI in various sectors, including education. It sets direction on usage of AI in K 12 and higher education. Several funding schemes like Atal Tinkering Labs are being set in Schools to develop the infrastructure and competency. Universities can offer online programmes, provided they meet the standards required by the University Grant Commission. The Association of Indian Universities (AIU) has published a report setting out the

potential uses of AI in curriculum design, transaction and assessment.

In **Africa**, there is an urgent need to improve domestic digital infrastructure and develop Learning Management Systems for digital learning.

In **Latin America**, ensuring effective learning in a digital environment requires addressing several key challenges, including access to technology, internet connectivity, and digital literacy. In many countries, there are significant disparities in access to digital tools, particularly in rural and underserved areas. Governments and educational institutions are working to bridge this gap by providing devices, expanding internet infrastructure, and promoting digital skills training. Initiatives focus on teacher training, integrating technology into curriculums, and developing localised content that fits the cultural and linguistic needs of students. Despite these efforts, obstacles such as inadequate infrastructure, lack of resources, and socio-economic inequality continue to hinder widespread success. Collaboration between governments, private sectors, and NGOs is essential to create inclusive and effective digital learning environments that are accessible to all learners in the region.

8.2 Support for students and faculty

> **Prior to the Covid-19 pandemic, most teachers worldwide did not have hands-on experience of teaching online. While this has now changed, all eight regions emphasise the importance of capacity building for both staff and students. Training and support measures are a priority for HEIs, and also for the university associations, and in some regions supported by government. In several regions, a goal is the establishment of new, or upgrading of existing learning and teaching centres, to provide more and more systematic support and training to larger numbers of teachers and other staff. While individual regions face their specific challenges, a shared one is limited staff and financial resources.**

In **Africa**, the Association of African Universities offer HEIs a range of capacity building initiatives, such as training programmes on the use of Learning Management Systems for faculty and students, and workshops targeting university registrars and other administrative staff. In addition, it provides educational technology support.

In the **USA**, faculty-centred, pedagogically driven, and equity-minded professional development is critical for high-quality digital learning at scale. In collaboration with experienced faculty developers, ACE has developed a "beta faculty development center matrix." This tool provides a framework for teaching and learning centres to assess current status and programme offerings, establish and communicate professional standards, set goals and priorities for improvement, and advocate for funding and resources. The Matrix is designed to support centres as catalysts for professional learning and teaching excellence in an increasingly digital education landscape.

In the **Arab region**, digital teaching skills have been incorporated into continuous professional development programmes for teachers.

In **ASEAN**, the AUN's Digital Transformation Thematic Network (AUN Dx) aims to nurture universities' ICT capabilities. The network promotes institutional readiness by supporting universities in developing robust ICT strategies, enhancing technical infrastructure, and equipping faculty and staff with essential digital skills. It also encourages knowledge exchange and peer learning, enabling member universities to benchmark progress, adopt best practices, and collaboratively address challenges in digital integration. By actively engaging with AUN Dx's integrative framework, member universities ensure they stay abreast of the latest advancements in the field. This involvement allows them to benefit from collective knowledge and expertise, fostering a robust community dedicated to enhancing institutional ICT management and quality. Specific AUN initiatives such as the AUN-QA Training Series include components on digital pedagogy and assessment, crafted to help faculty improve their online teaching practices while maintaining QA standards. Simultaneously, the AUN-TEPL Thematic Network works across institutions to advance faculty expertise in personalized and technology-mediated instruction, often through pilot projects, webinars, and development of online modules. These efforts are further boosted by partnerships with ASEAN Dialogue Partners and regional ed-tech collaborators, ensuring that digital training is not only contextually relevant but also forward-looking.

China issued the Teacher Digital Literacy industry standard in 2022, establishing a comprehensive evaluation framework covering digital awareness, technical skills, and innovative application. The country is promoting faculty digital competencies through initiatives such as the National University Teachers' Teaching Innovation Competition.

In **Europe**, digital skills and digital teaching skills are offered through specific training schemes, but tend to be integrated into existing schemes. Most of the staff training is organised by the institutions themselves, but some countries have strong

and well-established national schemes for staff development. There are also many initiatives at European level, through networks and associations, often supported by Erasmus+. The European Commission has supported the development of shared frameworks and instruments such as the European Framework for the Digital Competence of Educators (DigCompEdu). As "a scientifically sound framework describing what it means for educators to be digitally competent," DigCompEdu is to guide and support training, but also the development of training schemes at institutional and national level. The current issue in Europe is not primarily digital, but stems from career assessments placing significantly more value on research than on teaching and other professional activities. The assessment of academic careers is expected a bring a paradigm shift, and in many countries is being followed up at institutional, national and European level.

In **India**, due to resource constraints, budget limitations, and a shortage of technical staff, there is a focus on practical digital skills training and targeted development based on educators'' varying digital skill levels, and in due consideration of language differences to ensure broad and inclusive participation. Teachers undergo brief orientation courses on various blended learning models, enabling them to select the most suitable approaches offered by Human Resource Development Centres and Academic and Administrative Development Centres. Training comprises among others the development of blended modules and programmes, and the creation of MOOCs on specific subjects. National and state-level libraries are being established for consultation and training purposes, and to showcase best practices.

In **Latin America**, teachers' digital skills are increasingly vital as technology becomes central to modern education. Since the COVID-19 pandemic in particular, many educators are working to adapt to digital tools for teaching, assessment, and communication. However, there is a significant gap in digital proficiency among teachers, particularly in rural and underserved areas. Efforts are underway to provide training programmes and professional development opportunities that promote digital literacy and teaching with technology. Challenges include limited access to technology, lack of infrastructure, and insufficient institutional support. Improving teachers' digital skills is critical for effective digital education, student engagement, and fostering innovation in higher education across the region.

8.3 Improving digital infrastructure

Digitalisation requires a robust infrastructure, and this has been further highlighted by the Covid-19 pandemic. The choice and quality of applications for learning and teaching has significantly increased, but also comes with relatively high costs, issues regarding interoperability and data privacy, and technological dependency on commercial products and services. Beyond the shared challenges, overall, this is clearly one of the areas where the disparities between and within regions and countries become very tangible with regard to the existence, accessibility and quality of internet, and the capacity to purchase and maintain hardware and software. All countries and regions report issues of inclusion and equity, in particular regarding students, and the risk that digital technologies – which can foster inclusion – could also further increase the social divide.

In **Africa**, governments provide funding and resources for digital education infrastructure and programmes, including broadband and connectivity. Key interventions include digital identification systems, digital repositories for academic resources, learning management systems, student information systems, broadband, and open data initiatives.

In the **USA**, the Biden-Harris administration made significant investments to close digital equity gaps and advance racial equity in higher education access and attainment, and to overcome historical inequities in which federal government has allocated more funds for research and development to predominantly white institutions. This disparity has severely impacted the campus infrastructure of other institutions, including their ability to invest in digital technologies.

In the **Arab region**, investment in robust digital infrastructure has started, including high-speed internet, learning management systems, and digital libraries.

ASEAN is following the Master Plan on ASEAN Connectivity 2025 and its derivative, ASEAN Digital Masterplan 2025, to construct a better digital infrastructure. The AUN, as an implementing body, also has activities promoting better digital infrastructure in ASEAN universities. For instance, AUN Dx enhances digital infrastructure by supporting ASEAN universities with improved connectivity, cloud platforms, and cybersecurity. It facilitates shared digital resources and training, enabling institutions to adopt advanced learning technologies, empowering ASEAN universities to upgrade their IT systems, ensuring a more resilient and inclusive digital environment across ASEAN.

China has implemented a digital education strategy initiative, establishing the world's largest 5G+ smart education dedicated network. The coverage rate of digital facilities in HEIs has reached 100%, with the National Smart Education Platform surpassing 35 billion cumulative visits.

In **Europe**, for their main operations, most institutions rely on the offer provided by large technology companies as the most reliable solution in terms of organisation, service and safety. However, these solutions may not fully respond to specific needs, and carry the risk of monopolies and tech lock-in. There are also concerns over data privacy issues. Many institutions are also developing their own responses, or rely on local or national solutions, for example for national student information systems. Overall, information technology and infrastructure and the necessary services remain a major concern due to challenges involving interoperability, safety and security, sustainability and the related costs. With the return to campus after the pandemic, blended and hybrid education provision also required the adaptation of physical structures – which was challenging given the limitations caused by existing, partly historical buildings, planning and permissions required, and in particular the associated costs.

In **India**, the government has been working to enhance the digital infrastructure. The Ministry of Education together with the IT Ministry is committed to connecting all states, districts, blocks, and villages to internet with broadband connectivity through fibre optic lines and satellites, to ensure that all HEIs, teachers, and students, even in the remotest areas have access. To support synchronous learning and media-intensive activities, a minimum threshold for upload and download speeds is being established. For online learners, various Learning Management Systems are being developed in a digital environment. The National Educational Technology Forum, established by the All India Council of Technical Education (AICTE), will function as a dedicated e-education unit, to boost digital infrastructure, digital content and capacity building. All HEIs will develop requisite ICT infrastructure, ensuring access to digital devices and internet connectivity for all teachers and students, especially girls. Institutions will utilise free and paid technology platforms like MOODLE and Google Classroom, and subscribe to video conferencing tools. Teachers will maintain personal blogs for academic content, and students will have digital identities. This comprehensive approach aims to enhance technology readiness and support blended learning across the nation.

Digital infrastructure in **Latin America** is a critical factor for economic growth and technological advancement but varies significantly across the region. While urban areas often have better connectivity and access to advanced technologies, rural and underserved regions face challenges such as limited internet access, low broadband speeds, and inadequate

technological resources. Governments and private sectors are investing in expanding and upgrading digital infrastructure to address these disparities. Initiatives include improving internet coverage, enhancing network capacity, and promoting digital inclusion. Despite these efforts, challenges remain, including high costs, regulatory hurdles, and the need for further investment to ensure equitable access and support digital transformation across the entire region.

8.4 Challenges experienced with digital infrastructure

> **All eight regions emphasise the importance of further developing digital infrastructure. They focus on strengthening top-level design and strategic planning, actively developing digital campuses, integrating smart technologies into teaching and learning, and enhancing data security to accelerate the digital transformation of higher education. On the other hand, they have to face the realities of insufficient and unreliable internet and electricity supply, dependence on monopoly providers of software and services, and interoperability issues.**

In **the USA**, most institutions rely on cloud services and commercial learning platforms, but there are strong concerns about lock-in and lack of data control. ACE is working to advance standards for education blockchains and digital credentials.

While **India** is witnessing a steep increase in the use of technologies in education, this comes with a number of challenges such as a lack of infrastructure and a growing digital divide. Government and institutions are working on improving digital literacy and skills.
Africa has faced challenges such as lack of electricity, limited access to technology, and digital divide. Some initiatives aim to address these barriers and promote digital transformation in higher education.

In **Europe**, hybrid delivery and digitalisation of services have led to an increasing use of cloud services. Some HEIs use self-hosted solutions, while most use products from large technology companies. Many institutions use a combination of solutions, such as keeping important data on their own servers while using commercial solutions for other things such as online cooperation. Experimentation with blockchain for identification and to verify credentials is still very much in the testing phase and connected to a much larger debate about interoperability. This is just part of a much bigger puzzle, largely dependent on setting up a common digital ID infrastructure across the European Union (the eIDAS regulation).

Interoperability of university systems, including course catalogues, is being broadly discussed and experiments are ongoing, with well-working, scalable models yet to be developed.

The **Arab region** recognises the potential of digital learning and is promoting initiatives to enhance digital skills and literacy. The Arab Universities Consortium offers modular courses and flexible learning pathways for lifelong learning.
In **ASEAN**, there are frameworks emphasising digital infrastructure for higher education. Sector initiatives like AUN's projects are helping to improve and integrate infrastructure and capacity building. For example, AUN Dx promotes standardized ICT practices across universities of ASEAN.

China is promoting blended learning, developing digital platforms, and establishing standards for digital campuses. The government has also issued policies to enhance the information infrastructure and educational quality.

9. Collaboration with industry

Digitalisation and digital education also bring new opportunities for collaboration between HEIs and industry, to better address skills needs in their education provision, drive research and innovation in digitalisation, and contribute to technological advancement and economic growth.
This collaboration aims to better align educational programmes with evolving skills needs, foster research and innovation in digital technologies, and contribute to broader technological and economic development.
The Covid-19 pandemic expanded the range of technical solutions and services that are better adapted to the specific needs of HEIs.

In **Africa**, AAU has brokered research and project partnerships among member universities and development partners. Industry partnerships with HEIs in Africa aim to develop digital education programmes and foster skills development. The emphasis has been on integrating industry perspectives in curriculum design and implementation.

In **the USA**, higher education has been grappling with the double-edged sword of commercial IT solutions, but also collaborating with tech companies to advance educational innovation.

In the **Arab region**, AArU is committed to collaborating with member universities, governments, and the private sector to advance digital education. It also promotes collaboration and networking among member institutions to share best practices, resources, and expertise in digital education.

In **ASEAN**, AUN engages in various collaborative projects such as AUN-TEPL, promoting cooperation among universities, and also collaborates with external partners like the ASEAN Cyber University project, to offer via platforms such as Learning Management Systems and Open Educational Resources, and provide high-quality e-learning content to enhance skills, align academic programmes with industry needs, and drive innovation across the region. These credentials aim to boost employability and improve innovation readiness within ASEAN economies. In addition, the project meets the broader AUN goal of supporting the ASEAN Digital Masterplan 2025 and contributes to regional efforts to harmonize education and labour frameworks.

China and **India** are actively promoting the integration of industry, academia, and research, fostering close collaboration between the Ministry of Education and industry enterprises.
In **China**, the Ministry of Education's "Industry-Academia Collaborative Education Program" has supported over 72,000 projects cumulatively, establishing more than 50 national-level modern industrial colleges through partnerships with over 150 leading enterprises. Flagship initiatives like Tsinghua University-Huawei's "Intelligent Base" and Zhejiang University-Alibaba Cloud's "Smart Cloud Lab" are driving educational technology transformation, with Double First-Class universities achieving an average 34.7% technology commercialization rate in 2023.

In **India**, the Association of Indian Universities (AIU) has joined forces with the Confederation of Indian Industries (CII) to conduct activities such as joint workshops, curriculum development and faculty development programmes for promoting industry-academia collaborations.

As in the USA, universities in **Europe** are concerned about their dependence on commercial IT industry in terms of security, sustainability, ethics, and costs, and also the restrictions that this can entail for intra- and interinstitutional exchange and cooperation. Therefore, interoperability is an important issue for the higher education sector and for the EU.

Industry-academia-research integration in **Latin America** aims to strengthen collaboration between educational institutions, businesses, and research organizations to drive innovation and economic development. This integration fosters

partnerships that enhance research capabilities, align academic programmes with industry needs, and facilitate the commercialisation of research outcomes. Efforts include establishing research centres, fostering internships and industry projects, and promoting joint ventures that bridge the gap between theoretical knowledge and practical application. The challenges include limited funding, differences in collaboration practices and styles, and establishing institutional capacity for this cooperation. However, the emphasis on industry collaboration is increasing, which is helping to advance technology transfers, create job opportunities, and boost the region's competitiveness in the global economy.

10. Regulatory frameworks and legislation

> **The emergence and widespread use of social media, cloud computing, big data, and AI technologies has brought issues related to cybersecurity, data privacy and the appropriate use of information resources. In all regions, existing legislation is in process of being updated, and specific regulation on digital and AI is evolving, or has been established recently. As technologies continue to emerge and change rapidly, assessing legal compliance can be challenging, and legislation can quickly become outdated. Hence, HEIs are in a relatively uncertain situation.**

In **the USA**, the rapid shift to digital learning has outpaced the existing legal and regulatory frameworks, posing compliance challenges such as inconsistent state authorization rules for distance education, complex requirements for online courses, and evolving copyright and fair use considerations, requiring a more adaptive regulatory environment.

The situation is similar in **Africa**, where HEIs must comply with a host of general and specific national and regional regulations related to data privacy laws, student data protection, faculty rights and responsibilities, institutional autonomy, rules for collaboration and partnerships, online learning regulations, intellectual property rights and copyright regulations, cybersecurity rules, digital rights management, funding, and resource allocation.

In the **Arab region**, the Association of Arab Universities recognises the importance of establishing legal frameworks to support digital education, including issues related to intellectual property, data privacy, and cybersecurity, and the need to develop policies to ensure equitable access and inclusion in digital education.

In **ASEAN**, regional level regulation of the digital transformation and related management and security aspects is under development, but higher education can already rely on some existing rules such as the Data Management Framework, which provides guidelines for data governance, protection, and cross-border flows in digital education.

In **China**, the government has established a digital governance framework for education, anchored by the Cybersecurity Law, Data Security Law, and Personal Information Protection Law. Supported by the Education Informatization Standards System (2022 Edition), which sets specialised standards across 23 domains, the country has implemented a full lifecycle regulatory mechanism for education data.

In **Europe**, the European Union has established the General Data Protection Regulation (GDPR) to protect privacy, and more recently there has been a surge in digital regulation aiming at reining in monopolies, regulating platforms and AI, and setting standards for cyber security. The EU AI Act is "**the first comprehensive regulation on AI by a major regulator anywhere.**" All these regulations are having – or are expected to have – an impact on how European universities employ digitalisation.

India is developing a digital education legal framework but faces significant gaps in data privacy and QA for educational technology platforms. India's digital education framework is being developed by All India Council of Technical Education (AICTE). Key policies like the Right to Education (RTE) Act and NEP 2020 promote using technology for education. Regulations exist for universities offering online courses, but there is a gap in areas such as data privacy and QA for ed-tech platforms. The government is working on a more comprehensive framework through initiatives such as the National Education Technology Forum (NETF).

In **Latin America**, governments are working to develop and update policies that support the integration of technology in education, ensure safe online environments, and promote access to digital resources. Key challenges include balancing regulatory innovation with flexibility, addressing regional disparities, and ensuring that regulations keep pace with rapid technological changes. These laws and regulations need to be implemented effectively in order to improve the quality and accessibility of digital education, thus boosting educational equity and technological advancement in the region.

GUAF

Global University Associations Forum

The Global University Associations Forum (GUAF) is a platform for dialogue, cooperation and joint action. Established in 2021, it brings together leaders of university associations representing major world regions.

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