CLOUD

Connecting Leaders Online for University Digital Transformation

Issue 6
2023.03

Special Series of IIOE National Centre Pilot Projects

Summative Assessment in Distance Learning at UVCI

Andreas Schleicher: What Has Technology Advancement Brought to University Teachers?

Concept Review: HyFlex in Learning

CLOUD - Connecting Leaders Online for University Digital Transformation

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CLOUD is the quarterly publication launched by the International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI) in 2021. The name ***CLOUD*** symbolises a global network for knowledge sharing driven by Information and Communications Technology (ICT). ***CLOUD*** aims to build an exchange platform that connects professionals in the realm of global higher education by sharing knowledge, project updates, data and best practices related to the digital transformation of global higher education.

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approved the establishment of UNESCO-ICHEI in Shenzhen, China, which is the first Category 2 centre for higher education in China

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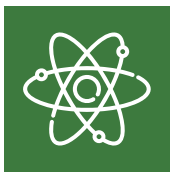
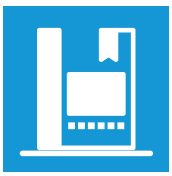
CONTENT



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Since the onset of COVID-19, teaching and learning have changed dramatically. It is with this that online education has been key. IIOE network was seen exponential growth as more and more countries embraced digital teaching and learning.

Online education has been in existence but not to a magnitude like what is being experienced. We all need to embrace technology and such networks that will continue to offer leadership and direction. Technology has to be, but in uttermost consideration, and due to the rapid transition to digital teaching and learning, the challenge of digital infrastructure is being felt.

Investing in digital infrastructure will cater for the digital transformation. UNESCO-ICHEI's International Institute of Online Education (IIOE), seeks to promote digital transformation through capacity building, empowerment of teachers, mutual creation and creation of digital infrastructure such as smart classrooms.

To this, IIOE has become an international higher education digital transformation alliance, covering 56 partner universities in 31 countries and 22 partner enterprises, serving more than 10, 000 higher education teachers in 135 countries around the world. This is a great achievement within a short period.

In order to reach out to as much diverse HEIs, IIOE officially launched a multilingual platform that supports 6 United Nations official languages and a series of research publications on digital transformation of higher education.

On 20 May 2022, in Barcelona, UNESCO-ICHEI, University of Nairobi (Kenya), Ain Shams University (Egypt), Universiti Putra Malaysia (Malaysia), and UNESCO Higher Education Section co-organised IIOE World Higher Education Conference (WHEC) Roundtable themed 'Towards a Shared Future of Higher Education Digital Transformation.' In the Roundtable meeting, achievements of IIOE were presented. The WHEC engaged global top experts to support the IIOE network.

With the need to access digital teaching and learning and the requirement for capacity building, IIOE established 8 IIOE National Centres to play the role of IIOE national pivots, in Kenya, Egypt, Nigeria, Zambia, Pakistan, Malaysia, Mongolia, and Indonesia. A total of 49 HEIs are now covered and supported through IIOE National Centres. The National Centres jointly with UNESCO-ICHEI launched pilot projects for Empowering Teachers' Digital Teaching and Learning in; Kenya, Egypt, Nigeria, Malaysia, and Mongolia. The projects provided tailored activities based on local needs to support local HEIs in quality teaching and learning.

This has been a major milestone for the five pilot universities which presented on their pilot projects namely; Blended Learning Capacity Building for STEM Teachers (Mongolia), Digital Educator Micro-Credentials (Malaysia), Empowering Higher Education Institutions for Digital Teaching and Learning in Egypt (Egypt), Empowering Institutional Policy Implementation for Digital Teaching and Learning in Nigeria (Nigeria) and Transforming Online Pedagogy for Effective Curriculum Delivery in Higher Education Institutions in Kenya (Kenya). They shared their achievements and received commentaries from regional experts. This was during the 2022 IIOE Annual Partnership Meeting held on January 5th 2023.

All these achievements could not be possible without the able IIOE secretariat that worked relentlessly and tirelessly to make sure that the objectives and mandate of IIOE were executed and achieved. I commend them for their remarkable support.
Let us strive to invest in digital infrastructure and capacity building for both teachers and students. Without these, digital transformation will not be realized. We all need to be diverse and welcome digital transformation for the betterment of the world.

Prof Stephen G. Kiama, PhD

2022 IIOE Rotating President

Vice Chancellor
University of Nairobi

Lift

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IIOE National Centres in General: **A Global Initiative for Quality and Inclusiveness**

Context: A Call for Transformative Cooperation Models

2022 marks a significant year for global higher education development with multiple higher education events at a global level. The Transforming Education Summit in New York widely discussed prompt actions on digital learning and transformation; the Third World Higher Education Conference in Barcelona acknowledged the importance of technology-transformed teaching, learning, research, and collaboration within and across nations. At the local level, governments and higher education institutions (HEIs) have placed special emphasis on the digital transformation of higher education and have positioned digital transformation as a key driver, while frontline teaching faculty, supporting staff, and students in various countries have also realised the significance of accommodating pedagogy to digital practices.

From 2019 to 2021, IIOE has developed from its initial 11 founding HEIs to a network of over 30 partner HEIs in the Asia-Pacific region and West Asia and Africa, providing capacity-building programmes of digital teaching and learning for more than 10,000 teachers in 135 countries worldwide. An increasing number of universities expressed their interest in joining IIOE to engage in the co-construction and sharing of quality education resources and to join hands toward the digital transformation of higher education. In this context, IIOE's traditional bilateral cooperation model could no longer meet an ever-increasing need for membership and cooperation from more HEIs. A call for a renewed collaboration mechanism thus arose.

> IIOE now has over 30 partner HEIs across the globe, serving more than 10,000 teachers in 135 countries worldwide.

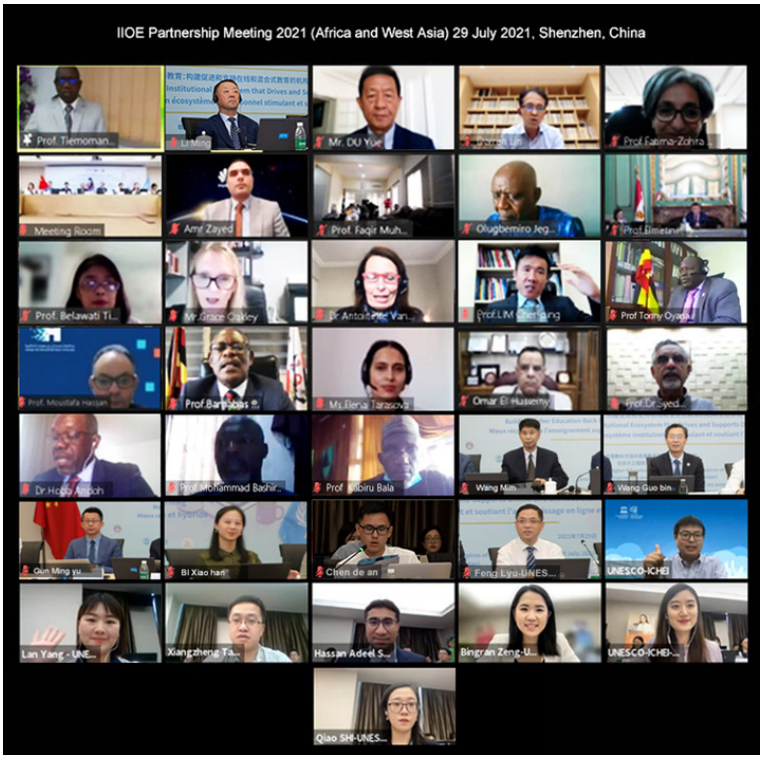
Modality: Setting Fundamental Mechanism of Operationalisation

In response to demands from an increasing number of HEIs in developing countries to join IIOE and enhance their capacity for online and blended pedagogy, and also the need to accommodate multilateral partnerships in digital higher education transformation, the IIOE National Centre initiative was first proposed to IIOE partner HEIs at the 2021 IIOE semi-annual meeting of Africa and West Asia.

According to the original agreement, IIOE National Centres are jointly established by UNESCO-ICHEI and one selected IIOE partner HEI in the target country or region. Equipped with the necessary digital infrastructure, the hosting HEI of the IIOE National Centre is usually a leading public HEI that is committed to facilitating the digital transformation of higher education in the country. The appointed HEI shall take the main responsibility for operating the IIOE National Centre in the national context. The establishment of IIOE National Centres should be endorsed and supported by governmental agencies, usually the ministry in charge of higher education in the country, in order to play its national coordinating role. Modality was also established for the national higher education institution, community, and operations to guarantee effective communication, coordination, and implementation of activities hosted by National Centres. Each partner university appointed a representative to serve as the IIOE focal point at their own institution. The focal point of each partner university represents his or her institution at all IIOE National Centre events and activities, as well as coordinating the involvement of leaders and colleagues in IIOE national events.

Localisation: Balance of Local Needs and Regional Integrity

The balance of sub-regions is a key factor throughout the establishment of the first eight IIOE National Centres in Africa, Asia-Pacific and Arab States. Each IIOE National Centre also takes priority areas or local needs of the host country into strategic planning and proposition design.



IIOE semi-annual meeting of Africa and West Asia

“The balance of sub-regions is a key factor throughout the establishment of the first eight IIOE National Centres in Africa, Asia-Pacific, and Arab States.”

Localisation of IIOENCs in Africa and Asia-Pacific

In 2022, the first eight IIOE National Centres were officially inaugurated, promoting the digital transformation of higher education domestically by performing the following roles and functions:

- Establishing the IIOE national hub to facilitate the process of digital teaching and learning.
- Building a national network of HEIs and constructing a national platform of dialogue and mutual exchanges.
- Coordinating the co-construction and mutual sharing of digital courses and programmes.
- Conducting joint research and applying research outcomes into practices locally.

Empowerment: Launching and Implementing Pilot Projects

At the Third World Higher Education Conference held in May 2022, UNESCO-ICHEI jointly launched the Research Series on the Digital Transformation of Higher Education Teaching and Learning with IIOE's global partners to provide research support to its partner HEIs to implement the digital transformation of higher education teaching and learning. To empower the newly established IIOE National Centre to play its domestic role of supporting quality teaching and learning and to facilitate the local transformation process, UNESCO-ICHEI launched pilot projects, guided by the Research Series, in five IIOE National Centres. The design and implementation of these pilot projects are guided by full principle customisation, national ownership, and are entirely evidence-based and outcome-oriented. The project activities are tailored to local needs of IIOE National Centres of different countries, so each IIOE National Centre owns its own agency for project implementation. With special emphasis put on evidence and research, the project was supported by solid research outcomes to ensure quality and effectiveness within a limited time frame.

> The design and implementation of these pilot projects are guided by full principle customisation, national ownership, and are entirely evidence-based and outcome-oriented.

In terms of the distribution of labor within each project, each IIOE National Centre is responsible for participant recruitment, training implementation, monitoring, follow-up communications, evaluations, and delivery of the outcome report. Local HEIs express interest to the management team of the relevant IIOE National Centre and assist in participant registration. IIOE National Centres will also be the key coordinator of IIOE partner HEIs in their respective countries and support their IIOE activities. UNESCO-ICHEI provides substantial resources in funding, expert networks, learning resources, and technical advisory.

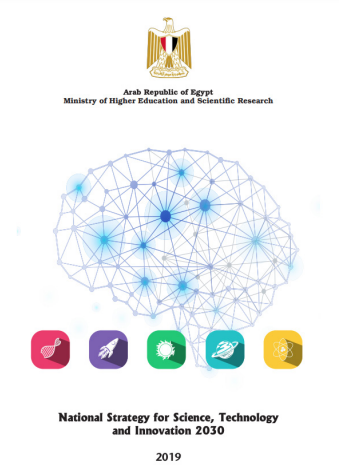
Following the planning and preparation stage, the first round of pilot projects was successfully launched in Mongolia, Egypt, Nigeria, Malaysia, and Kenya in September 2022 and concluded in January 2023. Though sharing similar themes of digital capacity building for university teachers, the design and implementation of the five projects reflects local features.

Egypt: Empowering Higher Education Institutions for **Digital Teaching and Learning**

Project Rationale

UNESCO's Futures of Education Report highlights the transformative potential of digital technologies in education, as well as the challenges yet to be overcome to deliver on the promises of digital technologies. In line with Egypt's national strategy to promote digital education, UNESCO-ICHEI and Ain Shams University (ASU) jointly established the IIOE Egypt National Centre in May 2022 with the aim to establish a national hub driving and supporting the digital transformation of higher education teaching and learning in Egypt. The IIOE Egypt National Centre hosted by ASU and endorsed by the Egyptian Ministry of Higher Education and Scientific Research and the Egyptian Supreme Council of Universities, has developed a national network of over 20 Egyptian HEIs.

UNESCO-ICHEI and IIOE Egypt National Centre jointly launched the national project entitled "Empowering Higher Education Institutions for Digital Teaching and Learning in Egypt" in July 2022 with a focus on supporting digital teaching and learning practices in Egyptian HEIs, and empowering IIOE Egypt National Centre to be a national hub driving the digital transformation of higher education teaching and learning. The project provides a variety of activities including Master teacher training on digital teaching and learning, National Higher Education Institutions Leadership Forum and Policy Dialogue Among Management Staff, engaging 22 Egypt HEIs participating in the project.



National Strategy for Science, Technology and Innovation 2030 (Ministry of Higher Education and Scientific Research of Arab Republic of Egypt)

The Launch Meeting of IIOE Egypt National Centre Pilot Project

Project Team of the IIOE Egypt National Centre Pilot Project

Mechanism and Activities

Need Anlysis and Goals

Despite numerous achievements, Egyptian HEIs still face vatious challenges to realise more effective digital teaching and learning. On the pedagogical side, teachers' digital teaching competencies need further enhancement and strengthening. Specifically, there is a need for systemic teacher professional development in digital teaching competencies, and a need for quality digital education or professional resources. On the managerial side, HEIs need to build a more conducive environment for digital teaching and learning, including raising awareness to steer the digital transformation process among HEI leaders, and guiding HEI management to translate visions or strategies to supportive policies, standards, guidelines, and daily practices.

Given the local needs, the project sets two goals. The first goal is to enhance teachers' competencies in digital teaching and improve the quality of digital education resources while strengthening digital pedagogy. The other goal aims to establish a conducive institutional environment for digital teaching and promote the culture of digital transformation among Egyptian HEI managers.

Operationalisation of Activities

The IIOE Egypt National Centre designed three major activities for the project "Empowering Higher Education Institutions for Digital Teaching and Learning in Egypt."

Master Teacher Training Series

In response to teacher's pedagogical needs, the project conducted an online Master Teacher Training Series consisting of three workshops with hopes to improve the effectiveness of digital curriculum design, delivery and assessment respectively. 63 master teachers were divided into two cohorts, and each cohort participated in three 3-hour syschronous sessions with asynchrous activities under the facilitation of IIOE experts and local staff. Each workshop session has its own detailed learning objectives and introduces different highly-accessible web tools to participants with supplementary technical support sessions. Through the completion of reading assignments, podcast reviews, Learning Management System (LMS) investigations, group discussions and course presentations, both cohorts submitted a blended course as a capstone, and the IIOE Egypt National Centre has been working with UNESCO-ICHEI to refine the courses and publish it as an open education resource.

IIOE - AIN SHAMS UNIVERSITY ENGLISH (EN) Login

DIGITAL TEACHING TRAINING SERIES-ROUND 1

Home / Courses / Digital Teaching Training Series Round-1 / Round-1 / Enrolment Options

Enrolment options

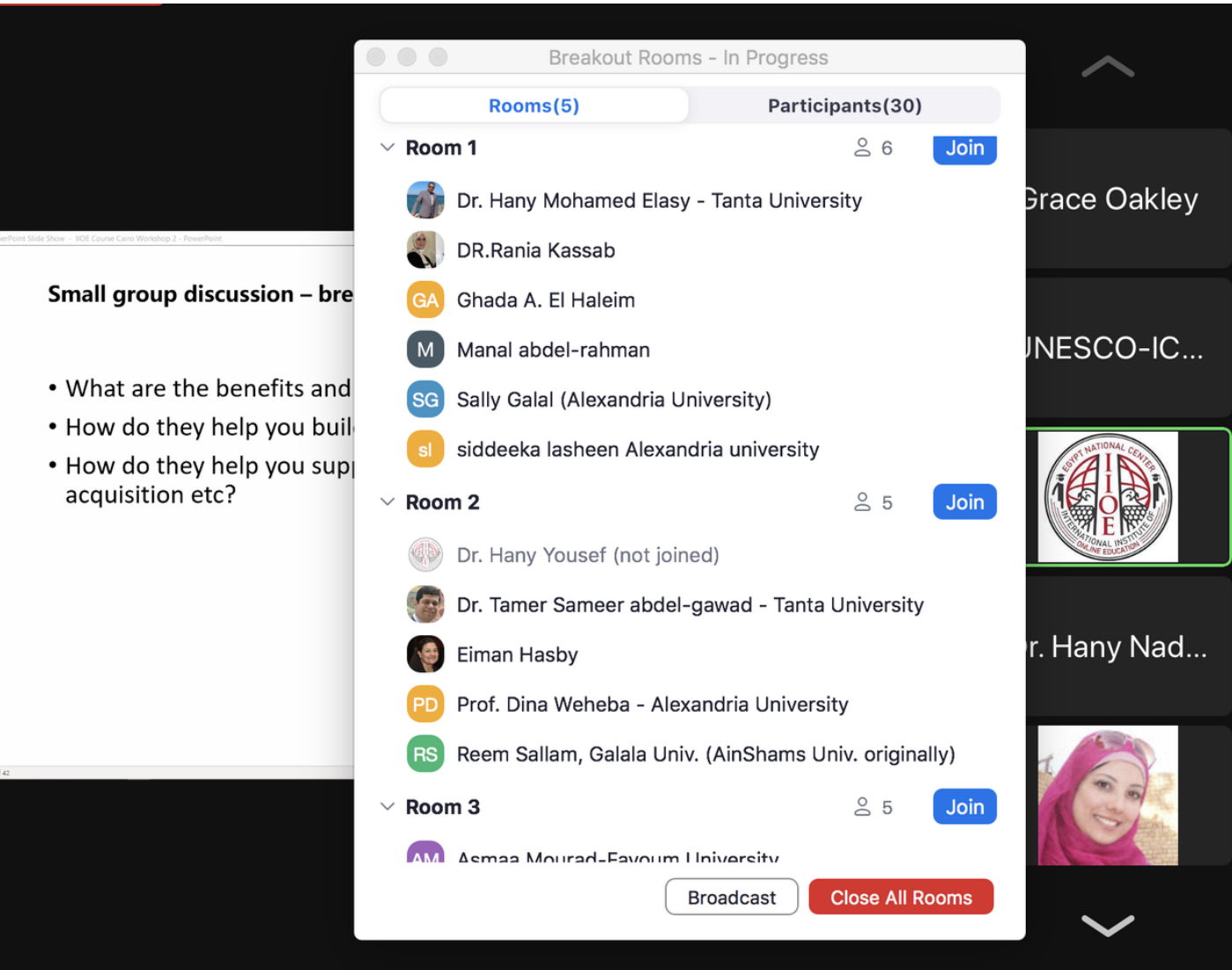
Digital teaching training series-Round 1

This program is co-initiated by UNESCO-ICHEI and IIOE Egypt National Center and designed to empower master teachers of Egyptian HEIs to enhance their capabilities in digital learning design, resource development, and evaluation criteria using digital technologies.

Teacher: Dr. BI Xiaohan
Teacher: Dr. CHEN Dean
Teacher: Dr. Grace Oakley
Teacher: E- Learning
Teacher: Dr. Peggy SHAO
Teacher: Dr. YANGLan

The Landing Page of the Master Teacher Training Series

Students are divided into breakout groups during session activities



Digital Teaching and Learning National Policy Dialogue

For HEI managers, the pilot project arranged a National Policy Dialogue on 12 January 2023. The Dialogue targets government representatives in higher education, including MOHESR, SCU, and NAQAAE, in addition to local HEI staff responsible for quality assurance, eLearning units, academic programme design. The National Policy Dialogue encourages information exchange and knowledge sharing in supportive policies for HEI digital teaching that are already available, while also proposes actionable recommendations for different higher education stakeholders.

The Digital Teaching and Learning National Policy Dialogue

Digital Leadership Symposium

The Digital Leadership Symposium enabled high-level talks among HEI presidents and deans, and delegates from UNESCO-ICHEI attended the conference on 15 March 2023. Joined by national leaders and ministers, as well as 6 partner universities from IIOE Egypt National Centre's network, the Symposium gathers decision-makers to investigate potential solutions to the development, revision and refinement of digital transformation strategies. A policy brief based on the discussions will be published.

Timeline

26 September 2022:
Project launch ceremony

September - November 2022:
1st Group of 30 master teacher training

November - January 2023:
2nd Group of 30 master teacher training

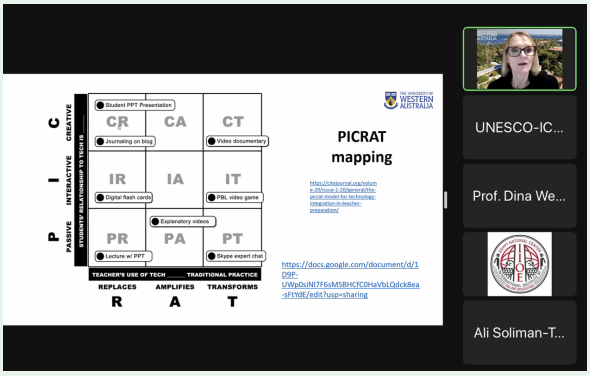
5 January 2023:
IIOE Annual Partnership Meeting

12 January 2023:
National Policy Dialogue

15 March 2023:
Digital Leadership Symposium

Snapshot: The Workshop Series Assignment I

This assignment asks participants to analyse an existing course with a focus on learner interactions during the course. The type of interactions to analyse include learners' engagement with their teachers, peers, and content materials. To complete the assignment, the participants are supposed to work in pairs or groups to examine the time, space, and format of the three student engagement modes and provide feedback for each other on what and how to improve the existing course under the theory of six learning types. After discussions, participants will use the slide template provided or other web tools of choice to formalise the advice and suggestions in a 10-minute video presentation.



Group1 (Room 1)
Your names:
Prof. Dr. Hany ElAssi
Prof.Dr. Seddika Lashin
Dr. Ghada Elsayed
Dr. Mohamed Farrag
Ass. Prof. Sally Galal

Creative	CR Student Presentation (PPT)	CA St. Developed infograph	CT Student created Videos & Podcasts Field community survey Patient education leaflets (Medical education)
Interactive	IR E-book Sharable Link Flash cards	IA Class Telegram Channel Interactive videos (with pop out Quiz) Interactive google documents (for Stu. team work)	IT Gaming (kahoot)
Passive	PR Lecture Recorded Video lecture	PA Short explanation videos	PT Mind Maps by lec
	Replaces	Amplifies	Transforms

Key Facts and Figures

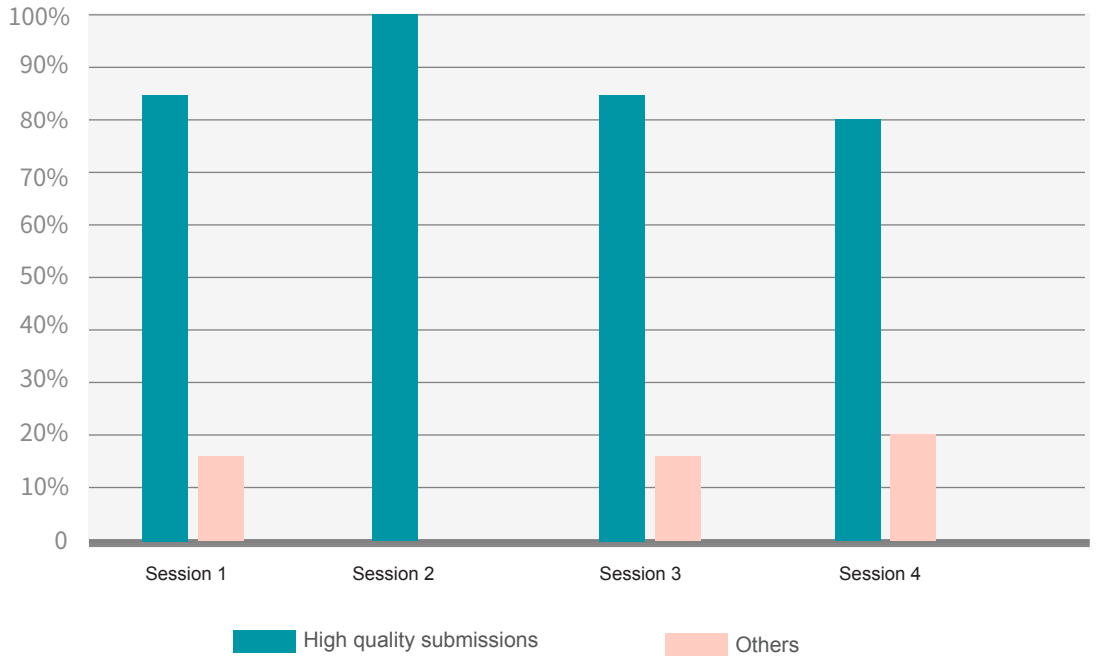
While the demographic statistics for the conference series are still in the process of monitoring and evaluation, there are three notable characteristics of the participant profiles and event planning of the workshop series.

- **Wide participation and active engagement of HEI networks:** There are 63 teachers from 14 Egyptian HEIs participating in the workshops, with a medium number of 3 teachers per HEI. The 14 institutions are located in different regions of Egypt with a majority in Cairo.

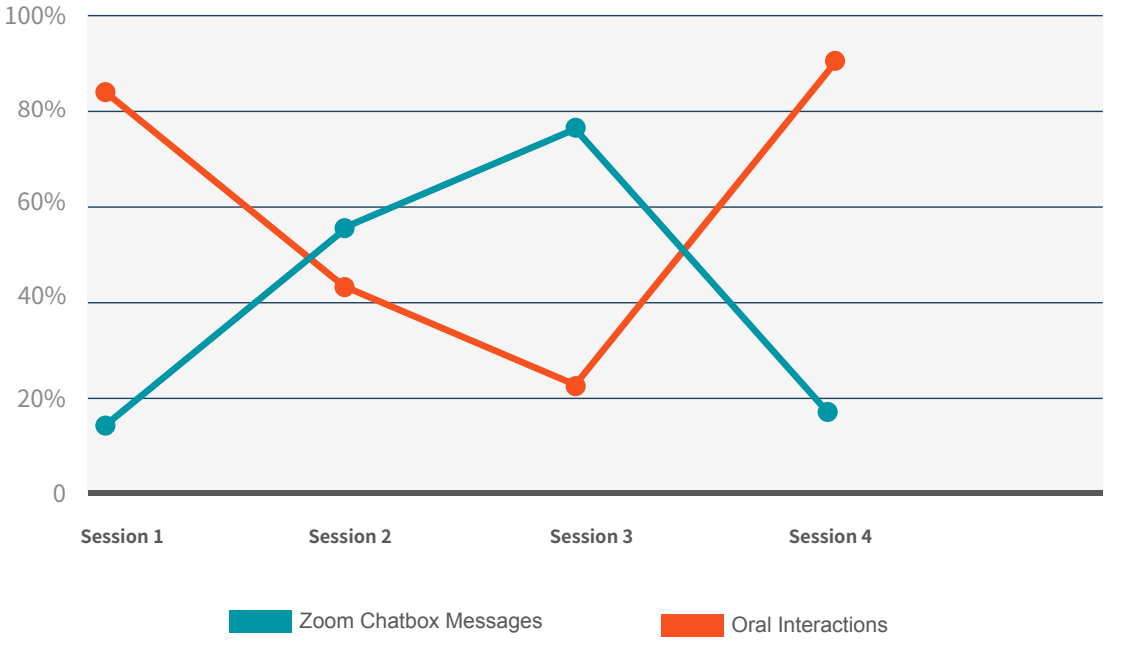
- **Diverse and balanced disciplinary background of participants:** Among the 63 master teachers, 18 were from departments of health sciences, 20 had an academic background in life sciences, 9 from humanities and the other 16 in engineering and computer science. 57.1% trainees had senior titles (professors or assistant professors), while 42.9% were lecturers, assistant lecturers or teaching assistants.

- **Outstanding female representation throughout the project planning and implementation:** 61.9% of the participants were female, in comparison with 38.1% male trainees. In addition, the majority of project leadership and execution team members are female.

Quality of Submitted Assignments



In-class Interactions



Digital Course: Basic ICT Skills for Students

One of the key deliverables of the project is a blended course designed for freshmen undergraduates in Egypt. The course is an organic combination of the two capstone assignments that the cohorts submitted respectively, consisting of a comprehensive curriculum structure of requirements and evaluation. The course will be available for free for all partner HEIs of IIOE Egypt National Centre to use in their programs.

The Master Teachers Training also offers certification with a tri-fold evaluation standard. According to participants' statistics on attendance and submissions, the certification is categorised into Certification of Completion with Distinction, Certificate of Completion, and Certificate of Attendance.

The pilot project of IIOE Egypt National Centre has four key deliverables, consisting of a Master Teachers Training certification, two online courses produced by trainees, a whitepaper document titled The Digital Teaching and Learning National Policy Dialogue Conclusions and Recommendations, and a Digital Leadership Symposium Policy Brief.

Digital Report: The Digital Teaching and Learning National Policy Dialogue Report

Released in February 2023, the outcome document for the Digital Teaching and Learning National Policy Dialogue is a digital report consisting 9 highlighted themes, including but not limited to international policies of digital transformation in education and challenges faced by Egyptian HEIs as they adopt digital teaching policies. The report also developed 6 recommendations based on discussions over the highlighted themes.

Policy Brief: Digital Leadership Symposium

A policy brief on how to execute digital leadership in higher education digital transformation has been released in March 2023 as another key deliverable of the pilot project. Based on the discussions from the Symposium, the policy brief aims to provide recommendation for Egyptian HEIs to develop, revise, or refine strategies and policies for digital transformation of teaching and learning.

Feedback and Stories

Survey among Participating Master Teachers: The need for professionalism and partnerships

"I am very happy to be one of the team in this workshop and hope that I can benefit my university after finishing this workshop. Thank you!"

"Very useful workshop. I really enjoyed it. Any other related workshops I can attend?"

"Support sessions are really supportive and indeed I benefit from them even more than workshops."

"Workshops were outstanding and met all criteria."

"The moderators are experienced and keen on making this workshop successful, beneficial, and satisfying."

"The network between all universities was valuable, and it helped in sharing connections and ideas."

Grace Oakley (Main Facilitator): The potential for microcredentials and quality assurance

"It was highly rewarding for me to work with a group of highly motivated participants. I was amazed by how engaged they were. I would also like to extend my appreciation to the IIOE Egypt National Centre for their tremendous help localising and contextualising the training, as well as assisting participants in assignment completion. I would also like to acknowledge that the project is a little bit time-pressured, especially in putting the professional training contents together. Perhaps I would also have done a better job if I had more contextual information about the participants before designing the courses. Given that it is still a pilot program, we still have time to revise these areas of growth."

Lim Cher Ping (IIOE Chief Expert): The importance of leadership-level awareness

"I am excited to know that the National Policy Dialogue and Digital Leadership Symposium is happening, because it is critical that education leaders are aware of the importance of professional development so that they can formulate policies to set up a conducive environment for professional learning and sharing."

Future Steps

Current Challenges

Within the context of Egyptian HEIs, there are still prominent challenges of project implementation and scaling-up. The first challenge is quantity. Considering the large number of HEIs in Egypt and interested participants in the training, the selection and promotion process requires additional human effort. Also, for teachers who are monolingual Arabic speakers or highly influenced by traditional teaching methods, language barriers and mental resistance to change teaching delivery are also practical problems. In addition, social issues such as the absence of a supportive policy or the discrepancy in quality education infrastructure or resources are also potential difficulties to address.

Next Steps

With many challenges ahead, Prof. Mona Abdel-Aal Elzahry, Director of IIOE Egypt National Centre, suggested that IIOE Egypt National Centre will analyse the results of the first phase of the Pilot Project to refine the action plan, focus more on the need for quality assurance framework when developing the next project, and strengthen cooperation and exchange with international experts, IIOE network, and all higher education stakeholders.

Kenya: **Transforming Online Pedagogy for Effective Curriculum Delivery in Higher Education Institutions**

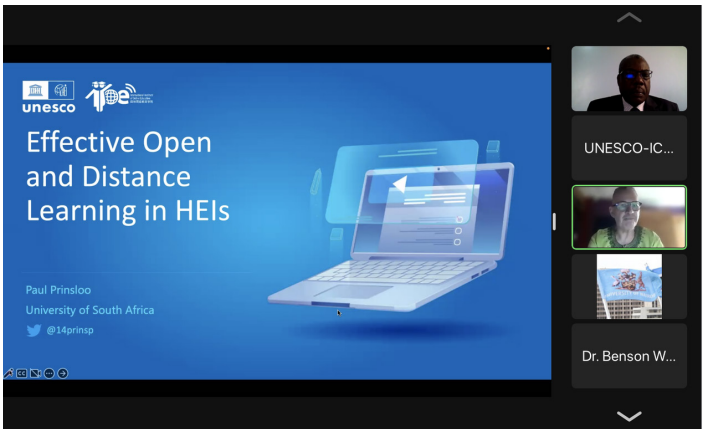
Project Rationale

In line with Kenya's Ministry of Education Strategic Plan (NESSP) 2018-2022 to strengthen and expand e-learning programmes in all universities, UNESCO-ICHEI and University of Nairobi (UoN) jointly established the IIOE Kenya National Centre In April 2022 to establish a national hub to support the digital transformation of higher education teaching and learning in Kenya. UoN, the host institution of IIOE Kenya National Centre, is also the 2022 IIOE Rotating Presidency Unit. In 2022, UNESCO-ICHEI and IIOE Kenya National Centre implemented a series of activities, including research, training, platform upgrading.

UNESCO-ICHEI and IIOE Kenya National Centre jointly launched the national project "Transforming Online Pedagogy for Effective Curriculum Delivery in Higher

The Launch of IIOE Kenya National Centre

Education Institutions in Kenya " in September 2022. In the format of a 3-week self-paced training series, the project aims to upskill lecturers on transformative curriculum delivery, and improve online blended teaching and learning practice in higher education institutions in Kenya. In total, 87 teachers from 4 partner universities of IIOE Kenya National Centre participated in the training on online pedagogy, as well as the application of online pedagogy in blended teaching and learning. 62 teachers completed the training.



The DTP Training at IIOE Kenya National Centre

Mechanism and Activities

Need Anlysis and Goals

According to National Education Sector Strategic Plan (NESSP) 2018-2022, the Ministry of Education of Kenya plans to "support ICT-based distance and open learning programmes offered by different universities with a target to have 30% of degree programmes available on e-learning mode." Despite policy efforts already devoted to digital teaching and learning in higher education, local universities including UoN are calling for transformative actions in the following aspects: a) incentives to encourage teachers to apply digital teaching and learning; b) digital literacy and capacity building for university teachers; and c) development of quality digital education resources.

In response to the three local proposals, the project defines university teachers as its target audience and sets a guiding goal for implementation, which is to increase the quantity of qualified university teachers in Kenya who are capable of digital teaching and possess high-level digital literacy.

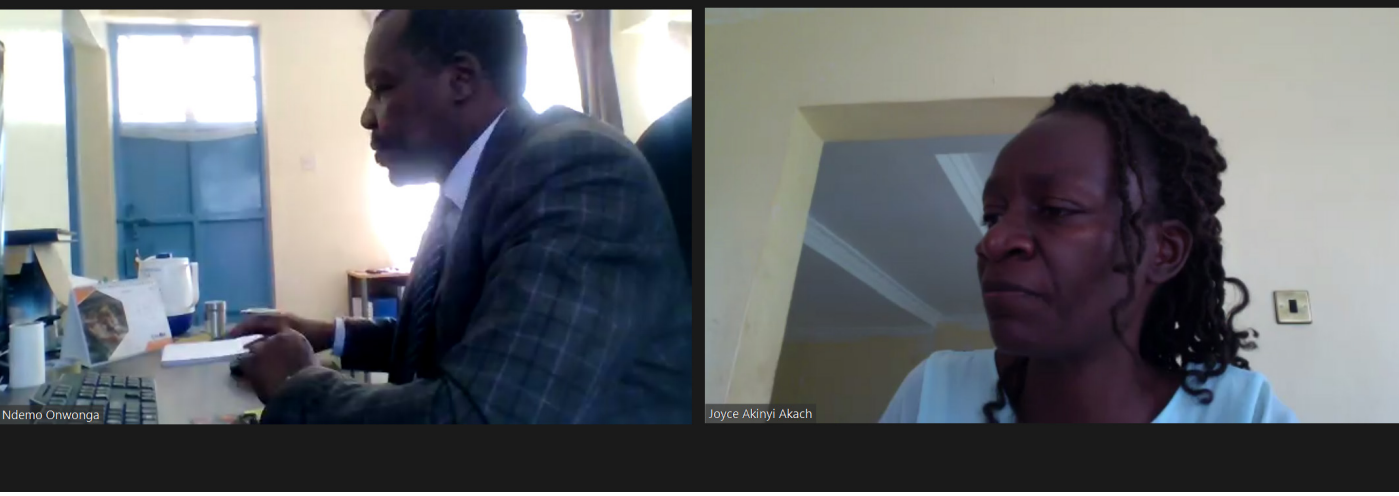
Operationalisation of Activities

The IIOE Kenya National Centre developed a series of professional development sessions titled Digital Transformative Pedagogy (DTP) Training as the flagship activity of this project.

Digital Transformative Pedagogy (DTP) Training

The training consists of three modules focusing on course design, course facilitation, and innovative assessments, respectively. In three weeks of a regular semester, participating teachers joined four live training sessions on online pedagogy to explore practical applications of digital teaching and learning. Besides synchronous activities, teachers are also encouraged to search and make full use of online teaching and learning content, create their lesson plans and assessment rubrics, and produce presentation videos in a self-paced manner. All the modules are pitched to entry-level difficulty to meet the learning needs of local teachers, while optional advanced training sessions are also provided.

The IIOE Kenya National Centre also conducts a special



Group presentation session after discussion at the DTP Training

synchronous session, titled Effective Open and Distance Learning in HEIs, with IIOE expert Paul Prinsloo from the University of South Africa. This special meeting serves as both supplementary technical support session and an entertaining informative webinar for all participants.

Timeline

30 September 2022 — Project Launch Ceremony

23 November 2022 - 14 December 2022 — Digital Transformative Pedagogy Training

14 December 2022 — Effective Open and Distance Learning Webinar & DTP Training Closing Ceremony

5 January 2023 — IIOE Annual Partnership Meeting

Key Facts and Figures

The profiles of project participants are considerably diverse. Also, the project outputs are so far positive, either quantitatively and qualitatively speaking, while the monitoring and evaluation is still ongoing.

- **Interscholastic partnerships and active participation of trainees:** Through the project, the IIOE Kenya National Centre established partnerships with 4 universities in Kenya, and recruited 62 STEM faculty members from the University of Nairobi and partner universities, taking up 69% and 31% of total participants, respectively. 71% of participating teachers completed all sessions.

- **Small gender disparity and positive perception and evaluation in both genders:** 42% participants were female, while the other 58% were male. According to a survey question asking "How do you rate DTP training so far with respect to your expectations?" The top three keywords are "good," "lively," and "informative," and both genders share similar responses in the three keywords.

- **The implementation of "training facilitators" proves to be an effective design:** Teachers who are already experienced in digital pedagogy were recruited as training facilitators to encourage peer learning and experience exchange.

The IIOE Kenya National Centre team also summarised lessons

Snapshot: DTP Training Rollout and Deliverables

Participants are asked to submit various assignments at different stages of training. In the pre-training phase, training participants will start working on their own course design template before they submit it during the Course Design session. Simultaneously, participants will also set off brainstorming contents of a LMS-related course. In the second session, they are required to submit and present the course plan with a micro-teach sample. At the Innovative Assessment stage, participating teachers will submit a link to their e-portfolio and the assessment rubric of the course they just created.

learned from the achievements. First, **university management** plays a pivotal role to pin the DTP training leading to enhanced teaching and learning processes. Also, **the adoption of digital pedagogy** as a viable mode of facilitation enhances the learning process. **Digital transformation** creates opportunities to strengthen networking and partnership, enabling "global classrooms," while **updated ICT infrastructure** enables effective implementation of DTP.

Feedback and Stories

Virginia Gichuru (Participant): An eye-opening learning journey

"I found the training an eye opener on how to transform my teaching and make it relevant for the 21st century using digital tools. I learnt how to do course design, how to effectively facilitate teaching and learning and finally how to carry out innovative assessment. I am looking forward to implementing many of the learnt ideas in the new semester where I will be teaching two units in Blended mode. This training could not have come at a better time. I would also like to complete the advanced part of the course in order to be more competent. The course was very interactive through the Zoom online sessions with our facilitators. I enjoyed the asynchronous sessions, which were varied and engaging. My desire is to transform my courses to fit what we learnt during this DTP Training. I look forward to more training and also being able to transfer skills to my colleagues."

Jared Ongaro (DTP Facilitator): A unique community-building programme

"Where it is being used successfully, teachers collectively share a vision of promoting deeper learning in all their students, and have collaboratively redesigned the role of the teacher to that of facilitator who uses technology as a tool for their educational aims. As facilitators, we teachers become learning strategists who constantly plan ways to enable students to master complex content knowledge and develop their critical thinking, problem solving, communication, and collaboration skills. This is exactly what makes DTP so unique in shaping a community of best practice."

Paul Prinsloo (Lecturer):

My role as resource person for the IIOE Kenya National Centre project only comprised of a presentation titled “Effective Open and Distance Learning in HEIs” during the final wrap-up of the project in December 2022. This was followed by a discussion of the key social, technological, economic, environmental and political trends impacting on higher education. In a breakaway session, participants were invited to reflect on these trends and to consider how these international trends apply to the higher education sector in Kenya. The presentation concluded with exploring three key theoretical perspectives in distance education literature and their implications for distance education in the context of Kenya.

Future Steps

Current Challenges

Two major challenges were discovered during the project implementation by the Team IIOE Kenya National Centre. The first is coordination. As the program involved participants from various universities with varying timetables, the participation rate never reached 100% of the registration number. Thus, investigating proper coordination management to cater to as many participants' schedules as possible, such as setting up different cohorts, should be on the checklist. Secondly, digital infrastructure such as internet connectivity has a notable impact on the learning experiences of participants. A large portion of participants were not able to fully engage in the learning activities due to poor internet connectivity. To promote universal engagement of trainees, the provision of stable internet services is a must.

Project Report: Transforming Online Pedagogy for Effective Curriculum Delivery in Higher Education Institutions

The IIOE Kenya National Centre will take the lead to compile a project report summarising project achievements and offering open education resources to all interested stakeholders. Specifically, the report will document 6 case studies on best practices for digital teaching and learning collected during the sessions, 4 quality online courses and 2 assessment rubrics which participants developed, and an upscaling plan of Training of Trainers (ToT) projects.

Next Steps

Professor Justus Inyega, the Director of IIOE Kenya National Centre, shared his vision for the next steps. In 2023, the IIOE Kenya National Centre will upscale the project to involve more universities and participants, carry out action research on DTP and partner universities to inform teaching and learning processes, involve advanced skills training such as Authoring Tools, Learning Design and Learning Analytics for online courses, and then conduct longitudinal research on DTP graduates for best practices and model case studies.

Malaysia: **Digital Educator Micro-credential**

Project Rationale

The rapid growth of digital technologies across the globe continues to challenge the higher education system. In line with the vision of promoting digital transformation of higher education, proposed by Ministry of Higher Education (MoHE) of Malaysia, UNESCO-ICHEI and Universiti Putra Malaysia (UPM) jointly established the IIOE Malaysia National Centre in January 2022. UPM, as a member of the IIOE, is the host university of IIOE Malaysia National Centre and the 2023 IIOE Rotating Presidency Unit.

In this regard, UNESCO-ICHEI supports UPM to launch a pilot project titled **"Digital Educator Micro-credential"** in September 2022. The overall objective of this project is to enhance UPM's institutional capacity in teachers' professional development and to promote the digital transformation of higher education in Malaysia. So far, this pilot project has benefited 262 educators from the IIOE Malaysia National Centre network, and is expected to benefit more.

The Launch of IIOE Pilot Project in Malaysia

Mechanism and Activities

Need Anlysis and Goals

In 2013, MoHE issued ***Malaysia Education Blueprint 2015-2025 (Higher Education)*** which aims to keep evolving in the Malaysian higher education system and HEIs for preparing digital talents to meet the needs of Industrial Revolution 4.0. On the basis of the Blueprint, MoHE proposed ***Malaysia Future Ready Curriculum Framework (2018)***, according to which UPM has conducted multiple practices in the digital transformation of teaching and learning. In recent years, micro-credentials empowered by digital means have arisen as a notable feature in UPM's professional development as a flexible alternative to fulfill educators' needs of up-skilling and re-skilling in teachers' performance.

This pilot project, therefore, seeks to explore ways to integrate micro-credentials into teachers' professional development sessions to enhance UPM's institutional capacity in educators' digital competencies. Through piloting micro-credentials in educators' professional development, the project hopes to promote the digital transformation of higher education in Malaysia.

Malaysia Education Blueprint 2015-2025 (Higer Education)

Malaysia Education Blueprint 2015-2025 (Higer Education)

Operationalisation of Activities

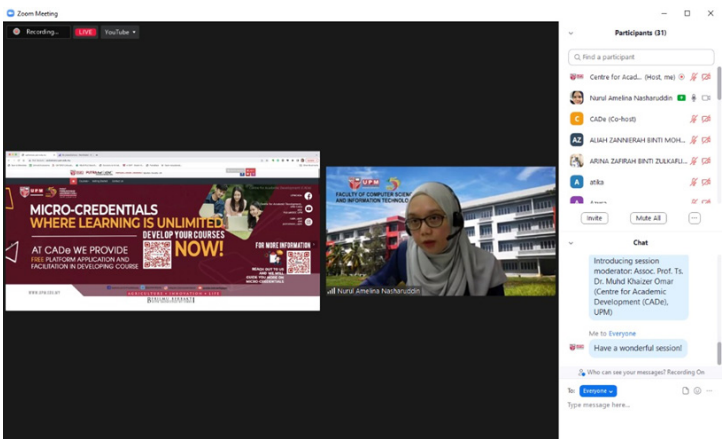
Referring to ***Malaysia Future Ready Curriculum Framework (2018), UPM's Technology for Future Learning Ecosystem Playbook (2021)***, and a pre-project need analysis, the IIOE

Malaysia National Centre pilot project spotlights on two themes for micro-credential development, namely **Artificial Intelligence for Personalized Learning** and **Innovative Practice of HyFlex Learning in the Post-pandemic Era.**

The IIOE Malaysia National Centre identified four key tasks in implementing the pilot project, including categorising educators' key digital competencies, developing micro-credential training contents, devising UPM's institutional implementation plan, as well as training educators to upgrade their digital competencies. The Centre is also responsible for the organisation, recruitment, and full-cycle execution of the project, while the Centre for Academic Development at UPM conducts academic training on micro-credentials. An expert team consisting of domestic and international master trainers with UPM's experienced technology leaders joined the project facilitation as well.

Pre-training Sessions on Micro-credentials

The IIOE Malaysia National Centre and UNESCO-ICHEI co-organised two pre-training sessions at the start of September 2022. The first pre-training aims to offer initial knowledge and landscape to potential digital educators of UPM and other partner higher education institutions in Malaysia, inviting experts in the field of educators' professional development, HyFlex learning, and Artificial Intelligence in personalised learning. The second pre-training is a trail-course to introduce the fundamentals of micro-credentials to UPM teachers.

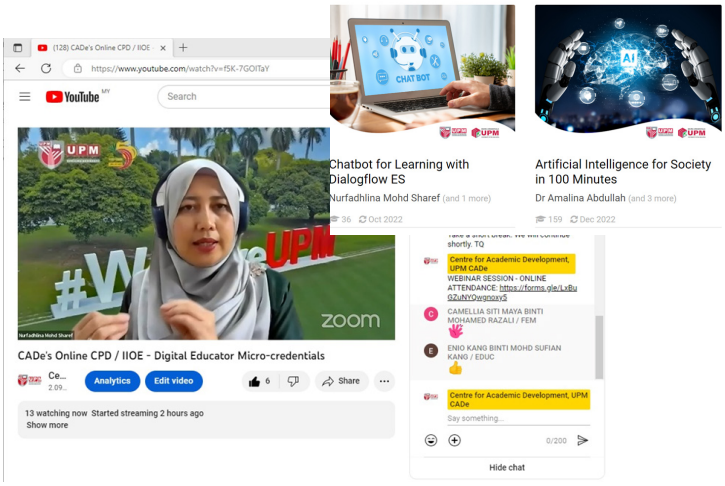


Training Package 1: Artificial Intelligence for Personalised Learning

The micro-credential on Artificial Intelligence for Personalised Learning identified two sets of key competencies for learners,

including developing an educational chatbot and enhancing data-driven reflection with learning analysis technology. Learners are expected to design and develop a chatbot and apply it to relevant teaching practices or discussions, while enhancing their data-driven mindset in pedagogical activities using learning data.

This training package consists of three courses, namely **"Artificial Intelligence and Data Literacy for Educators", "Chatbot for Learning with Dialogflow"** and **"Artificial Intelligence for Society in 100 Minutes."**

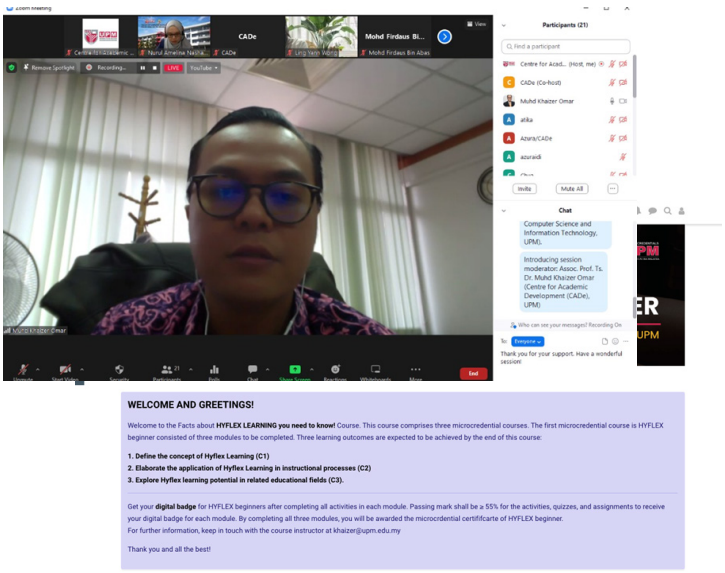


Snapshot: Continuous Professional Development (CPD) Training

Participants are asked to submit various assignments at different stages of training. In the pre-training phase, training participants will start working on their own course design template before they submit it during the Course Design session. Simultaneously, participants will also set off brainstorming contents of a LMS-related course. In the second session, they are required to submit and present the course plan with a micro-teach sample. At the Innovative Assessment stage, participating teachers will submit a link to their e-portfolio and the assessment rubric of the course they just created.

Training Package 2: Innovative Practice of HyFlex Learning in the Post-pandemic Era

For learners who are interested in HyFlex learning, the pilot project points out another two key competencies, including creating an inclusive teaching space to ensure learner-centred experience, as well as building adaptability in HyFlex Learning. Successful learners should be able to evaluate practical conditions to conduct blended teaching and take great advantage of digital infrastructure such as the Smart Classroom at UPM. They are also supposed to develop flexibility in pedagogical modes while devising effective teaching strategies.



This training package is still under development, with the first course titled **"Facts about HyFlex Learning You Need to Know - HyFlex Beginner"** to be released soon.

Timeline

23 September 2022
Pre-training (Hybrid)

28 September 2022
Project Launch Ceremony

October-December 2022 IIOE
Platform Training Workshop

5 January 2023
IIOE Annual Partnership Meeting

Key Facts and Figures

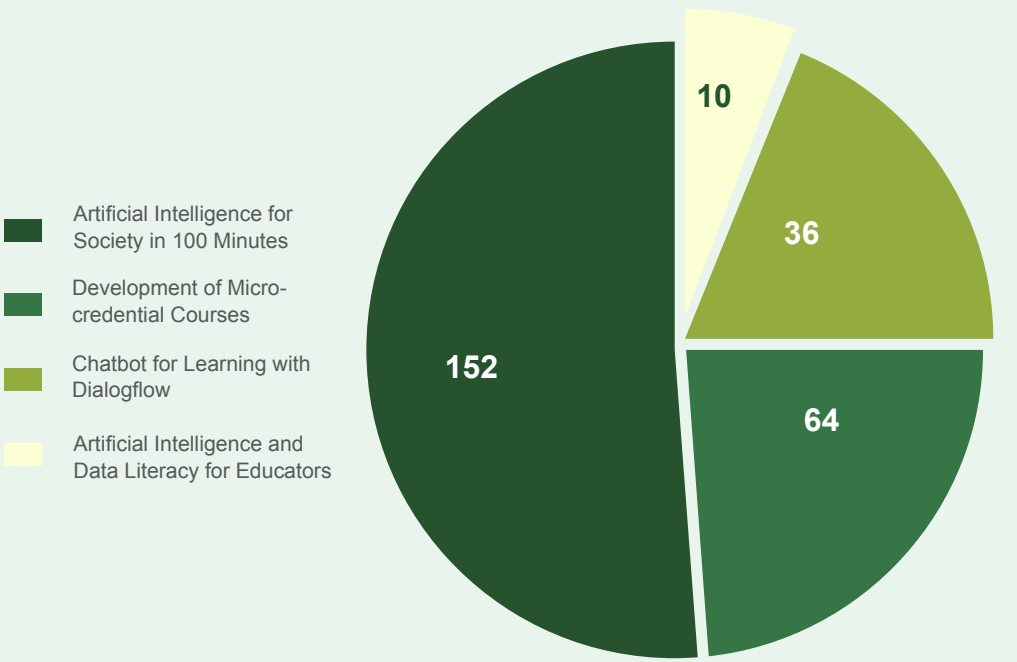
UPM took the lead in project monitoring and evaluation, including the full cycle of initiating, planning, executing, and closing, and will submit periodic reports based on agreed timeline. UNESCO-ICHEI acted as an external observer on the two major indicators: tools and training.

- **Theoretical tools for micro-credentials applications:** The project successfully delivered one institutional framework for educators to evaluate their digital competencies, as well as two sets of key digital competencies on the two micro-credentials themes, AI and HyFlex, respectively.

- **Training activities for digital educators:** To cultivate 30 certified Digital Educators at UPM including a large portion of female educators, the pilot project designed two ready-to-use micro-credential training packages and had planned to introduce the packages to 3 to 4 partner higher education institutions.

In terms of attendance, 262 educators were enrolled in the training programme, with 152 of the participants registered for the course "Artificial Intelligence for Society in 100 Minutes"; 64 of them for "Development of Micro-credential Courses"; 36 for the "Chatbot for Learning with Dialogflow", and the other 10 participated in the "Artificial Intelligence and Data Literacy for Educators". Another new micro-credential course titled "Facts about HyFlex Learning You Need to Know - HyFlex Beginner" is releasing soon with a high number of pre-registration. Among these registered educators, six participants who completed the course with remarkable performance will be selected in a separate process and be awarded as Digital Educators to engage in the rest of the pilot project.

Enrollment of Micro-credential Courses

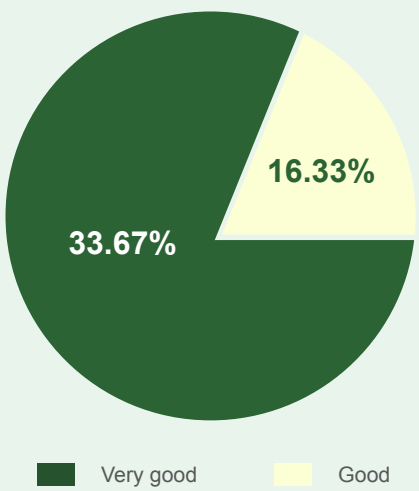


Based on a post-survey of the training programme, participants also have considerably positive feedback on the pilot project.

- **High score of learning experience:** 100% of respondents believed the implementation of the overall programming was "Good" and 67% ranked "Very Good." Over 80% of the 13 evaluation items were given an average score of more than 4.5 on a 1-5 scale, and the grand total average of the post-assessment from participating educators is 4.59 out of 5.

- **Positive evaluation of trainers:** The evaluation item which received the most positive feedback (4.71/5) is the statement "The trainer was knowledgeable," indicating the successful selection of micro-credential trainers and outstanding performance of UPM's digital educators.

Post-survey on Programme Implementation



Feedback and Stories

- **Waqar Mahmood, Director of Al-Khwarizmi Institute of Computer Science (KICS), University of Engineering and Technology, Lahore, Pakistan:** The micro-credential courses at UPM are very important for taking us to the next level. UPM has had a successful pilot project and has excelled in curriculum localization. ICHEI also plays a pivotal part in guidance.

- **Wang Libing, Chief of Section for Educational Innovation and Skills Development, UNESCO Asia and Pacific Regional Bureau for Education:** The integration of short-term training into the ecosystem of learning in the form of micro-credential is an important way to share quality resources across international platforms.

- **Abdul Karim Alias, Director of the Centre for Development of Academic Excellence, Professor of School of Industrial Technology at Universiti Sains Malaysia:** The pilot project had taken into full consideration of the specific needs in Malaysia and was truly a collective effort from international experts.

Future Steps

Current Challenges and Next Steps

In addition to the set goal of three micro-credential training packages, 30 UPM Digital Educators, and micro-credential promotion work in 3-4 higher education institutions, the pilot project team is also working toward the completion of monitoring and evaluation. Based on participants' feedback, some areas of growth in project implementation include content relevance, time arrangement, material preparation, and applicable practices.

Dr. Habibah Ab Jalil, Associate Professor, Deputy Dean, Faculty of Educational Studies at UPM and Director of IIOE Malaysia National Centre hopes UPM to expand the project to more universities in Malaysia in early 2023. She also looks forward to continuing utilising the new functions of Smart Classroom at UPM to support the pilot project and further empowering the digital capacity of teachers. UPM hopes to establish intensive collaboration with UNESCO-ICHEI and other IIOE partner universities and institutions, playing a bigger role in the digital transformation of higher education.

Mongolia: **Blended Learning Capacity Building for STEM Teachers**

Project Rationale

Mongolia has already established a national higher education network of 6 state-owned universities for in depth cooperation. Renowned as a national benchmark for accelerating digital transformation in the higher education sector in line with global trends, Mongolian University of Science and Technology (MUST), a founding member of IIOE, serves as the host university of the IIOE National Centre in Mongolia. MUST has also coordinated IIOE Mongolia National Centre to work with UNESCO-ICHEI and IIOE to develop an IIOE online course entitled 'Creating effective learning materials for STEM courses using Lightboard', which will be hosted on IIOE platform soon.

In September 2022, UNESCO-ICHEI in collaboration with IIOE National Centre in Mongolia together launched an IIOE pilot project **"Blended Learning Capacity Building for STEM teachers in Mongolia".** The pilot aims to empower Mongolian university teachers with competency and skills in blended learning and support implementation of related policies by carrying out a training programme on blended learning for master teachers, conducting university-wide blended learning practices and developing a blended learning assessment tool and guidelines for blended learning course development. 65 master teachers from 6 national universities in Mongolia were registered for the training.

Mechanism and Activities

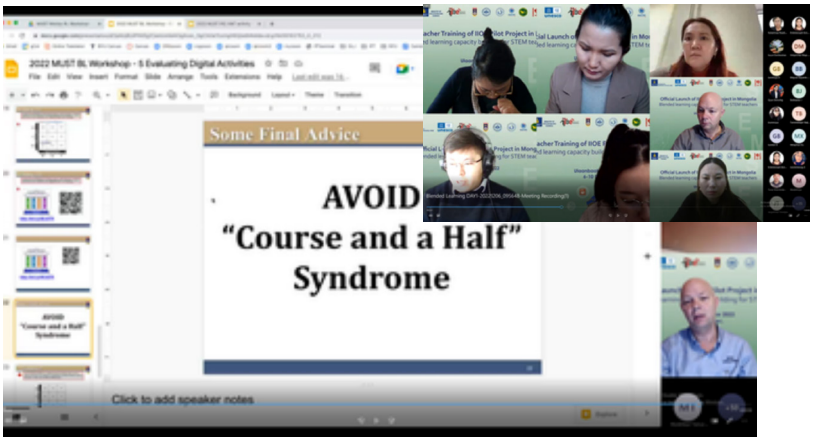
Need Anlysis and Goals

Mongolia's long-term development policy Vision 2050 embeds digitalisation in all its chapters and attaches great importance to enhancing an open and flexible lifelong education system. The Education sector mid-term development plan (2021-2030) also emphasises the necessity of promoting flexible learning pathways, open education and learning modalities such as blended learning. However,

Mongolian HEIs face significant challenges in effectively conducting online and blended learning, due to the following factors: lack of benchmarks and guidelines on blended learning; lack of systematic training on blended learning, especially pedagogy; lack of effective support for teachers in content development; lack of exemplary blended learning courses as references, especially course evaluation; etc.

Hence, in an attempt to meet the actual needs of front-line teachers engaged in blended learning, the pilot project focuses on capacity building for Mongolian university teachers and the support of related policies, so as to facilitate the digital transformation of Mongolian higher education.

The Education sector mid-term development plan (2021-2030)



Operationalisation of Activities

The pilot project 'Blended Learning Capacity Building for STEM Teachers' in Mongolia is centred around teacher capacity building training, university-wide blended learning practice and the development of the blended learning assessment tool and blended learning course development guideline. In the project, MUST is responsible for the overall implementation with guidance from a team of international experts. UNESCO-ICHEI provides the platform, coordinates experts and offers curriculum resources. The whole project is divided into four phases, stretching from project preparation to evaluation.

Master Teacher Training Workshop and Cascading Training

The Master teacher training was planned and implemented in the form of hybrid format combining 3 days of synchronous online training and 2 days of onsite (face-to-face) discussion. Two days of on-site training was organized to support and motivate master teachers to apply their knowledge and skills obtained during the training to the practice. During the training, the team of international experts delivered 5 modules related to blended learning concepts with live Mongolian interpretation. 65 participating master teachers also completed 6 tasks (activities) and 4 homework assignments. Upon completion of the master teacher training, 6 state-owned universities also organized cascading training in their respective institutions and involved 257 teachers in total.

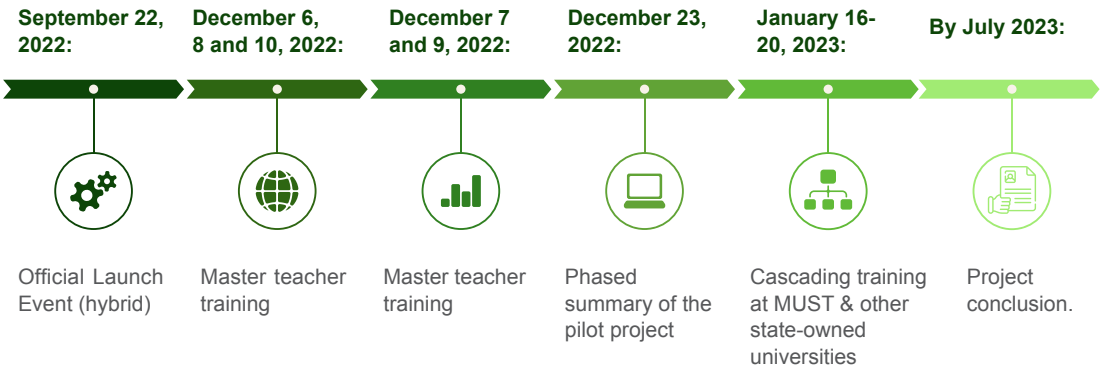
Mixed Method Research on Blended Teaching Readiness

The “Blended Teaching Readiness (BTR)” test was designed as a pre/post test for participating teachers with the collaboration of a 4-men research team and an international expert. The research team set four specific goals, namely evaluating impact, investigating successful factors, monitoring behavioural changes of teachers, and providing evidence-based guidance to future case studies. While the post-training results for BTR are not yet ready, MUST will eventually develop 1 set of blended learning assessment tools and 1 set of guidelines for blended learning course development pertinent to Mongolian context, based on the research outcome.

Snapshot: Blended Teaching Readiness Test

Master teachers were asked to perform a self-assessment survey of BTR, which is a quantitative tool to assess teacher's competency in five main themes of blended learning, including (1) BL dispositions, (2) Competency 1 –online integration, (3) Competency 2 -Data practice, (4) Competency 3-Personalizing Instrument, and (5) Competency 4-Online interaction. The overall BTR score (35.62) revealed that the general readiness for blended learning at MUST is moderate.

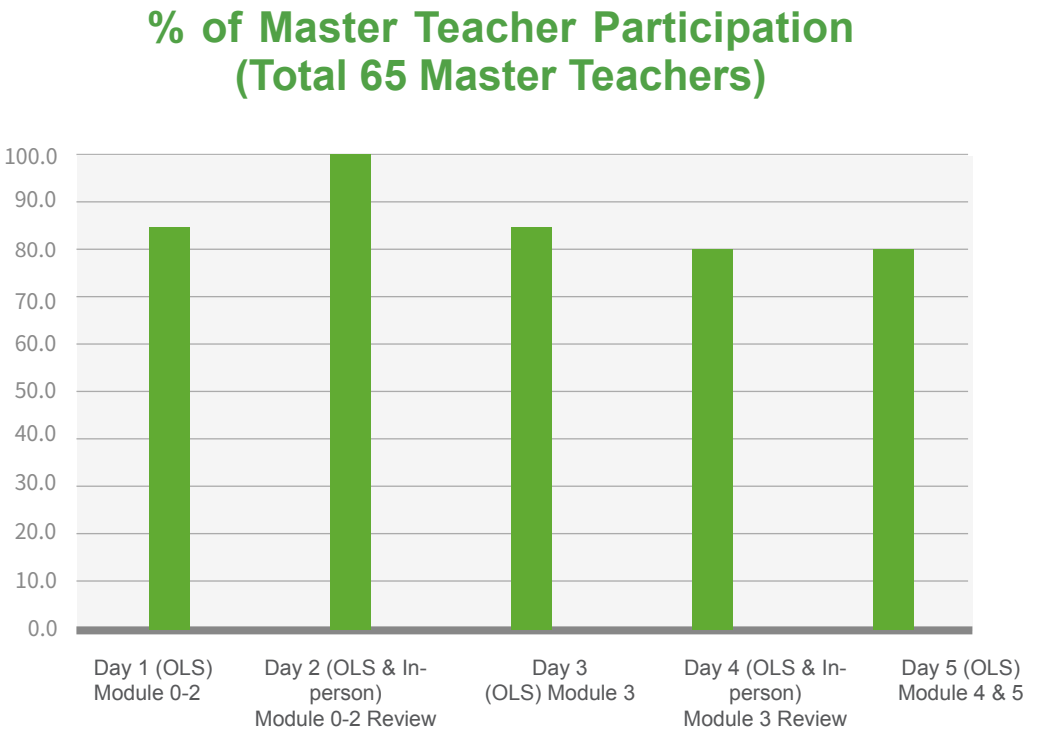
Timeline



Key Facts and Figures

The demographics of the Master Teacher Training, which is the first activity of the IIOE Pilot Project in Mongolia, appeared to have the following four features:

- **High attendance of registered teachers:** the attendance rates of all five training modules fluctuate between 86.2-92.3%.
- **Active participation of female teachers:** 80% of the 65 master teachers who participated in the training were women, which is a significant proportion.
- **Diverse participant backgrounds:** 65 master teachers are from 6 national universities, 43% are Ph.D, 55% are Master's, and 2% are Bachelor's degrees. The disciplinary backgrounds of the participants are also wide ranging, covering business, engineering, language, geology and mining, industrial design, applied science, life science, education, art and culture, etc.
- **Large number of less experienced teachers:** 11 out of the 65 surveyed participants have less than a year of teaching experience, while the majority of master teachers attending the workshop have less than 2 years of Blended and Online teaching experience.



In terms of cascading training, those Master Teachers graduated from the workshop delivered workshops to 257 teachers from their home institutions or departments.

- **Wide coverage of disciplines:** Participants at the cascading training were from 14 schools and 55 departments, with one institution yet to start training. Among the institutions, the Mongolian University of Science and Technology delivered training to 9 schools while the Mongolian National University of Education organised training to 40 departments.

- **Effective cascading of participants:** The average number of cascading trainees from each institution is about 52 teachers, with the largest number coming from Mongolian University of Science and Technology (86 teachers).

There are a few notable points in other aspects:

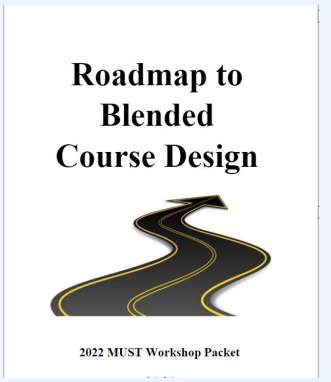
- **Successful development of two exemplary blended courses:** With approval from undergraduate office to pilot two blended learning courses in the spring semester, the pilot project team at IIOE Mongolia National Centre developed two blended courses titled Engineering Mechanics and Knitwear Pattern Design, respectively.

- **High level of localisation:** IIOE National Centre in Mongolia has spent efforts in localising the training contents and resources through Mongolian-English translation.

■ **Microcredential embedded:** All teachers who finished training will receive a certificate of accomplishment to recognise their efforts. This certificate also works as an incentive for training completion.

Training Resource Package

The IIOE Mongolia National Centre and MUST featured five modules in the professional development segment of the training. These modules are carefully planned in terms of logic and relevance, namely Purposes and Models of blended learning, Digital Assessment, Nurturing Community, Engaging with Content and Evaluating Digital learning activities. With each module, there is a presentation file available in both Mongolian and English. The project team also designed a 31-page handbook titled Roadmap to Blended Course Design, also available in two languages.



Feedback and Stories

Prof. LIM Cher Ping (IIOE Chief Expert): Networking with experts and master teachers

"It's actually amazing to see the IIIOE National Centre working closely with experts to produce resources and then to localize them and to be working closely with master teachers and trying to capture that of the master teachers, but also to their practices."

Prof. Waqar Mahmood (Director of Al-Khwarizmi Institute of Computer Science (KICS), University of Engineering and Technology, Lahore, Pakistan): The importance of incentives, assessment mechanisms and practice schemes.

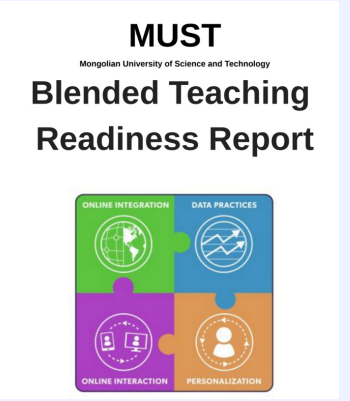
"I would say that Mongolian project is touching the base of the requirements that we are facing at this time in terms of bringing our higher education towards digital transformation. Training and capacity building are one of the most important aspects. And I was looking at some of the modules. In fact, I think they are needed by most countries, so they have done well in terms of taking master trainers earlier."

Prof. Charles R. Graham (Professor of Instructional Psychology and Technology, Expert in Blended Learning, Brigham Young University, U.S.):

"Tserenchimed Purevsuren and colleagues are doing a lot of work to reach teachers at many different institutions. I want to acknowledge that blended course redesign is hard work. I'm very excited about the stage forward, which

Blended Teaching Readiness Report

The research findings of the Blended Teaching Readiness Test will be compile into a report with more concentration on data practice, individualised learning, and online interactions. Currently available research findings, along with other notable outcomes of the pilot project, were presented at the biggest national conference (Outcome based education -2022) in the Education field on 23 Dec 2022.



is developing a guidebook and evaluation tool. It will be important for the long term sustainability of the training. It will also provide opportunities for research related to blended adoption in the Mongolian context."

Prof. WANG Libing (Chief of Section for Educational Innovation and Skills Development, UNESCO Asia-Pacific Regional Bureau for Education):

"I think it's also very interesting to see (the Mongolian pilot project) is focusing on promoting teachers' capacity for blended learning. When we are promoting blended learning, it will eventually come down to the operational level for teachers and professors to do program development and course planning. So we need to integrate this blended learning consideration or approach into program development and course planning. Otherwise, it's just on paper."

Future Steps

Current Challenges

With rigorous project design and implementation, there are still areas of growth. During the master teacher training, teachers were asked to fulfill 6 tasks (activities) and 4 homework assignments, but the completion rate for both in-class tasks and homework (expressed by % of teachers to complete the assignment) were relatively low (less than 50%). More incentives in addition to certificates may be added, and the school management team can also spare unnecessary schedules so that teachers can have time finish the homework.

Next Steps

About the future development plan, according to Dr. Tserenchimed Purevsuren, building upon existing achievements, more cascading trainings will be conducted at MUST and other state-owned universities. An additional 5 to 8 blended courses will be developed. In addition, blended learning assessment tools and blended learning course development guidelines will also be produced to support blended learning practices.

Nigeria: Empowering Institutional Policy Implementation for **Digital Teaching and Learning**

Project Rationale

Higher education plays an essential role in Nigeria's prospects toward a vibrant digital economy. As envisioned in the National Development Plan (NDP) 2021-2025 of Nigeria, investing in people and promoting digital technology in education are essential for the country's prospects in higher education development. Working in line with Nigeria's NDP and UNESCO's Priority Africa Strategy, UNESCO-ICHEI and Ahmadu Bello University (ABU) jointly established the IIOE Nigeria National Centre in April 2022. The objective is to establish a national hub in Nigeria that supports the digital transformation of higher education teaching and learning. Endorsed by the National Universities Commission of Nigeria (NUC) and the Nigerian Federal Ministry of Education, IIOE Nigeria National Centre has formed a local network covering 8 Higher Education Institutions (HEIs) in 5 northern federal states and the capital.

In September 2022, UNESCO-ICHEI and IIOE Nigeria National Centre collaboratively initiated the pilot project entitled "Empowering Institutional Policy for Digital Teaching and Learning in Nigeria". Based on local needs and UNESCO-ICHEI's research series

Group photo of participants in the IIOE Nigeria National Centre pilot project

on digital transformation of higher education, this project focused on a broad range of digital teaching and learning activities such as teachers' capacity to design, develop, produce, deliver and assess online courses and teachers' digital literacy and skills, as well as digital governance and management on the institutional level, namely the implementation of institutional policies for digital teaching and learning. The project has engaged more than 200 students and teachers from ABU and several other Negerian HEIs to participate in its thematic activities.

Mechanism and Activities

Need Anlysis and Goals

Nigeria's National Development Plan (NDP) 2021-2025 has a special focus on strategies and approaches of transforming Nigeria into a digital economy and it highlights the essential role of a resilient higher education system in this process. At the institutional level, the implementation of the Teaching & Learning Policy (TLP) initiative at ABU envisions the digital transformation of teaching pedagogy, professional development, and curriculum design. However, ABU still faces challenges with regards to awareness of digital transformation among leadership, the design and development of implementation plans for evaluation, and the coordination mechanisms to fully utilise the strength of TLP initiative. Also, a large number of teaching faculties at ABU do not possess sufficient digital literacy or capacity to actively engage in the implementation of TLP.

To address these challenges, the IIOE Nigeria National Centre takes ABU as a pilot case and devises the key objective of supporting the nationwide implementation of institutional policies for digital teaching and learning in Nigerian HEIs. Specifically, the project intends to enhance the awareness of implementing and evaluating TLP initiative by strengthening cross-departmental coordination in ABU as a trial. In addition, the pilot project will also work to facilitate professional learning for teaching faculties and produce high-quality open education resources.

The National Development Plan (NDP) 2021-2025

Operationalisation of Activities

To achieve these objectives, UNESCO-ICHEI developed the project framework in consultation with IIOE Nigeria National Centre during when the Centre identified the local needs, developed an implementation plan and organised project activities to ensure the timely delivery of up-to-standard deliverables. The IIOE Nigerian National Centre took the responsibility of assembling the local monitoring and assessment team, while UNESCO-ICHEI was in charge of the coordination of funding, resources and external support to implement the pilot project.

The project contains 3 major activities, ranging from webinar sessions to training series.

Training of Trainers (ToT) Sessions

Online Course Design, Development and Production Training workshop

As the core activity of pilot project, the Training of Trainers (ToT) sessions took place in November, 2022, targeting teacher trainees and teaching faculties from IIOE Nigerian National Centre's network. 55 participants from the fields of Engineering/ Computing, Medical/Bio Sciences, and Social Sciences/Humanities joined the 5-day, 10-session programme to design, develop, and produce online courses and relevant assessment rubric, among which 50 of them obtained certificates based on performance of attendance, assessments, and deliverable quality. The majority of trainees joined the activity onsite at the Smart Classroom of ABU with online participation as an alternative. Collecting feedback and lessons learnt from the implementation, the pilot training sessions are adapted to a flexible programme module which partner Nigerian HEIs and faculties might freely customise the sessions in correspondence with local needs and contexts. An assessment rubric for online courses and four quality online courses were also developed as another two key deliverables of the project.

Teacher trainees in the workshop interact with Dr. Paul Prinsloo, Open Distance Learning Specialist at University of South Africa

Policy Implementation Workshop

The policy implementation workshop intended to build a TLP implementation strategy for ABU, attracting university management stakeholders, representatives from partner HEIs, and student representatives to participate. The workshop included two plenary sessions, one breakout session, and a concluding summary of discussions. The first plenary session evaluated ABU's TLP and determined its essential components, followed by Parallel Breakout Sessions. Afterwards, the second plenary session discussed the reports from each breakout room.

The Policy Implementation Workshop for ABU's TLP

Snapshot: Customised ToT Programme on Online Course Design and Development

In a customised ToT programme, facilitators can instruct the design and development of online courses in two major sessions, focusing on theory and practices, respectively. To prepare trainees with theoretical information, the first session will touch upon factors impacting students' success in online teaching and learning, tips about designing online learning spaces, and elements of storyboarding toward a blueprint. In the second session, participants will have hands-on experience of using virtual teaching tools (ZOOM, Teams, etc.), creating digital content (Filmora, Powerpoint, Camtasia), and conducting online assessment (Google Suite).

Digital Literacy Enhancement Programme

The Digital Literacy Enhancement Programme consists of a series of individual capacity building activities to supplement ToT sessions. Instructed by IIOE Nigeria National Centre, Team IIOE at UNESCO-ICHEI, as well as partner enterprises such as Kingsoft, participants were able to learn and practice productivity tools such as PowerPoint, WPS Office, IIOE Platform 2.0, Google Workplace, and Microsoft Teams. Participants may also choose their preferred level of difficulty when signing up for the workshops. Aiming to enhance the digital literacy of teachers from IIOE Nigeria National Centre network, the programme engaged a wide range of audiences in Nigeria and beyond, and participants cut across all disciplines for most of the literacy enhancement sessions.

Poster of a Session of the Digital Literacy Enhancement Programme

Timeline

September 28, 2022:

Official Launch Event (hybrid)

September – October 2022:

Development of project ToT training plan

October 2022:

Announcement of ToT training & request for nominations

October 2022:

Registration of teacher trainees

November 2022:

3-day intensive ToT onsite training on online course design, development and production

November – December 2022:

Policy Implementation Workshop and drafting of Implementation Plan

November – December 2022:

Online course development & online support

December 2022 - January 2023:

Preparation and submission of project report

Key Facts and Figures

The IIOE Pilot Project in Nigeria is well received by teachers from ABU and other Nigerian HEIs with fruitful outcomes. In terms of participation, there are three notable demographical features:

- **Broad coverage across local HEIs:** The project supported professional development of 55 teacher trainers from more than 8 local HEIs, and certified knowledge transfer activities in Online Course Design and Development Training Sessions have developed far-reaching local impacts.

- **Active participation of female teachers:** 84.5% of 123 participants of the digital capacity building workshops were women, indicating active engagement of the gender group in learning digital literacy.

- **Balanced engagement in multiple activities:** Among trainees who completed the post-survey, 40.8% joined the ToT training sessions, 52.1% participated in the Digital Literacy Enhancement Programme, and 23.9% was part of the discussion on the TLP development plan.

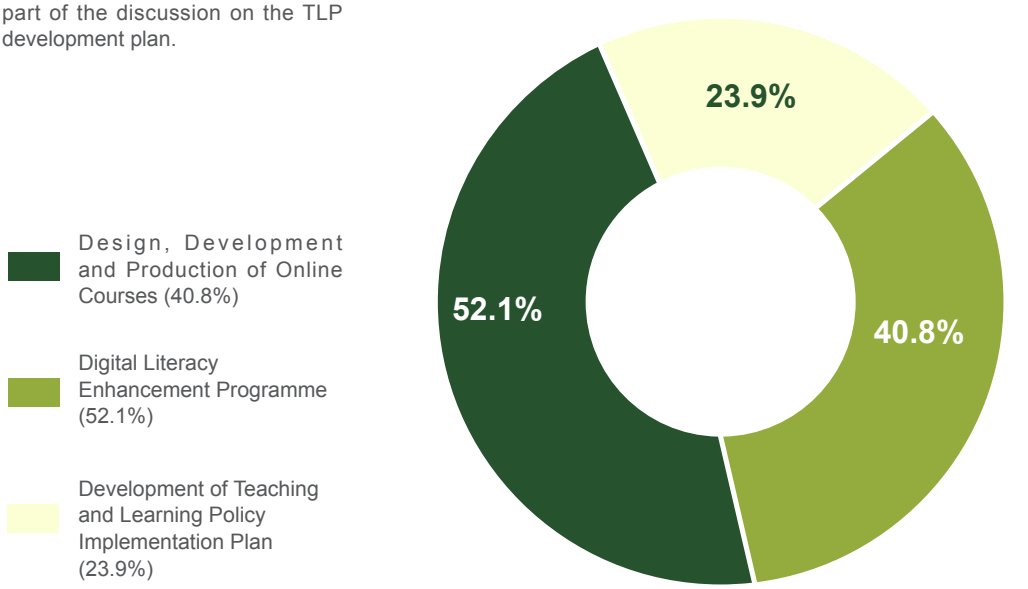
Throughout the pilot project, participants and facilitators collaboratively produced five key deliverables, including a customisable ToT project template, 50 certified trainers of trainees, an assessment rubric for online courses, 4 quality online courses, and a project report. With these deliverables, trainees have responded positively to the project's impact evaluation.

- **Notable progress and improvement:** According to the post-survey, about 92.6% participants have observed positive changes in the trainees' knowledge, skills, or behaviour as a result of training, and 100% responded that they made progress through the training. When investigating the effect of cascading knowledge on peers, more than 70% participating trainers believed that thanks to the training, their trainees could better understand the concepts or skills the trainers taught to them.

Open Education Resources: Quality Online Courses

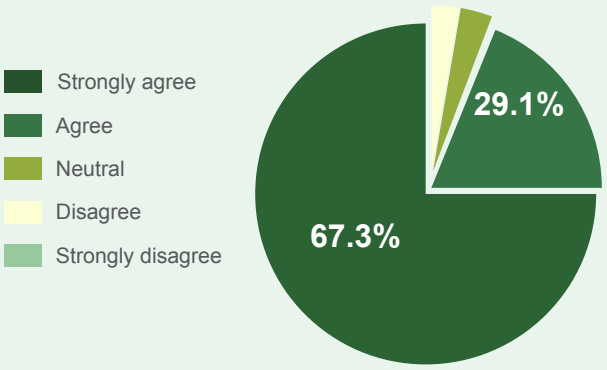
As part of the learning process, participants of the project used first-hand skills to develop 4 Quality Online Courses developed from the cluster of teacher trainers, including Introduction to DC Machines (Engineering/ Computing), Research Methods in Medicine (Medical Sciences), Lower Organisms in Public Health (Life Sciences) and Precolonial Systems in Nigeria (Humanities/ Social Sciences).

What training programme in the IIOE pilot project did you attend?

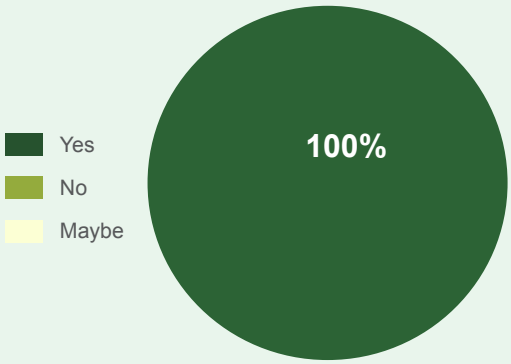


- **Large willingness to continue learning:** 22.7% participants said they were ready to start cascading training after the pilot project, while 36.4% believed they still need improvement. However, all participants (100%) expressed willingness to receive additional training or support to improve their cascading of training to others, if there's a chance.

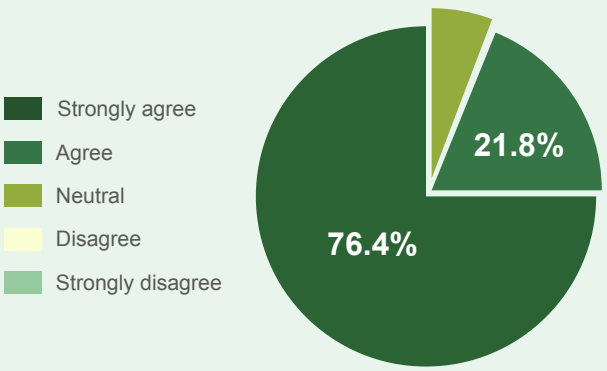
The Smart Classroom at ABU was very convenient for the training.



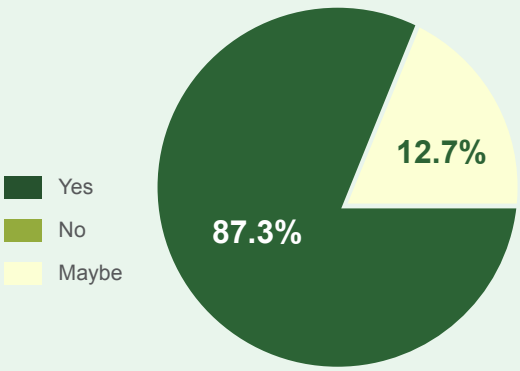
Do you feel like your skills have improved as a result of the training?



The training experience will be useful in my teaching.



Are you now prepared to step-down the knowledge, which was acquired during the training, to your Department?



Feedback and Stories

Prof. Kabiru Bala, Vice Chancellor of Ahmadu Bello University

The COVID-19 pandemic has exposed the deficiencies of higher education in Nigeria, exacerbating the need for digital transformation at Ahmadu Bello University. The pilot project of the IIOE Nigeria National Centre therefore comes at the right time, which will provide resources and experience for the promotion of education transformation in the post-COVID era.

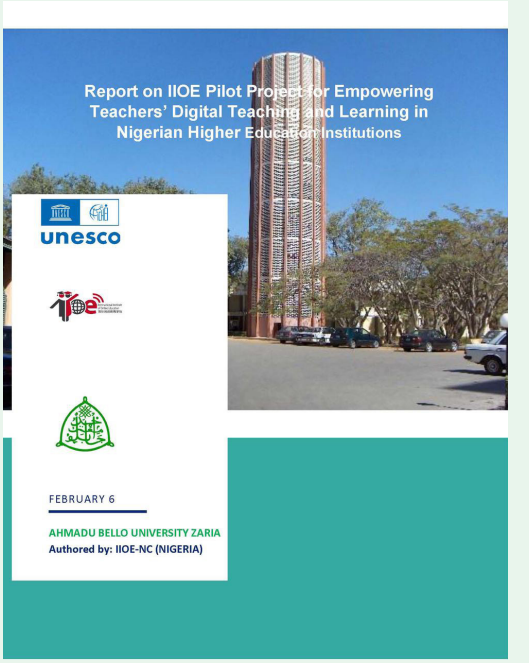
Picture montage of the IIOE Nigeria NC Pilot Project

Chris Maiyaki, Deputy Executive Secretary, National Universities Commission (NUC), Nigeria

The (IIOE Nigeria National Centre) pilot project aligns with NUC's vision of promoting digital education and guidelines on transnational education. The project represents a model of international education cooperation in Nigeria. I commend the IIOE Nigeria National Centre's leadership in promoting digital education. On behalf of NUC and the Nigerian Federal Ministry of Education, I express my full support for the project, and hope that the project outcomes and educational resources of the IIOE platform could be shared with more educators and contribute to the sustainable development of higher education in Nigeria.

Project Report: Evaluation & Documentation:

The pilot project is designed to support further digital transformation of Nigerian HEIs. The project team presented a detailed project report for further reference, which summarised activities, outcomes, impact, best practices, lessons learnt, prospects, and budget usage for IIOE partners' references.



Future Steps

Current Challenges

Evaluation of the project indicates that there is a general need for capacity building in teachers' digital literacy and specifically up-skill capacity of digital online content development. There is also a growing and gradual acceptance of the necessity to digitally transform teaching and learning and acquire the necessary skills. The project suggests that the ToT approach adopted is most likely the fastest and most cost-effective way to actualise capacity building in HEIs in Nigeria. Increasing the efficiency of the ToT model, however, requires HEIs to further incorporate digital learning policies with proper guidelines, implementable plans and measurable metrics in addition to quality assurance frameworks. To ensure the success of digital transformation of teaching and learning, challenges in infrastructure funding and institutional support via digital leadership are calling for further attention.

Next Steps

Looking forward, IIOE Nigeria National Centre will continue enhancing its mechanisms and carry out further education projects. In 2023, the Centre will undertake practical/hands-on capacity building training or workshops in at least 3-5 Nigerian HEIs, accommodating more than 300 teaching staff on digital literacy with emphasis on content development and producing 3-5 quality online courses for the IIOE 2.0 platform. The IIOE Nigeria National Centre will also welcome 5–10 new HEIs to join the IIOE Nigeria network. At ABU, the Centre's future projects will also offer M&E support for the University's TLP, coordinate acquisition of devices to support the development and production of content and ensure student-centric activities at the ABU Smart Classroom.

IIOE National Centres: **Looking Forward**

An evolving entity

The programming of IIOE National Centres will follow the renewed IIOE general strategic plan 2023. "Specifically, the development plan of IIOE National Centre will correspond with IIOE partner institutions' local needs and priorities to ensure inclusive and equitable project implementation," said Ms. Bi Xiaohan, the Assistant Director of UNESCO-ICHEI and

the Chief of West Asia and Africa Programme Office. Based on several rounds of preliminary research and consultation, four key strategies have been identified for a sustainable, future-oriented IIOE National Centre mechanism.

First, with lessons learned from the establishment of the first eight IIOE National Centres, the mechanism will expand the domestic network of each Nation Centre and scale up teacher professional training programmes to benefit an increasing number of higher education institutions and teachers. Secondly, while growing the number of training programmes and courses, the IIOE National Centre Team will also lay emphasis on localising the content and languages of teachers' professional training products. Also, as microcredentials have become an integral sector of lifelong learning and professional development, IIOE National Centres will continuously investigate potential pathways to certifications aligning with national and institutional regulations with verification. In closing, the overall aim of the three strategies aforementioned calls for the establishment of functioning modalities incorporating contextual features of IIOE National Centres.

An engaging opportunity

The brief introduction of these pilot projects was not intended for deep learning but rather a light touch on the National Centres' potential in developing localised and quality programmes. "We hope that IIOE National Centres are aware of what other National Centres are doing and what experiences they have gone through, then try to find connections with their own work and reaching out to others - no matter if National Centre-wise or institutional-wise - through the IIOE network," said Professor Lim Cher Ping, Chief Expert of IIOE and also the Chair Professor of Learning Technologies and Innovation of the Education University of Hong Kong. Professor Lim took the five pilot projects as his example on cross-institutional and inter-regional communications among IIOE National Centres; there is a connection between Mongolia and Kenya National Centres, because both centres are targeting their audience and trainees to STEM teachers. The two projects might also borrow experiences from the IIOE Malaysia National Centre on microcredentials to enhance their project framework in terms of professional learning. The other two Africa-based IIOE National Centres can also refer to each other's workstream as they are working in supplementary directions of professional learning. The Egypt National Centre works from the vertical perspective and tries to reach out to not only institutional leadership but also education policymakers, aiming to raise their awareness to formulate professional learning-related policies. Meanwhile, the Nigeria National Centre emphasises horizontal partnership development and network expansion in the project design phase, such as involving local partner institutions and planning for the cascade of professional learning to highlight the equitable nature of the IIOE network.

An inclusive community

"We hope to design IIOE for scale; but to make the project as inclusive as possible, it is quite critical that IIOE could work with the partners to be able to localise the courses, resources, or strategies in order to make our work relevant to local higher education stakeholders or communities in this global effort." Professor Lim noted. Therefore, IIOE National Centres are not only playing a critical role in localising the languages, but also in contextualising the local needs for professional learning of the higher education workforce. In addition, IIOE National Centres are also encouraged to reach marginalised teachers or institutions in remote developing areas or of lower socio-economical status, as inclusiveness is one of the key features of IIOE's work. As most IIOE partners mentioned in consultations and working meetings, the IIOE National Centre mechanism needs to emphasise the importance of collaboration - co-design, co-construction or co-creation - so that network members can share their promising practices as evidence within the country or region. Professor Lim then added, "Again, it is critical to see ourselves as a professional learning community working towards equitable and quality professional learning and lifelong learning for all."

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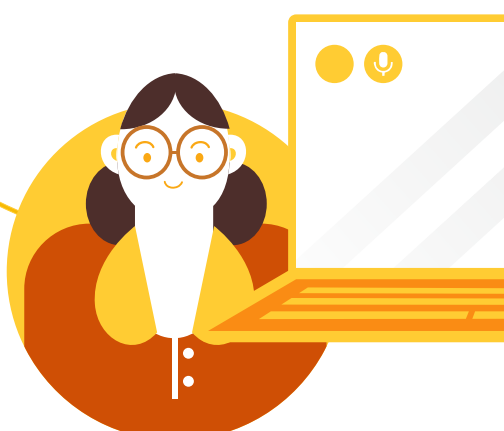
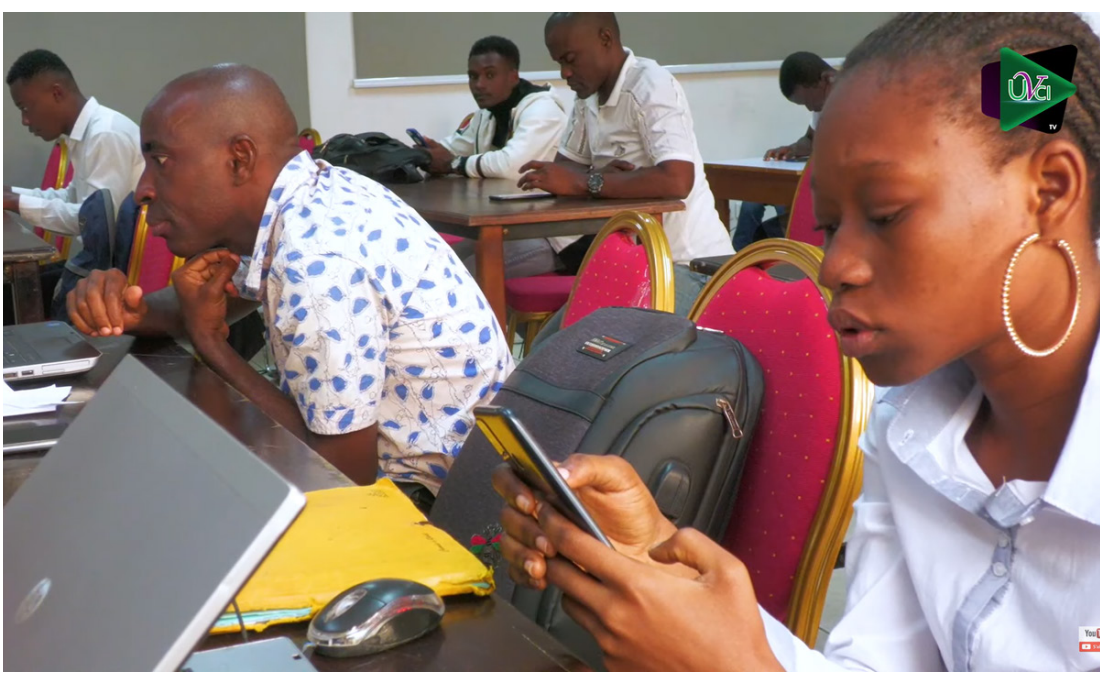


Us

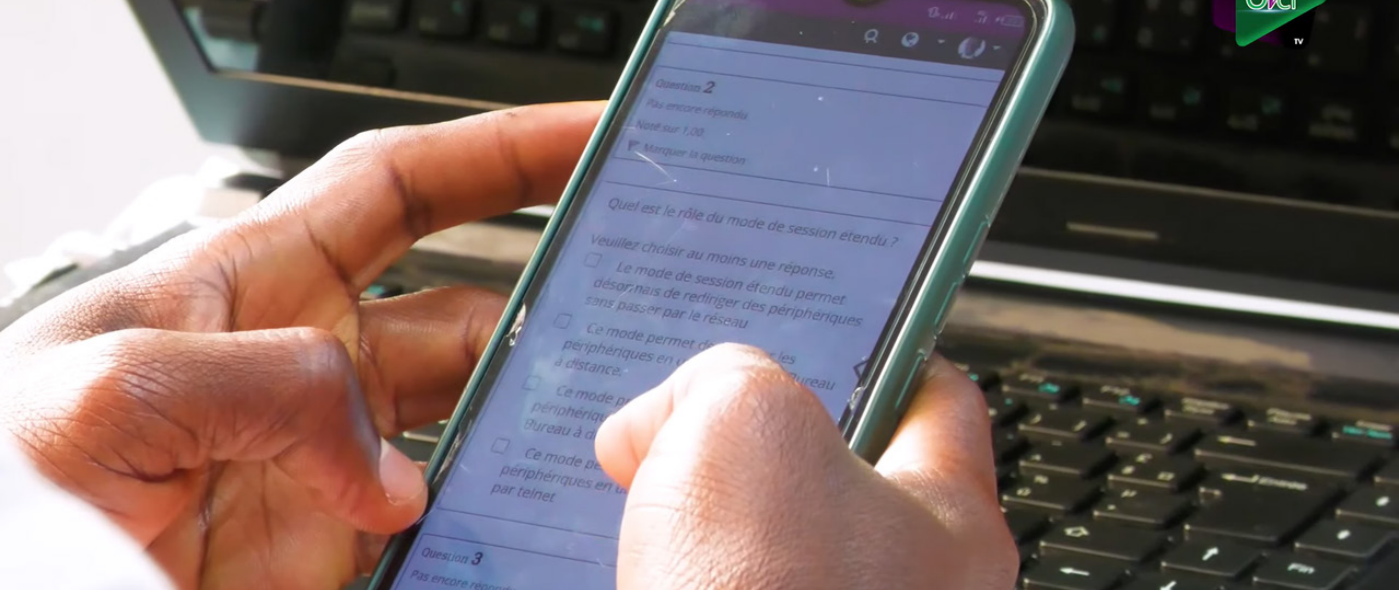
Summative Assessment in Distance Learning (EVAD) at UVCI: **Reflections and Challenges for Teaching and Learning**

Calmly and concentrated, students at the Virtual University of Côte d'Ivoire (UVCI) completed their 2022 final exams to showcase their learning from the semester. "I didn't face many difficulties.....at least everyone did their best", said one of the master's students who majored in Application Development and Services.

Students at UVCI are already familiar with the Summative Assessment in Distance Learning (EVAD), a new type of academic assessment implemented in response to the pandemic. Although students have adopted online and distance learning, they still need to deal with distance assessment.



Source: Report Exam of UVCI at the end of September 2022 (YouTube)



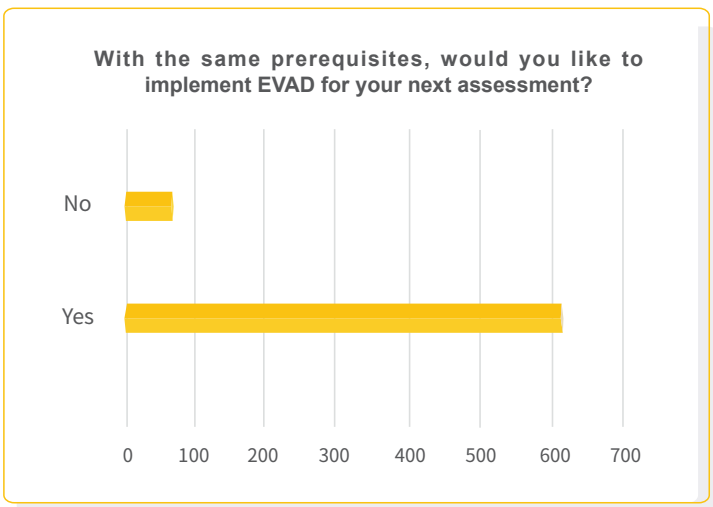
Summative Assessment in Distance Learning (EVAD): Design and Goal

Distance learning has developed considerably in recent years, especially in the field of higher education. In addition to teaching, academic assessment, as a crucial part of learning, requires the same attention from educators in HEIs. In France, for instance, some educators have opted for remote oral examinations, while others have required students to submit work online or merely consider continuous evaluations. EVAD is a continuation of the face-to-face and online assessments that have long been used at UVCI. It was introduced to avoid the classification of students for assessment which often occurred before the pandemic.

The overall goal of EVAD is to clarify the general teaching objectives, while the specific objectives aim to identify the learning contents to be evaluated and to precisely describe the level that students should have achieved by the end of a module.

According to a survey of 803 students at UVCI, students generally hold a positive attitude toward EVAD. Most students prefer this type of assessment to traditional face-to-face exams. EVAD is absolutely fair to everyone, avoiding classifying students regardless of their learning levels, learning status, or gender.

> Most students prefer online assessment to traditional face-to-face exams.



Students are reacting to the implementation of EVAD: With the same prerequisites, would you like to implement EVAD for your next assessment? (cr. a specialised survey on EVAD conducted by UVCI)

EVAD Requires Teachers a Higher Digital Competency

Online and remote teaching and learning, as the central feature of UVCI, guides students to make full use of technological tools in their practice, which requires a higher level of digital competency for teachers and students. Teachers, however, all agree that the consistency of EVAD still needs to be improved, which undoubtedly challenges whether this evaluation will be used in the future.

Teachers will also need to master a variety of distance assessment models with completion of additional professional development sessions. There are three common types of academic assessment at UVCI: "flash assessment" (a quick assessment within 10 minutes), structured assessment (a 30-minute learning assessment), and final exams (flexible time). How to balance the proportion of different assessments and improve the efficiency of EVAD? This is still the remaining question for UVCI.

> “Online and remote teaching and learning requires a higher level of digital competency for teachers and students.”

Building a Remote Assessment Framework to Familiarize Teachers with EVAD

UVCI is completely online, with teaching and assignments conducted remotely in a traditional way. It serves for the implementation of EVAD to function with fewer interferences. Therefore, any face-to-face educational providers planning to take EVAD have to be familiar with online teaching and learning in advance. As examinations are conducted online, technical difficulties may result in a temporary cancellation of the test. Therefore, a professional technical team should be assembled to prevent potential risks and interferences in the exams. Besides, as student cheating is one of the major obstacles to EVAD, effective anti-cheating software should assist teachers in dealing with this issue. Hence, institutions interested in adopting EVAD should find solutions from the upstream side to persuade potential cheaters and to supervise via anti-cheating software. Although relevant software demands a higher investment, it is essential to assure the integrity and equality of assessments.

> “A professional technical team is essential to prevent potential risks and interferences in the exams.”

EVAD Should Ensure Teachers and Students Face-to-face Meeting

According to the teachers in the survey, one of the problems with EVAD is the lack of assurance of offline communication between teachers and students, which is rather common in traditional face-to-face examinations. However, EVAD largely reduces the opportunities for in-person interactions between teachers and students and weakens their social connections as a result. In academic assessment, students communicating with teachers and getting face-to-face feedback is the only way for both sides to

interact offline. Therefore, teachers doubt the efficacy of the EVAD in maintaining the teacher-student relationship. It can be avoided by regular offline meetings between teachers and students, especially for institutions that operate in a fully remote way, such as UVCI, where offline communication and timely feedback between teachers and students is essential.

UVCI: The Leading Institution for Virtual Teaching and Learning in Africa

Esther OKA (MSc Big Data Analytics): "Having studied my first course in Application Development at UVCI, I chose to do a Master's degree in Big Data Analytics. I perceive that it is more in line with the current demand for complex personnel in the Ivorian and even international job markets. UVCI's distance learning based on the teaching model allows students to combine employment and training. Thanks to UVCI's educational model, I was able to benefit from the internship and continue to follow the course".

N'goran Assia Jean (MSc Computer Science and Digital Science): "Thanks to UVCI, I was able to quickly improve my skills and integrate into several companies, which gave me quite an interesting professional experience. After working for several technology companies, I started my own company with the support of my classmates at UVCI, focusing on designing digital solutions. Now I am a web developer for a French technology innovation start-up. Online education has enabled me to enhance my work through self-training and to differentiate myself in the company".

Source : site officiel de l'UVCI

Lahore College for Women University: **Female Power in Talent Training of STEM Education**

The Lahore College for Women University in Pakistan encouraged its students and faculty members to enter the field of STEM education through a variety of activities, including courses and training. The effort was devoted to promoting the empowerment of female STEM faculty staff and closing the gender disparity in STEM disciplines.

A teaching practicum display was organized by the STEM Education department where the students displayed their audio-visual aids along with their lesson plans and portfolios prepared during their teaching practice in different secondary schools. (cr. LCWU)

Classroom of "Parachute Man"

Junior students of the Elementary and Teacher Education Department at Lahore College for Women University (LCWU), Pakistan are assigned a special task in the class. They are required to fulfill a Parachute Man Challenge. Making a model parachutist landing demands students to learn scientific concepts about body structure, gravity, and air drag, calculate parachute area, balance the weight and size, slow down the speed, and produce a model parachute and parachutist with low-cost materials.

This course, "STEAM Education," is part of the LCWU Teacher Education Undergraduate Program. In the class, students are required to complete one simple "STEAM Challenge" per week, for a total of 12 challenges, such as the Parachute Man Challenge, Spider Web Challenge (each group is required to make a spider web

that could support the spider with a practical structure), Bridge Challenge (each group is required to construct a model bridge that can support a certain amount of weight), etc. This course's instructor, Dr. Asma Shahid Kazi, once visited a STEM activity for children as young as 3 while working. Dr. Asma Shahid Kazi explains, "I was amazed at seeing how young children can be exposed to science at such a young age." Profoundly impressed, she established the first STEM-related course at the university.

STEM is the abbreviation of Science, Technology, Engineering, and Mathematics, emphasising the interdisciplinary integration of multiple subjects. Studies find out STEM education differs from traditional education modes in integrating the four subjects into a whole, laying a solid foundation for cultivating students into problem solvers, critical thinkers, and innovators. STEAM education, however, adds Arts into the original STEM education, supporting students to understand the world through discipline integration and improving their innovative ability to comprehensively apply knowledge to solve practical problems. In essence, both STEM and STEAM education emphasize interdisciplinarity and creativity. Students are expected to have critical thinking and creativity, understand complicated information, and tackle challenges, which are crucial to the rapidly changing world.

Gender Imbalance

Whether in schools or the workplace, the development of STEM, however, is threatened by severe gender imbalance. UNESCO Science Report: Towards 2030 noted that women account for just 28% of global researchers, according to available data. Women are least present in engineering, and fewer females graduate in computer science. Numbers from the World Economic Forum also show the proportion

> “Women are least present in engineering, and fewer females graduate in computer science.”

(cr. UNESCO)

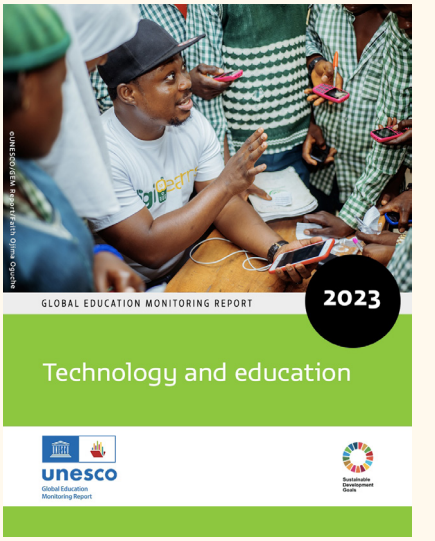
of the female labor force in digital areas is particularly low, with men accounting for more than 80%. Despite the differences between countries, women hold only 17% of tech jobs on average, and 22% of jobs in AI.

Gender imbalance in STEM not only involves gender equality in the education system and individual development of females but may also lead to brain drain in the whole society and unbalanced development in regions and industries. The joint message by Audrey Azoulay, Director-General of UNESCO, and Pumzile Mlambo-Ngekuka, Executive Director of UN Women stated that "women's and girl's voices and expertise in Science, Technology and Innovation (STI) are vital to bringing solutions to the disruptive change in our rapidly evolving world. We urgently need to close the gender gap in STEM fields and actively promote gender equality in STI careers." Dr. Asma Shahid Kazi and LCWU are also working to empower women in STEM-related education.

During the courses, Dr. Asma Shahid Kazi taught teacher trainees about STEM and instructed them on how to deliver the knowledge to their students. Thus, when these future primary school teachers finally get onto the stage, they are not just equipped with science teaching capacity based on inquiry thinking and design thinking, but also role models who encourage more girls to study science in the future.

UNESCO Global Education Monitoring Report 2023: Technology and Education

As a crucial indicator to evaluate the achievement of the fourth Sustainable Development goal for education (SDG 4), technology appears in six out of the ten targets. The 2023 Global Education Monitoring Report on Technology and Education will explore debates on how the role of technology is viewed, discussing potential solutions to educational challenges offered by technological applications and acknowledging the possibilities of the possible negative impacts technologies might have on educational development. The report also aims to investigate several systemic problems for technology to fully realize its potential in education.



University Reform

The fruitful achievements of Dr. Asma Shahid Kazi's teaching practice examplify STEM education reformation driven by LCWU. Founded in 1922 with a history of a hundred years, LCWU now has three major faculties (Pharmaceutical & Allied Health Sciences, Engineering & Technology, and Science & Technology) offering STEM-related courses.

LCWU also actively connects with relative industries and establishes an industrial advisory board to help students increase their knowledge of industry trends and keep the industry on board during various stages of curriculum development. In addition to that, a separate STEM education department has been established in the education faculty, which offers curriculums based on science, knowledge engineering, and mathematics subjects. In terms of facility equipment, LCWU has

National Research Conference organised by STEM Education Department (cr. LCWU)

> The fruitful achievements of Dr. Asma Shahid Kazi's teaching practice examplify STEM education reformation driven by LCWU.

a central research lab with highly technological instruments, providing available devices for students from physics, chemistry, biology, and other departments to conduct collaborative research. From the perspective of international cooperation, LCWU, as a member of the International Institute of Online Education (IIOE) Pakistan National Centre, has advocated for teachers and students to further enhance their digital capacities through participating in various international events.

By encouraging more female teachers to practice STEM methods, LCWU has created a supportive learning environment for women in the STEM fields, which has benefited both the university's faculty and its student body. Women at LCWU participate actively in STEM-related research and education, learn relevant skills, and make outstanding contributions to the national economy.

Female Power

In accordance with the trend toward the digital transformation of higher education, institutions will foster integrated and inventive talent under the guidance of STEM education. Therefore, the abilities of female teachers in STEM courses play a crucial role. However, there is still much work to be done to empower female STEM educators and advance gender equality in STEM fields.

From the standpoint of digital empowerment for female teachers, education departments and higher educational institutions should actively develop extensive cooperation with enterprises and international organizations related to digitalization and online learning. Emphasis should be placed on introducing technology and expanding the accessibility of digital learning resources. Based on the observation of Professor

Saima Farhan, Chairperson of the Computer Science Department of LCWU, while some institutions have slowly begun to introduce new technologies, there is still a need to amplify the reach of learning resources to more schools in Pakistan and to explore "how to effectively integrate knowledge into the educational curriculum for more effective learning". Meanwhile, it will require heavy training for teachers on innovation and creativity through the integration of critical thinking and scientific knowledge. " A change in the mindset of the schooling system as a whole is therefore required ", says Dr. Farhan.

As positive role models for girls, female STEM teachers are found to effectively dispel stereotypes about boys' natural skills and increase girls' perceptions, enthusiasm, and self-efficacy in STEM through their teaching activities. The story of LCWU Vice Chancellor Professor Bushra Mirza serves as a vivid example. In this male-dominated scientific community, female scientists must compete fiercely in order to obtain a position. Prof. Mirza is one of the 10 percent of the 44 Pakistani scientists on the Stanford University's list of the most protected scientists who are women. Her presence is the greatest source of motivation for LCWU students. Female STEM professors at universities should integrate STEM education across the entire curriculum in order to increase female students' interest in STEM subjects and innovation capability based on the paradigms of inquiry thinking and design thinking.

> "There is still much work to be done to empower female STEM educators and advance gender equality in STEM fields."

Under the trend of digital transformation of higher education, female power continuously emerges in STEM fields worldwide, which offers a good opportunity to jointly build the future of education.

Teachers and Students of LCWU jointly celebrate International Women's Day (cr. LCWU)

A Breath of Fresh Air: **Transforming College Classrooms Through VR Technology**

About the Author

Jiangxi Kejun Industrial Co., Ltd. (hereinafter referred to as "KMAX") is one of China's leading Ed-Tech providers of comprehensive services focusing on VR (Virtual Reality) applications in education. KMAX has more than 1,000 patents and copyright innovations, which have served more than 3,500 colleges and universities globally. KMAX is committed to pioneering the in-depth convergence of emerging educational technologies, such as VR and AR (Augmented Reality), and the transformation of teaching and learning. KMAX has strong capabilities in systematic designing, VR hardware, VR-based education resources, and Cloud-based VR platforms. As one of the top companies in China's VR industry, it also hosts a national training centre for VR education.

The Trend of "VR + Education"

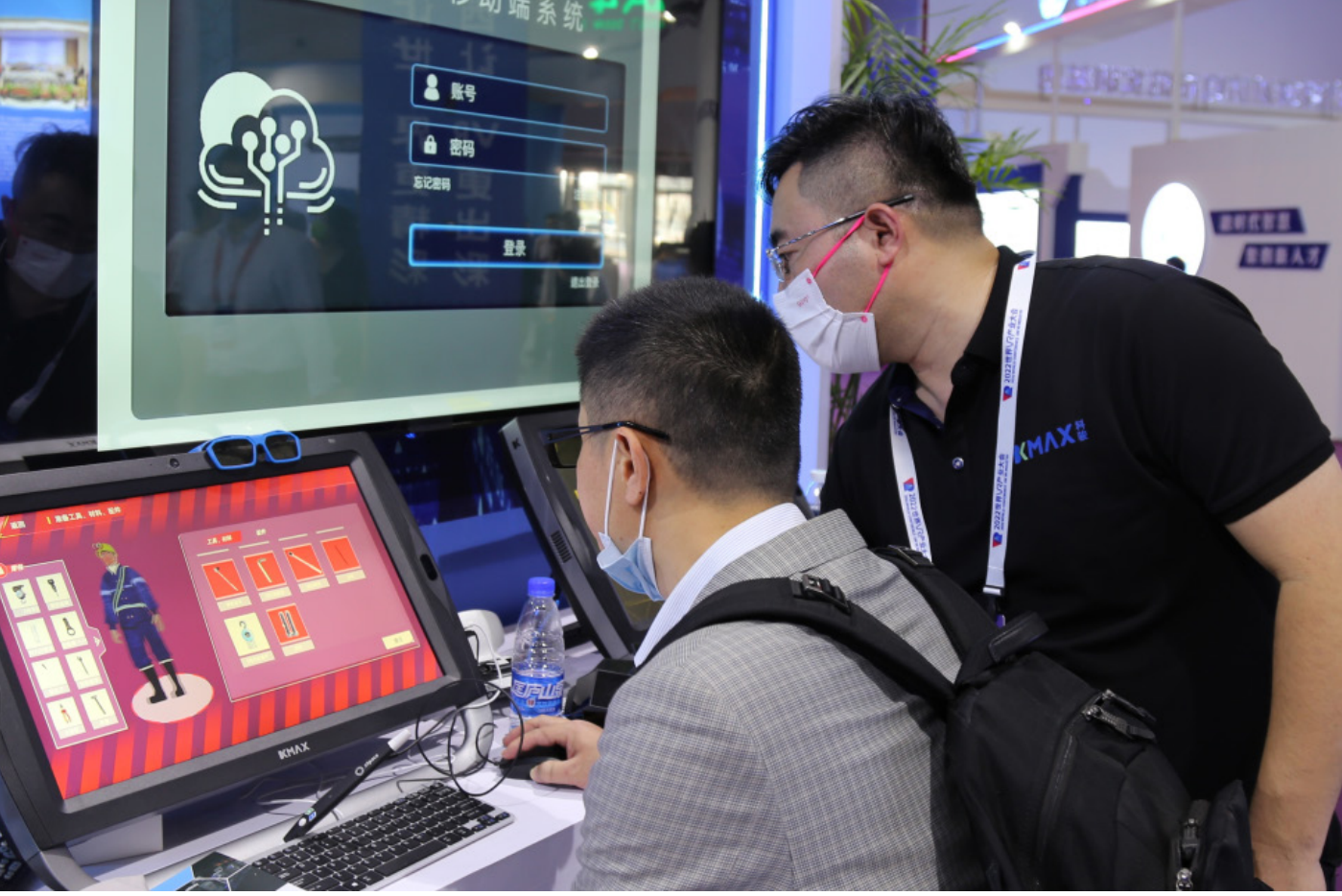
Due to the combined effects of technological revolution and COVID-19 impacts, modern education has entered a new stage of growth where opportunities and challenges coexist. The in-depth development and integration of ICT in education has provided a steady stream of new momentum for digitally transforming the classrooms of tertiary education, and prompted smart approaches to professional development, textbook resources, and pedagogy.

> "With the help of VR technology, HEIs and TVET institutions can feed students' individualised learning demands and improve their learning efficiency."

In a VR Smart Classroom which makes full use of VR technology, university teachers are able to combine abstract (hard-to-understand) or boring (hard-to-reproduce) knowledge in a virtual space through VR hardware and devices to create an immersive and vivid learning environment beyond traditional classrooms. The "VR Smart Classroom" can address some of the most challenging scenarios of teaching, training and experiment in traditional higher education institutions (HEIs) and technical and vocational education and training (TVET) institutions. Those traditional teaching scenarios could be expensive, hard to imitate, and sometimes dangerous; VR applications can effectively assist

In a classroom supported by KMAX, students use VR devices to access the teaching material, such as machine construction, which could be difficult in traditional classrooms. At the same time, the promotion of smart devices also reduced the cost of practical training and improved the teaching efficiency of teachers.

colleges and universities to optimise teaching content and transform various educational activities. With the help of VR technology, HEIs and TVET institutions can feed students' individualised learning demands and improve their learning efficiency.



KMAX offers free access to the "VR+ Education" experience hall, where visitors can physically experience the teaching resources and hardware developed by KMAX.

> Universities and industries can complement each other through the model of such trilateral cooperation mechanism.

The Industry-University-Research Collaboration

Guangzhou Panyu Polytechnic (Panyu Polytechnic) is one of China's earliest and most successful TVET institutions at the tertiary level. Panyu Polytechnic has established more than ten "Virtual Simulation +" learning spaces, which can simultaneously satisfy immersive teaching and learning for multiple disciplines. With VR glasses, students can access practices and experiments in Computer Numerical Control (CNC), Jewelry Design, and other courses, without constraints of time and space. "The new teaching method has attracted great interest among students. Students are more active in learning, and teaching has become more effective," said a Panyu Polytechnic teacher of Intelligent Automobile Manufacturing. He believed that VR could help students to have in-depth observation and conduct repeated practice: "VR helps students to have a visualised understanding of mechanical design of engines with great efficiency."

Similar to the case of Panyu Polytechnic, EdTech companies in China have worked with prestigious HEIs to support the development of national and provincial projects of digital transformation. By collaborating with enterprises with advanced VR technology, institutions could gain access to

advanced innovations to cope with challenges caused by the pandemic and improve teaching efficiency. Under the framework of industry-university-research cooperation, institutions can keep up with the trends and requirements of industry development, and upgrade their teaching contents or curriculum. In addition, universities and industries can complement each other through the model of such trilateral cooperation mechanism, which can not only empower the cultivation of talents in HEIs, but also support knowledge transmission related to further industrial innovations.

New Global Models of Training

Transnational technology flow has a positive impact on promoting the globalisation and development of equitable and quality higher education. Many institutions across the globe have already adopted VR-based systems of teaching and learning. During the COVID-19 Pandemic, Renton Technical College in the state of Washington, United States, transformed conventional teaching activities. For example, a lecturer of the automotive technology course instructed students remotely on how to construct and disassemble vehicle engine projects. He noted: "The pandemic did not interrupt students joining our automotive programme, and we are trying very hard to integrate online and offline instructions". Using KMAX's auto training software that combines advanced VR technology, teachers of Renton Technical College helped students to learn about automobiles and repairing techniques without an actual warehouse. The use of VR in teaching has created a highly effective and individualised learning experience.

> “Transnational technology flow has a positive impact on promoting the globalisation and development of equitable and quality higher education.”

In addition, VR enhanced industrial robots can also help manufacturers to connect the virtual training space with actual production lines, and greatly improve the cost-efficiency and quality of employee capacity building.

The model of "VR + Education" is becoming increasingly popular across the globe, as it brings innovative ideas and approaches to education. The continuous evolution of digital technology, especially the effective integration of VR technology and learning practices, has transformed learning spaces in higher education and created immersive and borderless experience for learners. The application of VR technology in education can greatly enhance the linkage between knowledge and practice and support the continuous cultivation of highly capable talents with future-oriented skills.

KMAX and UNESCO-ICHEI Jointly Promote "VR + Education"

Based on the common understanding that the new generation of ICT can play an important role in promoting innovation, popularity, equity, and quality of higher education, KMAX and UNESCO-ICHEI formally signed a strategic cooperation agreement in 2023.

In the future, the two parties will work together in areas such as the sharing of "VR + Education" software and hardware resources, the construction of an international virtual simulation training platform, the co-development of VR courses, and localisation of VR education resources in developing countries and regions. At the same time, as an important partner of UNESCO-ICHEI, KMAX will actively participate in the construction of Smart Classroom Project in addition to other multilateral projects organised by International Institute of Online Education (IIOE). Dedicated to supporting UNESCO-ICHEI's global effort in the digital transformation of teaching and learning at partner institutions, KMAX will utilise its resources to design VR education in different languages, provide access to learning platforms, and empower professional development activities in online and blended forms.

Group photo of UNESCO-ICHEI's Visit to KMAX

Ideas

03

Andreas Schleicher: **What Has Technology Advancement Brought to University Teachers?**

Introduction

Professor **Andreas Schleicher** has worked for over 20 years with ministers and education leaders around the world to improve quality and equity in education, making great contributions to the strategic planning of digital transformation in the field of education. In this interview with Team CLOUD at UNESCO-ICHEI, Prof. Schleicher talked about publications, academic research and public keynote speeches initiated, published or addressed by him and his colleagues at OECD, of which include PISA 2022, Digital Education Outlook 2021, Education at a Glance 2022, and more.

Chen Huang from UNESCO-ICHEI conducted the interview with Prof. Schleicher. **Xuan Wu** and **Yige Xu** from UNESCO-ICHEI assisted in note-taking. **Abdel-Rahman Ghandour** and **Langqi Zhao** from UNESCO Headquarters, **Rebecca Tessier** and **Rasa Silyte-Niavas** from OECD also contributed to this interview.

About Andreas Schleicher

Prof. Andreas Schleicher is Director for Education and Skills, and Special Advisor on Education Policy to the Secretary-General at the Organisation for Economic Co-operation and Development (OECD) in Paris. In addition to policy and country reviews, the work of the Directorate includes **the Programme for International Student Assessment (PISA).**

He studied Physics in Germany and received a degree in Mathematics and Statistics in Australia and is the recipient of numerous honours and awards, including the "Theodor Heuss" prize. He holds an honorary Professorship at the University of Heidelberg. (information cr. OECD)

Between Science and Education

With a background in physics, mathematics and statistics, why did you finally decide to work in the education field?

I believe that science and education are not too distant from one another, and education should become less of an art and more of a science. If we want to produce good performance systematically and help all students succeed, we must increase our understanding of how students learn and make this concept more feasible. Consequently, I have attempted to incorporate numerous scientific principles and ideas, particularly measurement, into the field of education via our PISA examinations. We've endeavored to make success in education attainable; we've searched for adult skills; we've examined how older people work and study, as well as how they integrate working and learning. Therefore, I believe that developing better tools to make education a more predictable and scientific process will help us provide individuals with greater educational opportunities.

> “We should make education more of a science.”

PISA 2022: From Learning Recovery to Education Transformation

> We're trying to look at what makes us human in a world of artificial intelligence and creative thinking.

PISA 2021 has been postponed for a year due to the pandemic. Are there any changes to PISA 2022 compared with the original PISA 2021?

Absolutely. We made a number of modifications. During the pandemic, we found that students who were previously spoon-fed by their teachers and without access to numerous alternatives lagged far behind. **In PISA 2022, we will incorporate a global crisis module in which we will survey students on their learning experiences during the pandemic in order to determine if they have fallen further behind, made more progress, or just learnt differently.** We also examine emerging automation trends. We are aware that skills that are easy to educate and assess are equally easy to digitise and automate. In a world of artificial intelligence and innovative thought, we are attempting to determine what makes us human. This is our starting point in this field. **PISA 2022 places a significant emphasis on social and emotional skills, the growth mindset, and the extent to which young people view the sky as the limit to their success and believe that investing effort and hard work will result in a better future, as opposed to believing that this is all about intelligence and is innate.** In a nutshell, we are considering a variety of new perspectives, some of which are inspired by the pandemic experience.

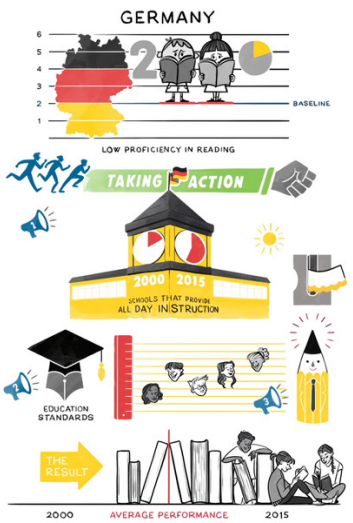
Although PISA is designed for basic and secondary education, what can higher education stakeholders learn from PISA 2022?

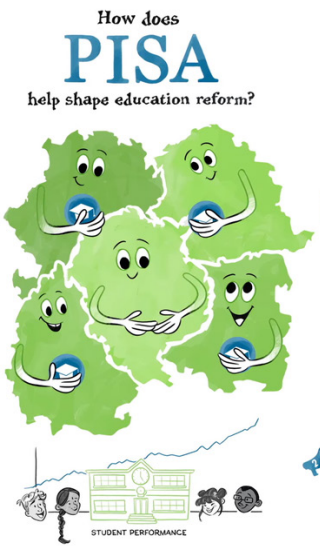
I do believe that technology is getting more transformative in the higher education sector. Higher education is highly effective at building monopolies, that's what makes it dominant. It delivers educational content with accreditation, which means that you must attend the university at a specific cost in order to earn a specific degree. Now, technology can make educational content accessible from any location and at any time. Through these major online resource providers, you can gain access to the finest educational content from around the globe. They are challenging the monopoly of educational content delivery. Universities must double their efforts to compete with technology firms in terms of learning modes and learning experiences. I believe there will be a greater variety of learning experiences, even in the workplace. As a result, universities are losing their monopoly on the transmission of knowledge, learning experiences, and accreditation. That is actually the most intriguing question: technology can provide stackable micro-credentials using blockchain technologies, so that learners will have much more control over what, how, when, and where they learn. It is the revolutionary potential of technology which is undermining traditional monopolies by making learning more accessible and connecting the formerly separate and sequential worlds of work and learning.

Programme for International Student Assessment, PISA

PISA is the OECD's Programme for International Student Assessment. PISA measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills to meet real-life challenges.

To reflect post-COVID difficulties, PISA 2021 has been postponed to 2022. PISA 2022 will focus on mathematics, with an additional test of **creative thinking.**





Publications

Since 2000, PISA has involved more than

90

countries and economies

and around

3, 000, 000

students worldwide

Find all PISA publications here

Next steps

OECD member countries and Associates decided to postpone the PISA 2021 assessment to 2022 and the PISA 2024 assessment to 2025 to reflect post-Covid difficulties.

PISA 2022

PISA 2022 will focus on mathematics, with an additional test of **creative thinking**. The new **PISA 2022 mathematics framework** was recently launched.

Preparations for this test are underway with participants from 38 OECD members and likely 50+ non-members involved.

PISA 2025

PISA 2025 will focus on science and include a **new assessment of foreign languages**. It will also include the innovative domain of Learning in the Digital World which aims to measure students' ability to engage in self-regulated learning while using digital tools.

Want to join PISA?

Helpful links

- Access data files for PISA survey
- About PISA
- Webinars
- TopClass Podcast: EPISODE 13: What can low- and middle-income countries learn from PISA?
- Frequently Asked Questions
- OECD Education and Skills

PISA 2025 Foreign Language Assessment

PISA 2025 will assess foreign language learning as an optional component.

For more information, visit our dedicated website.

Digital Education Outlook 2021 (OECD): **Learning and Assessment, Technology and Professional Development**

> The separation of learning and evaluation, in my opinion, is one of the biggest mistakes in education made in recent centuries.

Why did you initiate and publish the Digital Education Outlook 2021? Are there any notable similarities or changes in your work in digital education before and after the pandemic?

The divorce of learning and evaluation, in my opinion, is one of the biggest mistakes in education made in recent centuries. Technology can facilitate the reintegration of learning and evaluation. What is fascinating is that the incredibly innovative ideas of such integration are frequently highly localized. Education has been particularly effective at scaling, disseminating, or connecting good practices. However, we do not yet have a level playing field or the regulatory environment to comprehend how we can make digital solutions interoperable so that teachers are not confronted with a patchwork of different solutions but rather can engage with technologies that are consistent across disciplines, etc. Consequently, I believe the purpose of our Digital Education Outlook is to examine these successes, but also to improve our ability to design a system that is more conducive to digital use. The system shifts from idiosyncratic experience to increased coherence, interoperability, and revaluation of the open flow of data that we require to make learning effective while protecting the rights of individuals at the same time. Towards this end, we will launch a second edition very soon in an effort to monitor advancement progress in this field.

The idea of "keeping humans in the loop" and "reinventing the role of teachers" mentioned in Digital Education Outlook 2021 echoes with our work at UNESCO-ICHEI. Could you briefly discuss the new role of teachers in the digital era and their significance?

Perhaps teaching is not so different from other professions in that technology does not replace these functions; rather, it merely modifies, augments, and substantially empowers teachers. It is possible that technology will perform the function of knowledge transmission more effectively, allowing instructors more space to become exceptional coaches, mentors, facilitators, psychologists, and designers of more inventive learning environments. During this pandemic, we all learnt that learning is never a transactional business, but rather a social and relational enterprise. Therefore, the function of educators will not become less important, but rather more so, but in a completely different way: it will be less of a mechanical dissemination of knowledge and much more of an interpersonal engagement with students on an individual basis. This is also consistent with the expectation that university lecturers will pique the interest of particular individuals. Who are they? Whom do they aspire to be? How can I assist them on their own educational paths? Teachers and university professors who excel in this area will have a prosperous future.

OECD Digital Education Outlook 2021

OECD Digital Education Outlook 2021: Pushing the frontiers with AI, blockchain, and robots highlights the relationship between digital technology and society. This publication overviews the opportunities and challenges of digital technology and state-of-the-art smart technology solutions. It also explores how smart technologies can change education in the classroom and support the management of education organisations and systems.

This series aims to be a reference for education policy makers and researchers. The latest edition is expected to be released soon.

In the Digital Education Outlook, there was a very interesting finding from PISA 2018 that there is a persistent negative correlation between the intensity of technology use in classrooms and the digital reading, mathematics, and science skills of 15-year-olds. Do you have any fresh ideas as to why the relationship is so persistently negative?

That is an excellent point. I believe the purpose of technology is not to preserve existing practice or simply replicate traditional learning experiences, but to fundamentally revolutionise learning experiences. That is, making learning more interactive, more participative, more social, and more relational; providing students with better tools to access a broader range of learning material and more adaptive forms of learning content; utilising the power of learning analytics and big data to comprehend the varying learning patterns of students. Why should students listen to a teacher describe the outcome of an experiment when they may experiment themselves in a virtual laboratory? If you simply broadcast information to students, or have students type information into a tablet instead of communicating with other students, it can indeed make learning more scripted, passive, and consumptive. I believe that if we begin to employ technology to genuinely transform learning experiences and use technology in a more imaginative manner in the classroom, we will see improved outcomes, as is the case in many local contexts.

Future Skills

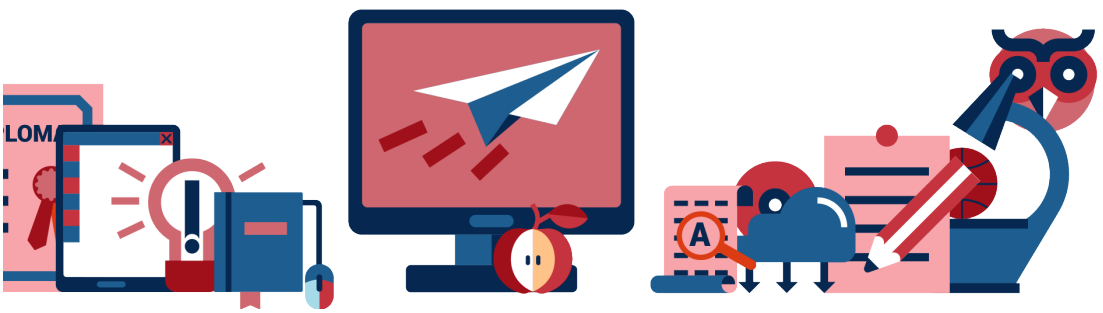
We are also curious about how you perceive technology's role or function in the new future skill set.

I believe there are two critical questions, which are two entirely different ones. The first is about what we should learn from a world of technology, and the second is how we can leverage technology to learn. For the first question, we must further consider what makes us human. How can we supplement, rather than replace, the artificial intelligence we create in our computers? Our ability to create, build, and innovate is critical for connecting the dots for the next big idea to emerge. We do not empower young people enough to take agency and develop that kind of motivation. Therefore, I believe this is the role of learning in a technological world. I also think there are limitless opportunities to leverage technology to make learning a far more lifelong and exciting experience. Our curiosity in broadening our horizons will be our most valuable asset in the future. I'm hoping that technology will be a game changer in this situation.

> The capacity of humans to understand technologies and to actively use them is a big part of a good education today.

Could you further explain the "race between technology and education", which was mentioned in some of your keynote presentations?

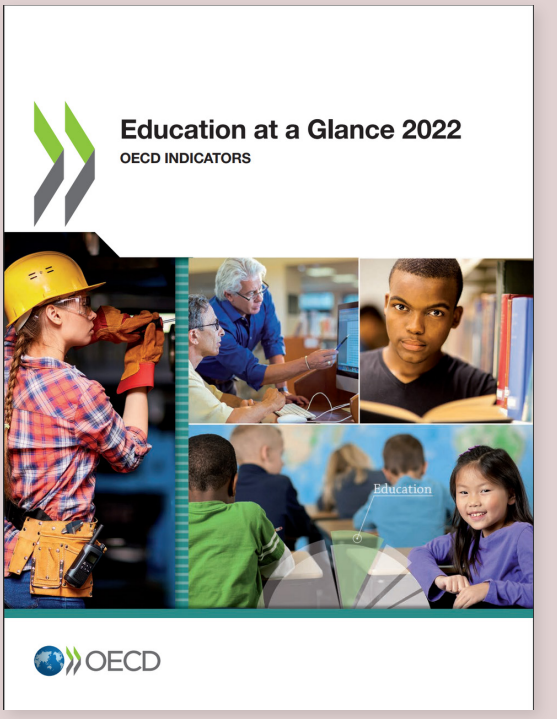
Before the first Industrial Revolution, there was an ongoing competition between education and technology. Industrial revolution pushed technology ahead of humanity, and people at the time were unprepared for this while many job types vanished. That is the source of the social anguish. The traditional methods of schooling make individuals compatible with the principles of the industrial economy, and created generations of prosperity. However, technology is once again racing ahead of people's knowledge and skills. Now our education systems frequently accreditor a culture of compliance in which you learn not to question but to reproduce the established wisdom of our age, which renders you redundant in a world of technology. Again, I believe humans are capable of having the compass to know what is right and wrong, truthful or false. Throughout history, humans have always won the race with technology, but there's no guarantee that it will continue this way. The accelerating forces of technology are making it increasingly difficult for us to see ourselves and our humanity. The great risk is not that everyone loses the race, but that people become victims of it. I believe that individuals' ability to understand and actively use modern technologies is a critical component of a good education today.



Education at A Glance 2022

Education at a Glance is the authoritative source for data on the state of education around the world. It provides information on the structure, finances and performance of education systems across OECD countries and partner economies.

The 2022 edition focuses on tertiary education, looking at the rise of tertiary attainment and the associated benefits for individuals and for societies. Two new indicators on **professional development for teachers and school heads** and on **the profile of academic staff complement** this year's edition.



As Prof. Schleicher indicates in the interview, technology has changed the role of teachers and the monopoly of education content delivery. It is notable that the International Institute of Online Education (IIOE), proposed by UNESCO-ICHEI with its partner HEIs and enterprises, is working to build HEI's capacity for online and blended teaching and learning to realise higher education innovation. Based on the UNESCO ICT Competency Framework for Teachers and all-round IT skills, IIOE provides training programs comprising assessment, courses, tools and practice to support partner HEIs' capacity building for teachers' professional development. Besides, the IIOE National Centre mechanism also serves to empower partner countries' higher education through digital transformation in alignment with each nation's development strategies.

Collaborating with higher education stakeholders at various levels, UNESCO-ICHEI commits to realising a more sustainable, inclusive and equitable future in the digital era.

04

Stories

Stories in Five Minutes: **Glittering Pieces of 2022**

Celebrating the third anniversary of IIOE, Team CLOUD has collected some short stories from UNESCO-ICHEI global partners sharing their own experiences with this international network. Despite diverse cultural and educational contexts, we hope CLOUD readers will enjoy these glittering story pieces together with us.

It is not Easy to Develop a Course, but We Made It

Mongolian University of Science and Technology (MUST), the largest public university for engineering in Mongolia and a partner university of the IIOE Course Co-development Project, specialises in applying light-board technology, also known as learning glass, to various teaching and learning contexts. Dr. Purevsuren Tserenchimed, a senior specialist of the Open Education Centre at MUST, participated in the course planning and curriculum organisation. "It was a huge project to deliver MUST's light-board technology in seven modules and eight hours through digital contents," Dr. Tserenchimed told UNESCO-ICHEI, "and it was challenging not because of the pandemic, but for that, this is our first experience to develop an English online course serving for an international audience." While the course development team had skilled and experienced light-board experts in the house, delivering content in the digital format was still something too new to handle. "The repeated editing process was exhausting, and we did not realise that we need an instructional designer for online courses until we started for a while." What made things harder was the language barrier. "Even if our instructors tried their best to prepare the course in English, it was not their native tongue at the end of the day," said Dr. Tserenchimed, "we hired experienced translators, but they had problem understanding the professional terminology, which required additional working time of the whole team."

Though facing uncountable and unpredictable difficulties throughout the process, Dr. Tserenchimed and his colleagues managed to complete the task, and the course is now ready for deployment on the IIOE platform. "IIOE itself cannot be understood as a stand-alone online learning platform.

> We are very happy and motivated through overcoming challenges and making to the first finish line; now we are ready for more sharing.

It is a network of motivated universities and colleges to chart the way of higher education digital transformation forward together by sharing resources. It is our, as a partner institution, primary duty and valuable opportunity to share our best practices, achievements, as well as lessons learnt within the network of IIOE." Dr.Tserenchimed believed that the joint development mechanism, along with the spirit of joint contribution and shared benefits, is necessary regardless of the difficulties "We are very happy and motivated through overcoming challenges and making it to the first finish line; now we are ready for more sharing," he then added.

MUST teachers are recording the IIOE course about light-board technology. Some key difficulties in the course implementation include transforming pedagogy into digital format, translating content knowledge to non-experts, editing bilingual videos, etc.

The Mechanism of Joint Course/Training Development

The joint development mechanism for courses or training bootcamps is an symbolic feature of IIOE. Building on the tone of sharing and learning, partner institutions are invited to not only disseminate local practices within the network, but also systemize their lessons learnt and serve as a knowledge hub at IIOE by co-developing courses or fix-term training sessions with UNESCO-ICHEI and IIOE secretariat. Under such collaboration mechanism, user needs were pre-screened and analysed, then corresponding partner institutions with relevant expertise selected, finally the joint training developed and promoted. In this way, quality course contents and flagship projects that used to be limited to a specific geographical or institutional scope become widely recognised and spread due to genuine user needs. Compared with self-paced online courses, the training sessions are usually synchronous; either courses or training should be carefully planned and pass rigorous acceptance tests by IIOE secretariat to ensure quality and accessibility.

A Local Campaign for Francophone African Teachers

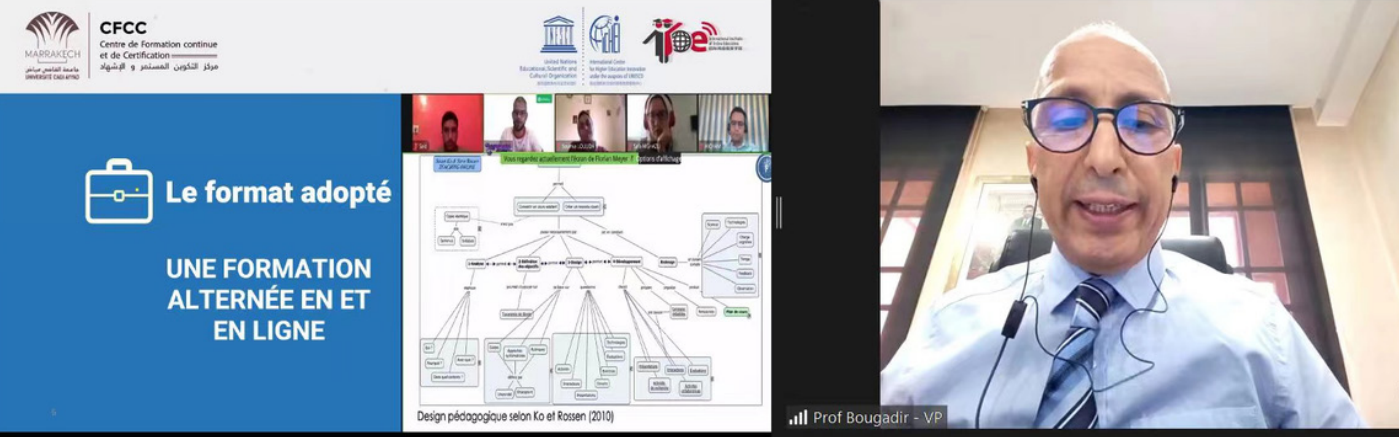
On 19 July 2022, UNESCO-ICHEI officially launched the IIOE Activity Series for Francophone Africa. As the first of its kind, UNESCO-ICHEI closely collaborated with UNESCO Priority Africa and External Relations Section, universities in Francophone Africa, including the Cadi Ayyad University (UCA) in Morocco, to organise a global forum, online teacher training sessions, and a competition on digital teaching capacity. "(The activity series) plays an active role in using new technologies to promote paradigm shifts in higher education development, build quality educational resources, and promote educational innovation in Africa," said Mr. Yue Du, Director of the Division for Cooperation, Intersectoral Follow-up and Partnerships for Africa at UNESCO.

As one of the key areas of UNESCO-ICHEI's strategy, Francophone Africa has always been a frontier of UNESCO-ICHEI's localisation experiments, and UCA has been playing an essential part in this effort for its in-depth understanding of the local picture. When designing a jointly-developed teacher training programme, for example, the Centre for Lifelong Learning and Certification at UCA stems its working philosophy from the challenging reality. “Unlike other countries, African teachers must design, prepare and produce online resources themselves (due to the lack of resources and the unique historical background),” said Professor Bouchra Lebzar, project coordinator of the Centre for Lifelong Learning and Certification at UCA, “so we have to design learner-centred training sessions to enable teachers to acquire basic knowledge skills of digital technology, then effectively integrate digital technology to their education context for the next step.”

As the first African university that introduces MOOCs and virtual reality labs to higher education, the

> Unlike other countries, African teachers must design, prepare and produce online resources themselves.

The online training programme "Design and Production of Educational Videos", developed collaboratively by UNESCO-ICHEI and UCA, was also launched at the forum. This is the first training programme co-developed by UNESCO-ICHEI with partner HEI in Francophone Africa. The training was launched in September 2022, providing teachers in Francophone Africa a valuable opportunity to improve pedagogical skills, and to share knowledge and quality educational resources.



Centre for Lifelong Learning and Certification at UCA and its course development team understood the importance of a holistic approach and collaborative management in creating meaningful learning experiences for university teachers. “I found it particularly insightful about the idea of Professor Bouchra Lebzar and her colleagues at the Centre for Lifelong Learning and Certification, which is that it is not technology that enriches teaching; it's human beings using technology that enriches our educational experiences,” said Professor Paul Prinsloo, an IIOE international expert from the University of South Africa. With the support and technical guidance from UNESCO-ICHEI, the project eventually evolves into a transnational training programme specifically designed and culturally curated for French-speaking teachers and attracted enrolments from 11 francophone African countries and regions through the UCA Centre and IIOE’s network. Professor Lebzar was happy about the collaborative efforts in course development with IIOE: “Over these two years, we have conducted various surveys and found that participants are highly satisfied with the course content and largely motivated to either develop new digital skills or contribute to quality online resource development.”

"I would like to highlight that UCA's strategy of internalisation and digitalisation is based on local needs in Morocco and Africa, which are highly consistent with the work of UNESCO-ICHEI," said Professor Fatima-Zohra Iflahen, Vice-President of UCA.

Testimonies from training participants:

Dr KPOTIN Assongba Gaston, Deputy Chief of Department of Chemistry, Faculty of Science and Technologies, Abomey-Calavi University, Republic of Bénin : I would like to thank you for this training which has given us a good approach in our teaching. I will put into practice (what I've learnt) and encourage other colleagues to do so. We could organise this training for teachers at our university.

Prof. Michel-Bakar DIOP, Director, Institute of Open and Distance Learning, Gaston Berger University, Senegal: We could make short videos for the identified courses of the INACEQ (utilisation of new technologies in teaching and research for solving local development problems) project, building upon results of this training and through support from IIOE.

Dr. Clément Lobo, Deputy Director of Techno-pedagogy, Virtual University of Côte d’Ivoire: We are satisfied at this point (with the results of the training). The learners have demonstrated their willingness to apply what they have learnt in their teaching.

Growing with Opportunities as Individual Learners

Tay is an instructor at a local community college from one of the most impoverished areas in South Asia. He spent several months searching for education resources that can both feed his learning needs and certify his learning hours, but often found paid courses from commercial MOOC companies unaffordable or free resources substandard. Through a regular internet search, he happened to find IIOE and enrolled in the course because it didn't charge any fees while still providing high-quality content. "Though I live in poverty, I want to learn more things to polish my skills as a teacher and even do a Master of Science degree in data science or computer science," Tay was hopeful about his future.

IIOE is designed and assured to provide accessible and quality education resources for all teachers with digital transformation needs. "Our teachers attended many sessions – either courses, training, or webinars – of IIOE," Dr. Mulat Asnake, Director of Continuing and Distance Education Office at Addis Ababa University in Ethiopia was excited about the professional learning opportunities brought by IIOE, "(the education resources provided) created the culture of conducting online professional training."

Professor Ganagathulasi Janardhanan from the National Institute of Technical Teachers Training and Research (NITTTR) of India was another individual user of IIOE. "When I first learned about the IIOE activities, I got hooked on their simple and easy-to-learn upskilling programmes for teachers." Before knowing IIOE, he was the core developer of seven

Though I live in poverty, I want to learn more things to polish my skills as a teacher and even do a Master of Science degree.

MOOCs in the area of technology-enabled learning and sustainable materials that attracted more than 100 thousand learners in five years. Encouraged by UNESCO-ICHEI's vision of higher education digital transformation in an Asia-Pacific regional webinar, the Head of Curriculum Development at NITTTR decided to learn more about IIOE, and was excited to find that he was entering into a global community that recharges his inspirations in the world of curriculum development and teacher training. "IIOE provided a new perspective in redefining the programme I offered at NITTTR Chennai. I wish to learn and adapt the best practices implemented at IIOE to my institution and integrate them into the training programme," said Professor Janardhanan, "It broadens my horizons in understanding different cultures and education contexts beyond boundaries."

Hardware-empowered Workshops for Inclusive Education

Ain Shams University (ASU), the first rotatory presidency unit of IIOE and the host of IIOE Egypt National Centre (IIOE Egypt), is keen on creating an engaging environment for students with disabilities. To help spread awareness of the available assistive technologies, the Teacher Developing Centre at ASU organized the "Teaching for Students with Disabilities" workshop series. The workshops comprised three parts: effective communication with all students, preparing accessible documents, and accessibility features on mobile phones. "We need to break digital barriers, create guidelines for the development of accessible digital content, train the university community in the use of accessible technologies, and detect entrepreneurship opportunities through accessibility research," said Dr. Nabil M. Hamed, director of ASU Accessibility Centre and one of the workshop instructors, illustrating the goals of the workshops. The smart classroom (SCR) at ASU was the ideal place to conduct the workshops. "The SCR's facilities allowed illustrating the steps to create accessible documents clearly," explained Eng. M. Yosry, Head of Technical Support and Media Team at IIOE Egypt and

Dr. Nabil M. Hamed discussing “effective communication with students with disabilities” with attendees in the SCR at ASU

also an instructor of the workshop, “It allowed carrying out practical tasks such as sharing digital documents with the attendees to apply what they learned on them and get feedback.” The attendees showed special interest in learning about the accessibility features of smartphones. They found it beneficial not only for students with disabilities but also for senior citizens. “All of our team members know at least one relative or acquaintance who has a certain level of visual or hearing difficulty,” said Eng. Ahmed Yehia, senior ICT specialist at ASU, “knowing about the accessibility features in mobile phones makes our lives as well as the lives of people whom we care about easier.” The workshops covered the accessibility features of different operating systems. The facilities of the SCR were used to project or share the phone screen of the tutor with the attendees so that they could follow the steps on their mobile phones. Finally, the attendees were invited to visit ASU’s accessibility centre where they knew and tried the accessibility technologies available at the university.

> “Knowing about the accessibility features in digital devices makes the lives of people who we care about easier.”

“The feedback of the attendees was great. They recommended the workshop series for all faculty members and the administrative staff,” Dr. Nabil said. The attendees also praised the use of the SCR for conducting the workshops. “This experience allowed us to realize the potential of the SCR,” added Eng. Ahmed Yehia, “which will be used for more events in the future.”

Eng. Mohamed Yosry **(on the left)** and Eng. Ahmed Yehia **(on the right)** use the facilities of the SCR to conduct the practical part of the workshops

Smart Classroom in Ain Shams University (Egypt) Sponsored by WEIDONG

The Smart Classroom in Ain Shams University is supported by Weidong Cloud Education Group (WEIDONG), featuring a tri-layered solution plan. The fundamental layer is the digital infrastructure consisting of hardware devices, while the other two layers upfront are content creation tools and a learning management system, respectively. By applying practical and operational scenarios, local teachers and students are able to experience teaching and learning that are more efficient, convenient, and diverse thanks to the digital transformation.

Through strategic cooperation with UNESCO-ICHEI, WEIDONG-sponsored Smart Classrooms have successfully landed in 6 countries in Asia and Africa, serving nearly 20,000 college students with more than 100 hours of recorded teaching resources and a total usage time of nearly 1,000 hours.

WEDON
EDUCATION

Smart Classroom in Ahmadu Bello University Zaria (Nigeria) sponsored by CreateView Edu-Tech

The Smart Classroom at Ahmadu Bello University (ABU), supported by CreateView Edu-Tech, was commissioned in August 2022. Expected to serve as an interactive system for teaching, the Smart Classroom at ABU is designed as both a training centre for online and blended teaching and learning and a multimedia hub for the creation of teaching materials.

Including the Smart Classroom at ABU, each CreateView-sponsored Smart Classroom consists of an interactive touch panel, two automated motion detection cameras (teacher-based and student-based), a teacher-view display, and two students-view displays. Other features include 50 all-in-one computers, a server, switches and routers, audio system, recording host, and recording management system.

创显科教
Createview Edu-Tech

To Compete And to Self-affirm

"I was thinking about giving up this opportunity as I had a presentation that shared a very close deadline with the competition." Dr. Otmrksb Kalawana from the University of Colombo was one of the very few competitors who won prizes in the IIOE Courseware Competition and IIOE Video Course Competition in 2022. Due to conflicting schedules, participating in these global competitions was not in Dr. Otmrksb's plan at first when she learned the news from Professor Panaragama, who oversaw her presentation. "But Professor Panaragama coordinated to reschedule my presentation to ensure that I had enough time to prepare for the competition, as she had a firm belief in my work."

Curious about her own teaching performance and grateful for Professor Panaragama's trust, Dr. Otmrksb started her work by focusing on the subject matter she taught. "The Ah-Ha moment came when I read through the guiding video for all competitors provided by IIOE," Dr. Otmrksb told UNESCO-ICHEI. "There's a line saying that 'a picture is worth a thousand words', then I tweaked my strategy a little bit to ensure I have appropriate and compelling pictures as my explainer." When she learned that she was the only academic from Sri Lanka that won both prizes in the IIOE Online Course Competition Series, one of her first reactions was to update and optimise her slide template for the next class by applying what she learned from the Competition Guidelines. "Now I am beginning to add more pictures to my course materials, and it proves to be an effective teaching strategy."

> The Ah-Ha moment came when I read through the guiding video for all competitors.

Snapshot of IIOE Online Course Competition

The IIOE Online Course Competition is co-sponsored by UNESCO-ICHEI and Seewo. With a special focus on developing countries and regions, the IIOE Online Course Competition is arranged in two phases, with the first phase on courseware and the second phase on video, as well as categorized by two separate regions (Asia and Africa). The last phase of competition in video making concluded in April 2022, attracting more than 200 teaching faculties from 45 countries.

Like Dr. Otmrksb, many participants are continuously learning from the competition. "The acknowledgment from the award committee encourages me to improve my courses and produce quality teaching materials," Professor Mariem Liouaeddine from the University of Ibn Tofail in Morocco took the top spot in the IIOE video competition 2022 (Francophone path). "It is important to make students passionate about learning through creative approaches," she believes.

Partnership Between UNESCO-ICHEI and Seewo

A donor to the Smart Classrooms Project, Seewo is a leading edtech player in China. In May 2021, UNESCO-ICHEI and Seewo signed the Strategic Cooperation Agreement, initiating the industry-organisation partnership by a series of digital teaching workshops reaching 53 countries and a set of educational software to create course contents for teachers in Arab States.

In 2022, UNESCO-ICHEI and Seewo co-initiated the IIOE Online Courses Competition, aiming to encourage more teaching faculties in higher education to recognize the importance of digital teaching capacity, research on successful stories of technology-empowered learning, and apply digital transformation to pedagogical practices. In the future, Seewo and UNESCO-ICHEI will continue with the global sharing and joint contribution of higher education digital transformation by utilising industrial experiences and multilateral partnerships.

Knowledge

- 05

Concept Review: **HyFlex in Learning**

What is Hybrid-Flexible (HyFlex) Course Design?

A HyFlex course design enables a flexible participation policy whereby students may choose to attend face-to-face synchronous class sessions or complete course learning activities online without physically attending class. Traditional hybrid courses typically include a blend of instructional activities which include classroom and online components for all students, but the instructor or designer decides when learning activities are completed in the classroom (in-person) and when they are completed online (out of the classroom).

> Students decide which participation mode - classroom or online - they'll use to complete learning activities for a class session.

HyFlex courses are similar to many hybrid or blended learning environments, but with a major difference. Students decide which participation mode - classroom or online - they'll use to complete learning activities for a class session. HyFlex courses are sometimes called a "student-directed hybrid". In a HyFlex course, the teacher provides instructional structure, content, and activities to meet the needs of students participating both in-class and online. Learning activities may not always be exactly the same for both modes of student participation, but they must all lead to equivalent (or equitable) student learning in all participation modes.

Why and When is HyFlex Used?

There should be an important reason for deciding to offer a course using the HyFlex design, because it may be challenging for designers and teachers to learn how to create and deliver effective courses in multiple modes at the same time, and it may be even more challenging in some contexts to allow students to choose which path - classroom or online - is most appropriate for them on any given day.

HyFlex course design is used when an institution or teacher wants to serve students who are not all able to learn effectively in one single mode. When used

appropriately, the HyFlex design can expand access to high-quality and equitable learning opportunities for all students. Successful HyFlex implementation requires a strategic effort that provides faculty training, reliable and easy-to-use classroom and online technology for teachers and students, and supports students with technological needs and choosing effective learning paths.

In higher education, the HyFlex mode has the potential to improve education accessibility, instructional capacity, as well as learning performance. By allowing students and faculties who are not able to attend in-person classes or do not possess sufficient online learning support to freely choose their preferred learning modes, the HyFlex course design offers a flexible access to learning to all participants. Also, teachers may develop skills for blended teaching while institutions gradually build capacity for online and blended pedagogy. With increasing education accessibility and instructional capacity, students are likely to become more engaged in learning activities, and institutions are more capable of creating customized instruction models to fit the emerging learning needs of students.

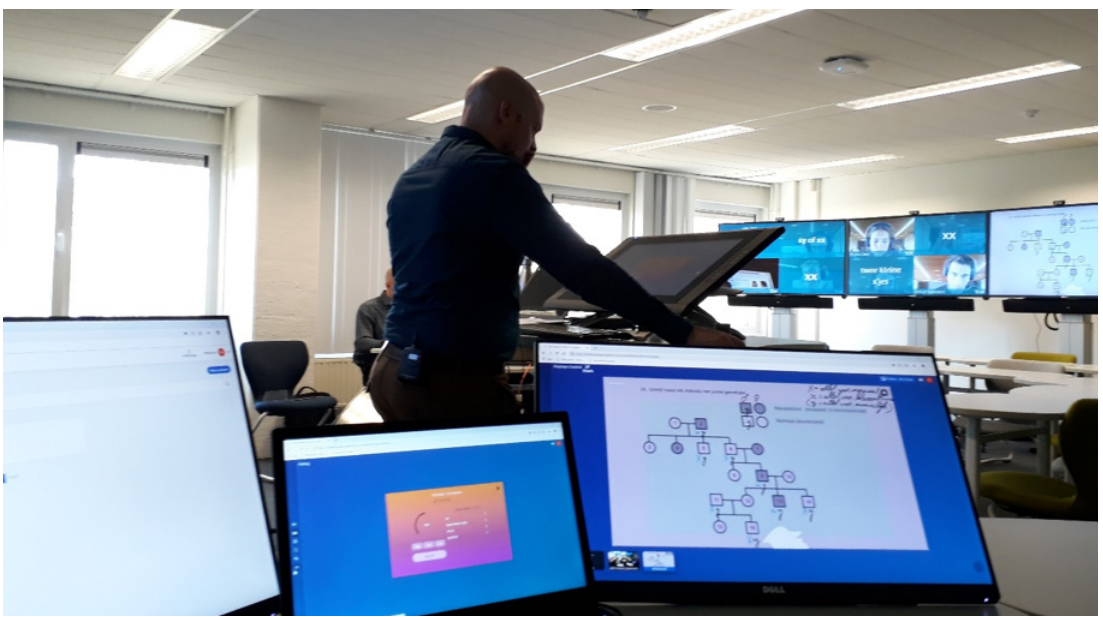
“In higher education, the HyFlex mode has the potential to improve education accessibility, instructional capacity, as well as learning performance.”

A New “Why?” Emerging from the Pandemic

HyFlex courses have been used effectively during the global pandemic to provide a limited and phased return to classroom instruction through physical distancing and instructional continuity.

Implementing a HyFlex approach can provide an instructional environment that reduces the number of students in a classroom and allows students to choose their mode – no one is forced into an environment they do not want. If classroom seats are limited, a seat reservation system can be

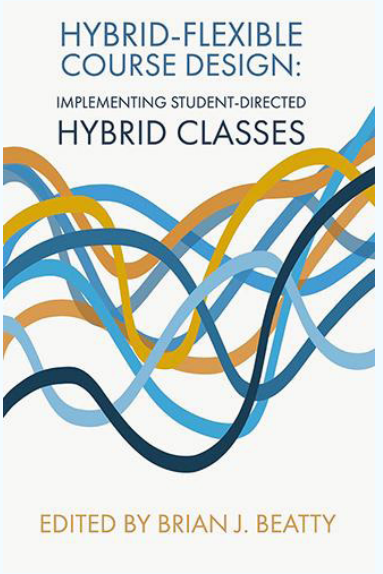
Picture Taken in the Hybrid Virtual Classroom at Edulab, KU Leuven Campus Kulak Kortrijk, Belgium. (Annelies Raes, Marieke Pieters, & Piet Bonte. 2019)



used – modifying the flexibility aspect of HyFlex to fit the situation. Also, if a shift to fully online is mandated, course development is already complete. When classroom instruction is allowed again, the designed classroom instructional mode can be readily activated and no additional design is needed.

As the world is recovering from the pandemic, the usefulness of having more flexibility in how students learn and teachers teach has become evident. Rather than moving completely online or fully returning to classroom instruction, institutions may choose HyFlex learning design to serve both students who prefer to learning online and those who need to learn in the classroom.

Hybrid-Flexible Course Design: Implementing Student-Directed Hybrid Classes (2019)



There have been many others working on similar approaches to combining classroom students and online students; some very similar – even identical – to HyFlex. Many of these instructional formats were developed before the global pandemic, and others have been developed since 2020. For those with published descriptions prior to the pandemic, representative articles are listed in the HyFlex Learning Community Research Bibliography, available online at https://hyflexlearning.org/bibliography.

How to Implement HyFlex Course Design

The HyFlex course design is built upon four fundamental values: Learner Choice (aka Alternatives), Equivalency, Reusability, and Accessibility, each with a corresponding guiding principle for designers and instructors to follow. These four "pillars" provide a consistent and solid foundation for resulting courses and programs.

- **Learner Choice (Alternatives):** Provide meaningful alternative participation modes and enable students to choose between participation modes weekly (or session by session).

The primary motivation to be considered in the design of a HyFlex course design should be to give students a choice in how

> The HyFlex course design is built upon four fundamental values

they complete course activities in any given week (or topic). Without meaningful choice, there is no flexibility, and therefore no HyFlex.

- **Equivalency:** Provide equivalent learning activities in all participation modes.

All alternative participation modes should lead to equivalent learning. Providing an alternative approach to students which leads to inferior learning because of poor design is not acceptable. Equivalent learning does not imply equal experience, however. Learning in the classroom will always be different than learning online, though both modes can be effective when well-designed.

- **Reusability:** Design/build one course and teach it in all modes. Utilize artifacts from learning activities in each participation mode as "learning objects' for all students.

Many class activities which take place in classrooms can be captured and represented in an online-delivered form for online students. Podcasts, video recordings, discussion transcripts or notes, presentation files and handouts, and other forms of representation of in-class activities can be very useful – both for online students and for classroom students wishing to review after the class session is finished. In a similar way, the activities completed by online students, such as chats, asynchronous discussions, file posting and peer review, etc. can become meaningful learning support for in-class students as well as provide useful review materials for online students.

- **Accessibility:** Create accessible learning opportunities. Equip students with technological skills and access to all participation modes.

All course materials and activities should be accessible to and usable for all students. For example, audio or video recordings should include text transcripts and captions, web pages and learning management systems must be screen-reader-friendly. Students need sufficient technologies (hardware, software, internet) or skills to make legitimate choices about participation modes.

Dr. Brian Beatty, Dr. Glori Hinck, Dr. Cathy Littlefield, Dr. David Rhoads, Dr. Jeanne Samuel contributed to this article.

Dr. Brian Beatty at San Francisco State University pioneered the development and evaluation of the HyFlex course design model for blended learning environments, implementing a "student-directed-hybrid" approach to better support student learning. (cr. San Francisco State University)

Concept Review:
Notes on Microcredentials

This article introduces the basic format, key components, and notes on applications of the education concept "microcredentials." As a reliable way to increase learning efficacy, the development of microcredentials is expected to contribute to a more flexible and effective organisational structure of higher education institutions.

This article is adapted from an IIOE Global Webinar presented by Professor Eric M. Carbaugh from James Madison University in the United States. Picture: Professor Eric M. Carbaugh.

Request for Quality Learning

How can we engage professionals in high-quality learning that reflects the realities and contexts of their work? This is one big challenge we are confronting in the world of education today.

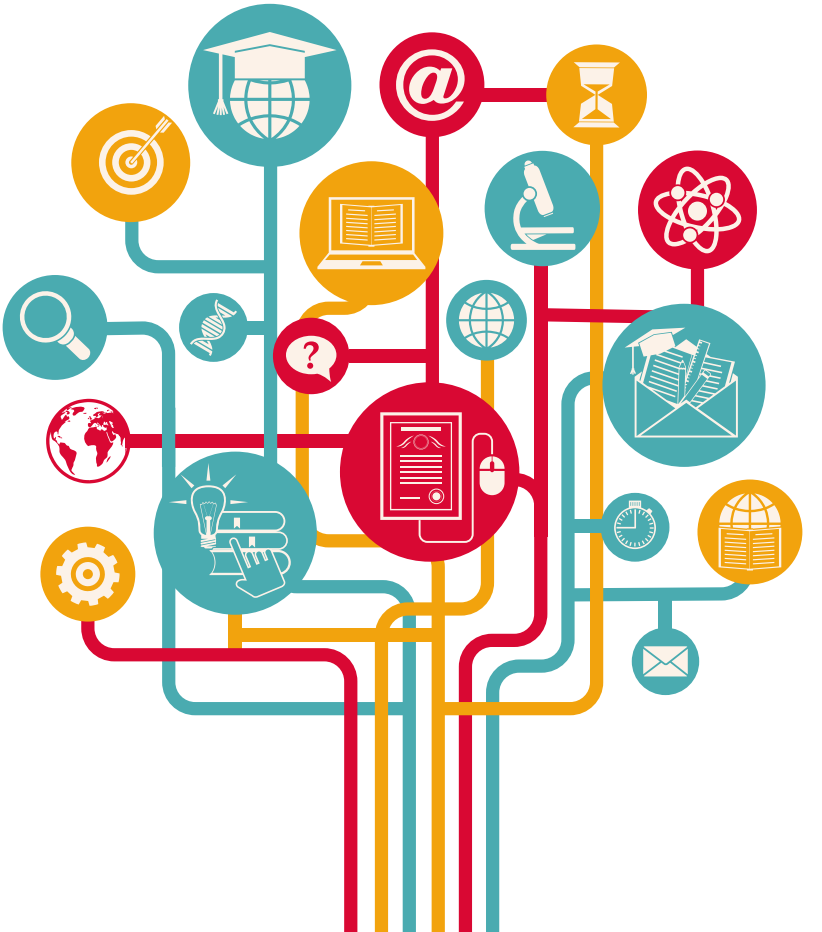
Ensuring high-quality learning must meet four requirements: first, it must be goal-oriented, that is, to enumerate clear learning goals, development directions, practical plans, etc.; second, it must be a process that includes thinking, action and application, not just one instance; third, the learning content needs to be related to the work context of the learners, so that the learners can implement what they have learned; fourth, the learning content needs to be personalized, not cookie-cutter content, or stereotype.

> Micro-credentials (or microcredentials) are an ideal way to improve learning efficiency.

Key Components to Successful Microcredentials

Microcredentials or micro-credentials is a very efficient method to improve learning efficiency. The mode of microcredentials usually refers to the relative short hours of education, which are provided by higher education institutions, vocational education schools and private educational institutions, and generally do not accept restrictions on course types and learning methods. A successful micro-credential will consist of three key parts:

The first key part is to clarify the learning objectives and meaning of the microcredentials. Designers of microcredentials need to have mindsets of reverse design to clarify the learning purpose of the microcredentials, that is, the



skills and outcomes that learners can master after completing the microcredentials. This kind of reverse design can not only organically integrate the background information, rationals, technical details and other information about the microcredentials, but more importantly, it can deepen the understanding of learners about the purpose and significance of the microcredentials.

The second key part is to list the learning materials and information related to the skill or capacity. Because most learners may not be familiar with this aspect of content before, listing relevant learning materials will facilitate learners to familiarize themselves with the microcredentials and make adequate preparations. Study materials and information come from a wide variety of sources, which can be articles, blog posts, websites, podcasts, videos, or any other information. This will help the completers to better understand and become familiar with related skills quickly.

The third key part is the tasks, submission evidence, reflection, and evaluation rubric (e.g., focus questions, activities, and final reflection questions). The first category is pre-reflection questions and rubric, and these questions are designed to centre learners' attention on the skill as it relates to their work, and to give the assessor information about their current context and understanding. The second category is submission evidence which includes activities that will demonstrate learners' understanding and use of the micro-credential skill in their practice. These tasks usually also list the submission criteria of the learning tasks, especially to reflect the improvement of teachers in teaching activities and the positive impact on students after learning microcredentials. The third category is post reflection questions and rubic. Reflective questions ask learners to review the learning activities mentioned above and assess their contribution to their own academic and professional learning; such reflective questions also help to establish continuity in the learning process. Successful learning tasks should couple learning outcomes with learning objectives, where it can be judged whether learning expectations have been met or not.

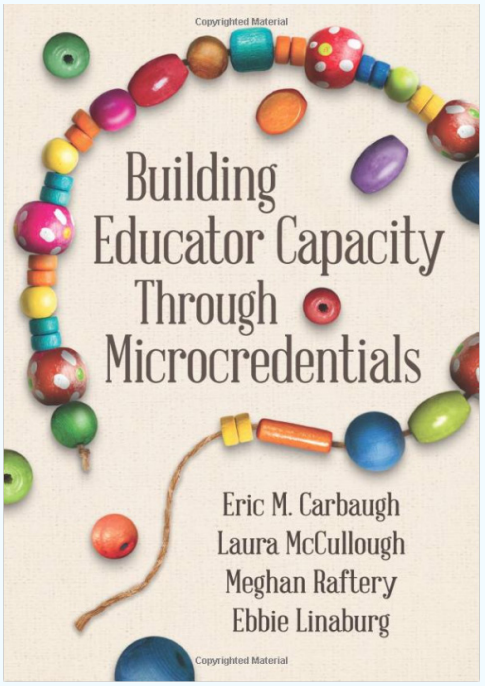
Decision Process of Microcredentials

Here are four points to keep in mind about the decision-making process for microcredentials. First, to begin with the end in mind: alignment to organizational goals. The decision makers should make sure that they are very clear about the learning targets that we want people to achieve. Second, to strive for quality: a decision needs to be made about whether to redesign new microcredentials or adopt existing microcredentials. Third, to consider who will complete the credentials and why. For example, a centralized approach - a microcredential is offered as an alternative to required professional development related to an initiative. Fourth, to plan the details of implementation in advance. In addition, if multiple skills within a topic are desired, educators might pursue a "stack" of microcredentials (3-5) which reflect a broader understanding and skill about the topic.

A New Format for Professional Learning

In general, a microcredential is a performance-based assessment intended to allow the educator to demonstrate competency in a skill. Microcredentials are an alternate form of professional learning-they are job-embedded, sustained, relevant, and focused on student outcomes. Educators completing microcredentials collect evidence of proficiency in the context of their daily work, which is documented to directly impact student learning.

> “A micro-credential is a performance-based assessment intended to allow the educator to demonstrate competency in a skill.”



Building Educator Capacity Through Microcredentials (2022)

Effective learning is the solution to engage professionals in high-quality learning that reflects the realities and contexts of their work. In order to increase effective learning, microcredential is a performance-based assessment intended to allow the educator to demonstrate competency in a skill.

This practical guidebook shows teachers and leaders in Higher Education Institutions how to apply, design and maintain an effective microcredentialing program in their school, district, colleges, etc. Experienced authors explain how teaching faculties and leaders can: set goals for microcredentials; select existing microcredentials or design new ones; implement a high-quality microcredential; structure and support microcredentialing at scale.

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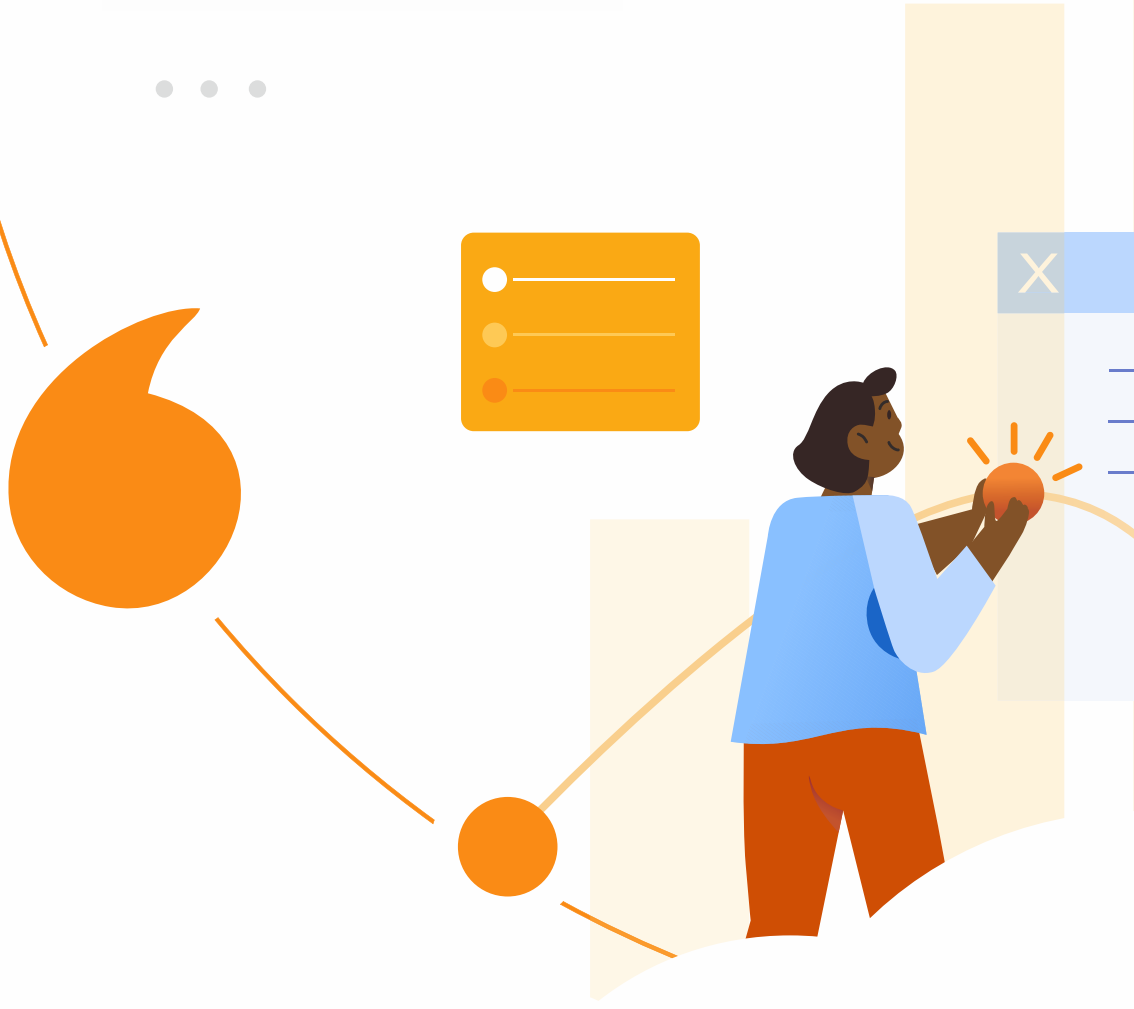
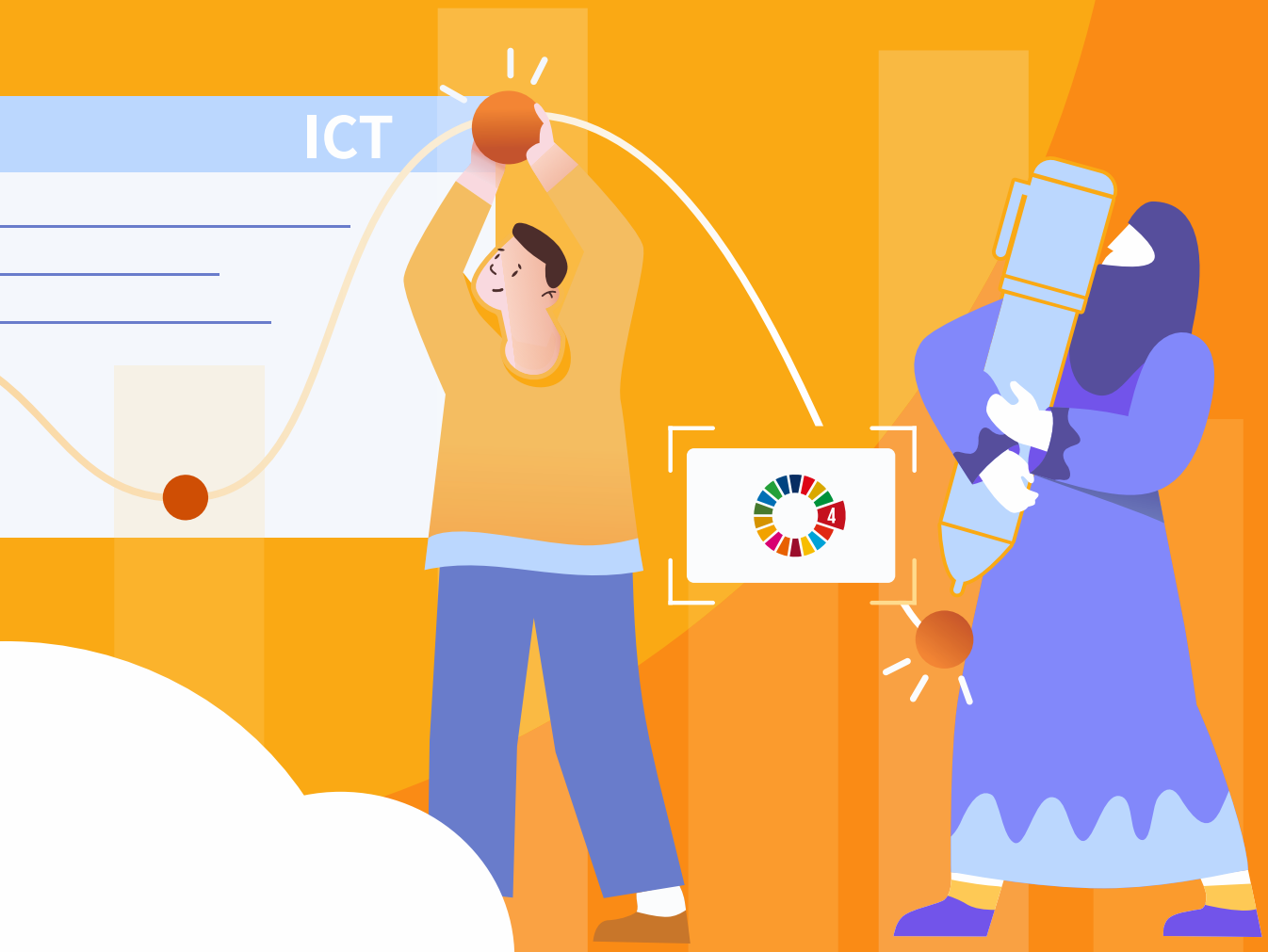


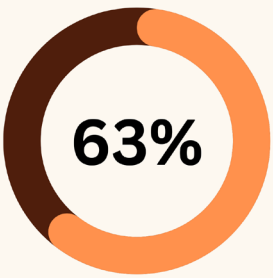
Digits



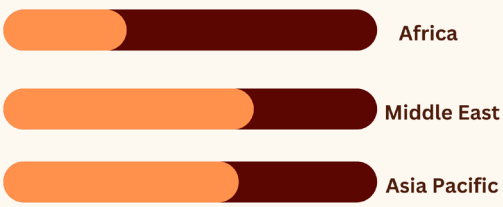
Global Preparation of Digital Transformation in Higher Education

Rapid development of technological innovations in the past decade has led to an era of digital transformation around the world, and more countries and Higher Education Institutions (HEIs) are pushing forward digital transformation in the education sector. This data report will present the current stage of global digital transformation from the perspectives of global and regional contexts, HEIs' preparations for change, adoption of new technologies, and significant obstacles confronted by some regions and HEIs.

Globally,



of the population had access to the internet in 2021.

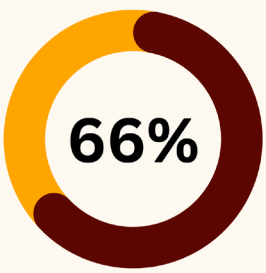


By region, Africa had the lowest percentage of population online, while the Middle East and Asia Pacific reached over 60%.

Youths

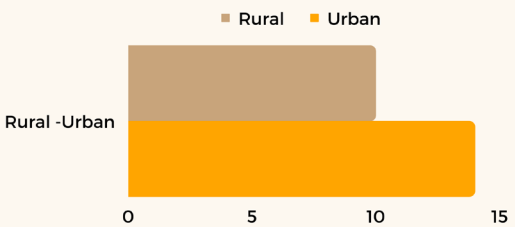
Are Internet Users

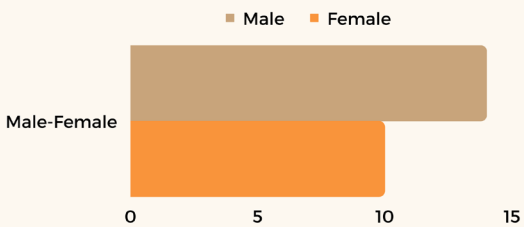
The youth population (15-24) has a much higher percentage of internet usage across all regions, showing an increasing trend of digital transformation led by the youth.



of HEIs are connected to the internet.

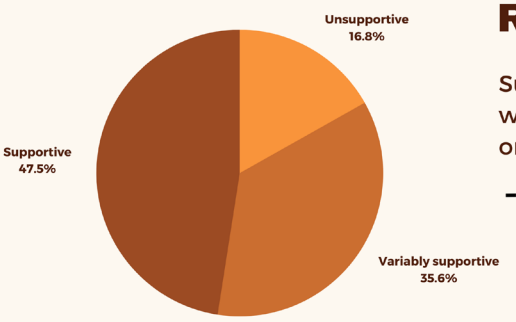
The level of digital infrastructure, however, is largely variable across different groups, presenting a substantial urban-rural divide and a less apparent but still noticeable gender divide across most regions.





Data Source: ITU DataHub

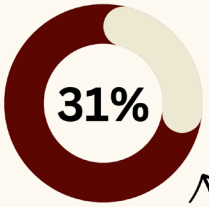
National Policy



Regulatory policies

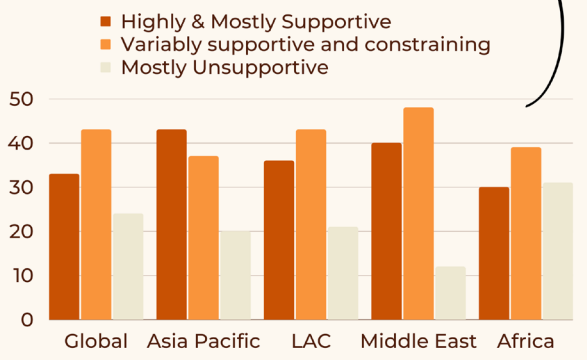
Survey shows that HEIs have a divisive opinion on whether national regulatory policies are supportive or constraining to digital transformation.

In Africa specifically, 31% of the HEIs consider the financial framework "mostly unsupportive."



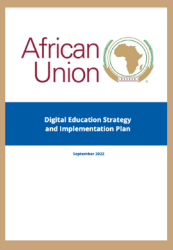
Financial Framework

Financial support for HEIs are crucial for the actual process of digital transformation, but survey shows that the financial frameworks are mostly "variably supportive and constraining."



Data Source: IAU (2019) Higher Education in the Digital Era

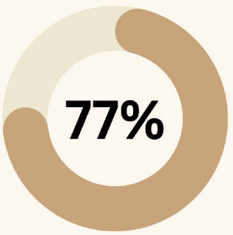
African Policy Environment



The African Union's Digital Education Strategy and Implementation Plan proposes two pillars: the first pillar is digital technology for education, and the second pillar is digital literacy and digital skills for students and staff.

HEIs' Commitments

Leadership Support



of the leadership from HEIs in Africa shows strong support for digital transformation.

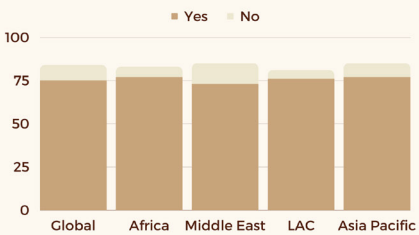
Budget Allocation

of the leadership from HEIs in Africa shows strong support for digital transformation.

10-19%

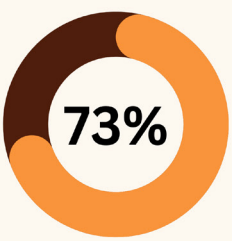
of the institutional budget is allocated to digital transformation.

Strategic Planning



75% of respondents confirmed that digital transfromation is part of their HEIs' strateic plan.

Human Resources



of the surveyed global HEIs have designated units or personnel to be in charge of digital transformation.

HOWEVER

19% of the surveyed HEIs have a clear NO to the question above.

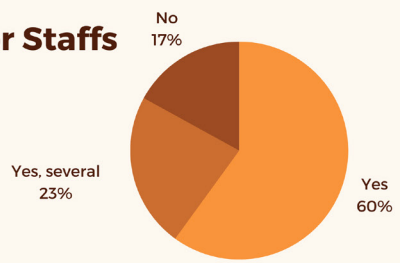
19%

17% - 21%

of HEIs faculty and staff receive no training for the use of new technologies in teaching.

83% of the respondents confirmed that they have senior staffs in charge of digital transformation.

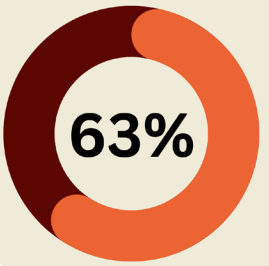
Senior Staffs



> The digital transformation of HEIs is promising across the globe, while progress is variable in each continent and country.

Data Source: IAU (2019) Higher Education in the Digital Era

Adoption Of Technologies in HEIs



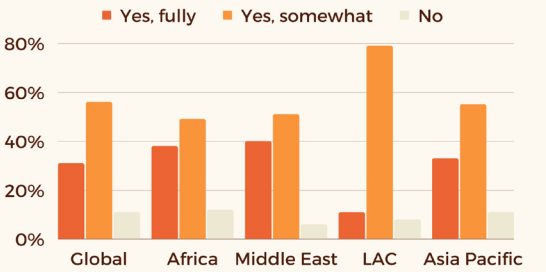
Student Data Management

of students **globally** are enrolled online, and their data is fully managed online. However, there is a comparatively lower percentage in **Africa (53%)** and **LAC (58%)**.

Yet, **7%** of the HEIs still manage this process **fully offline,** which represents around 1,300 institutions worldwide.

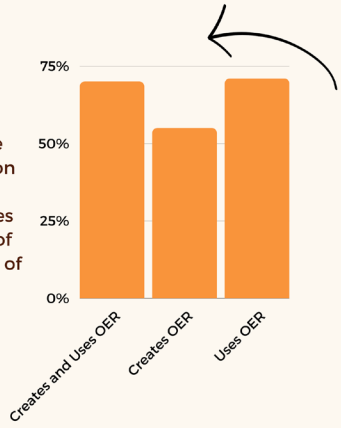
Technology in Teaching

Globally there are 87% of HEIs that integrate technology as part of teaching, either "fully" or "to some extent," who is that technology is increasingly being used in teaching.



LAC

LAC has the highest score in both the use (71%) and the creation (55%) of OER, and as well as when it comes to the combination of the creation and use of OER (70%).



Creation and Use of OER

45% **63%**

Concerning the creation and use of Open Educational Resources (OER), 63% of HEIs globally use OER and 45% of them create OER themselves. Survey shows that HEIs tend to use existing OER more than create their own ones.

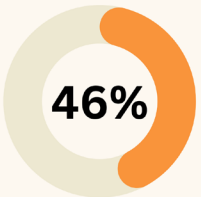
Achievements of Digital Transformation in HEIs

- Improved governance of information
- Enhanced student experience and learning outcomes
- Improved research
- Improved access to scientific knowledge
- Improved accessibility through distance learning

Data Source: IAU (2019) Higher Education in the Digital Era

Challenges and Perception

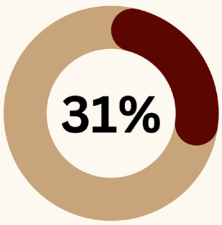
HEIs across all regions show a very positive attitude and strong willingness to digital transformation.

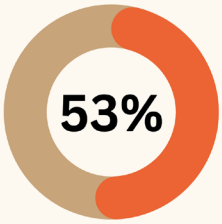


Africa

of the HEIs in Africa responded that they are "very ready" for digital transformation.

of the HEIs globally responded that they are "very ready" for digital transformation.



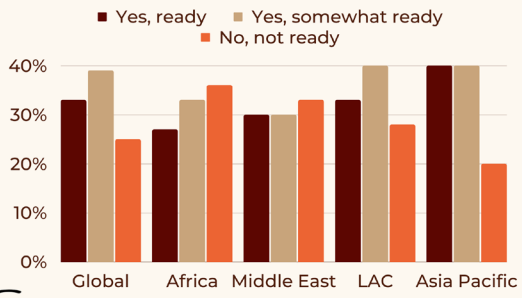


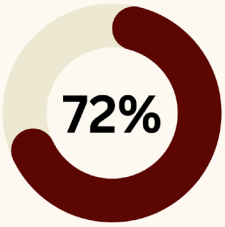
of the HEIs globally responded that they are "somewhat ready" for the change.

Key Challenge

1. **Financial costs**
2. **Cultural change within the institution to any new technologies**
3. **Digital Infrastructure**
4. **Lack of capacity building**

Lastly, 33% of respondents globally believe their institutions are prepared for future changes and emerging opportunities for digital transformation, leaving Africa (36%) and Middle East (33%) the least equipped.

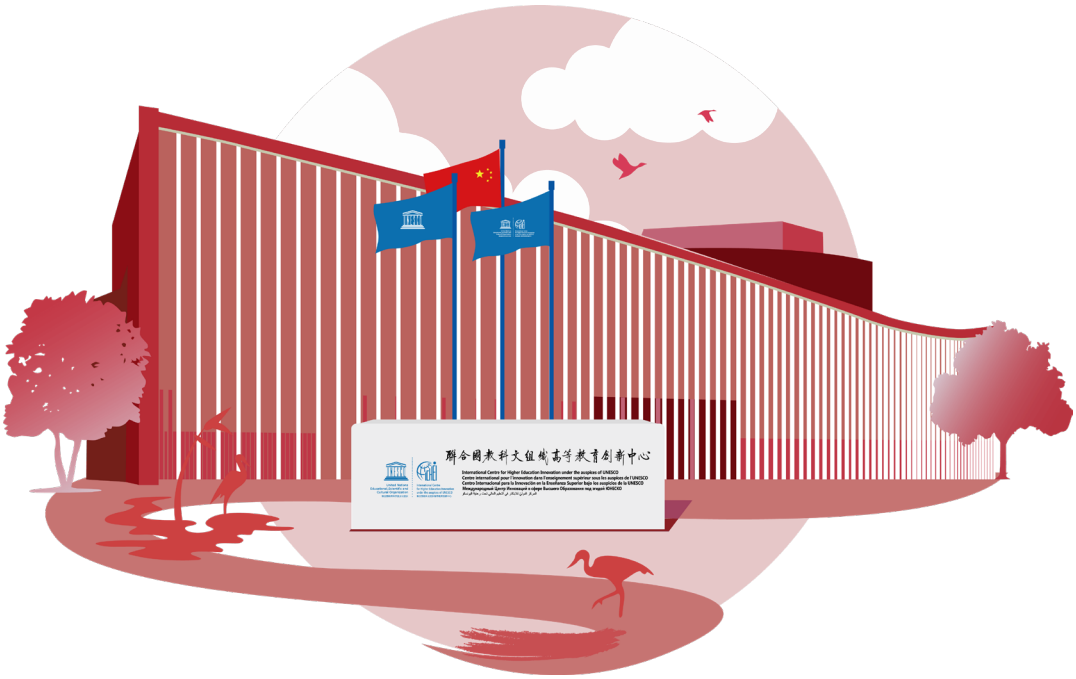




of the respondents globally feels that it is at least "somewhat necessary" to adapt to the new changes.

97% of the respondents in Africa strongly agree that digital transformation is essential for improving higher education.

Data Source: IAU (2019) Higher Education in the Digital Era



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