



UNIVERSITY OF THE FUTURE: Perspectives, Transformations, and Sustainability



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EDITORS

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FOREWORD

We live in an increasingly complex world. Advancements in technology, such as artificial intelligence and immersive technologies, are disrupting economies, workplace arrangements, and communication practices. Consequently, these changes necessitate not only reforms in academic institutions and practices, but a new, transformative approach to the whole education sector.

And yet, educators and students do not exist in a vacuum—we grapple today with many difficult challenges both locally and globally. Amid the rapid technological advancement of recent decades, the effects of climate change, continued ecosystem degradation, and recent international health emergencies increasingly threaten the survival of humanity, necessitating reforms in governance, business practices, and individual behaviors.

Higher education is crucial to addressing these concerns. Today, universities are urgently compelled to reevaluate what and how they teach, and the research agendas they choose to pursue. For while modernization has led to substantial economic growth, it has also caused environmental damage and exacerbated income disparities.

Hence, a more sustainable approach to development is imperative, requiring a comprehensive and multidisciplinary approach. This, in turn, has implications for the functions of universities in instruction, research, and public service. Moreover, the increasing trend toward regionalization presents opportunities for educational collaboration, transnational education, and the exchange of knowledge and practices across borders.

Amidst these challenges and opportunities, the educational system is tasked with preparing citizens who can navigate a future threatened by interconnected problems of environmental degradation, economic inequalities, and social exclusion. As more universities and schools adopt open and distance e-learning to enhance their academic programs, they must also address disruptions caused by changing workforce requirements, new technologies, and evolving learner profiles.

The higher education sector is faced with a number of issues—and opportunities—as it faces these myriad challenges.

First, there is a need to make higher education more inclusive, especially for marginalized sectors. Universities need to maximize the affordances of online and distance learning to make quality education more accessible to a more diverse group of e-learners.

Second, there is a need to maximize the benefits of new technologies like artificial intelligence and virtual and augmented reality in teaching and learning while mitigating their drawbacks. Alternative pathways to learning and upskilling through microcredentials and other nonformal courses need to be developed to address the changing learning needs of the professional and industrial sectors.

Finally, avenues for increased collaboration and partnerships among universities and other regional organizations must be strengthened and expanded to promote quality higher education and research to address shared sustainability concerns.

This book is a valuable addition to the ongoing and larger discourse on the role of universities in the future. The book is a collection of papers from academics at the University of the Philippines Open University (UPOU) as they attempt to make sense of the macro challenges and issues in the educational landscape and the possible instructional and research responses to address issues of sustainability. By gathering different perspectives, projections, and re-imaginings of the University of the Future, this book hopes to raise more relevant questions for educators to reflect on.

My heartfelt congratulations go to UPOU for bringing this publication to reality. I hope that it helps in opening up more conversations among educational institutions on their evolving roles in creating more inclusive, technology-supported, and impactful academic offerings in the future.

More than ever, the educational sector must engage in discussions and reflection on how flexible approaches to teaching and learning can contribute to addressing these intersecting sustainability issues. This will hopefully generate innovative ideas to seize opportunities and overcome forthcoming challenges.

Atty. Angelo A. Jimenez
President
University of the Philippines

PREFACE

The changing educational landscape brought about by various disruptions has affected academic institutions both locally and globally. Needless to say, with such unforeseen changes, it is important for educational institutions to map or forecast their future direction in consideration of these economic, social, and environmental disruptions.

With its leadership position in open and distance e-learning, the University of the Philippines Open University (UPOU) spearheads an initiative to document various ideations of the University of the Future (UoF). No less than the leadership of the country's premier university recognizes UPOU as "the University of the Future." It becomes imperative, therefore, to articulate what it means and strategize towards achieving such a status.

As an early initiative, UPOU held discussions among its constituents to reflect on the future direction of UPOU and similarly situated educational institutions. This series of discussions was organized to begin charting UPOU's direction amidst the disruptions in the educational landscape. With the shift of most higher education institutions to remote teaching and learning (RTL), UPOU needs to lead in the conceptualization of the so-called UoF. Towards documenting these insights, an institutional book was proposed to capture the Virtual Roundtable Discussion (VRTD) series it held, where UPOU's various constituents took part in a participative, reflective, and forward-thinking exchange of ideas.

The book is also a compilation of thought papers emerging from formal and informal debates and discussions among UPOU's administrators, faculty, researchers, staff, students, and alumni. The book suggests a continuing discourse on the nature, challenges, and issues of the UoF. It constitutes various provocative ideations that present trends and realities that could fundamentally influence the structural configurations and processes of universities in the future.

The first section gives a rationale and a context for the institution's deliberate efforts at envisioning its future. The opening article, "University of the Future: An Articulation of a Perspective," articulates the university leadership's appreciation of current disruptions and developments that are seen to impact the university's philosophy, outlook, and operations.

In an attempt to get the views of its constituents and other stakeholders in open and distance learning, the article “Conceptualizing and Strategizing the University of the Future in Open and Distance Education” surfaces some features of the UoF and proposes a way forward through strategizing approaches. At the academic discipline level, the article “The Disciplinary Dimension of the University of the Future” argues for information and communication as a pandiscipline of the UoF.

The next section delves into the evolving educational landscape as a result of new trends and how these are shaping the future of education. The first article, “Morphing of the Educational Landscape: Implications on the Instructional Function of the University of the Future,” looks into the potential changes in the instructional, research, and public service aspects of the university. Two related articles, “Exploring Short Courses in an Evolving Educational Landscape” and “Flexible Learning Pathways and the Future of University Education,” articulate the changes happening in the instruction realm.

Innovations in teaching and learning in the UoF are seen to be dominant. The use of immersive pedagogies is chronicled in the article “Immersive Open Pedagogies in the University of the Future.” It also explores future directions in the use of such technologies, contemplating potential advancements, improvements, and challenges. In research, the article “The Future of Educational Research in a Technology-mediated Collaborative and Distributed Research Environment” assesses the potential of the virtual research environment in a UoF scenario.

A culminating section looks into an important aspect of envisioning the future, that of sustainability. Any forward-thinking strategy should ensure continuity amidst an ever-changing scenario. The section is introduced by the article “Sustainability and the University of the Future” in which the United Nations’ (UN) sustainability goals are taken into consideration in envisioning the future of education. Towards this commitment, the article “Sustainability Office: An Important Element of the University of the Future’s Organizational Structure” argues for the creation of a Center in the UoF and elucidates why this will encapsulate the characteristics of the UoF. Lifelong learning is seen to be prominent in the UoF, as articulated in the article “Sustaining Lifelong Learning through Continuing Education in the University of the Future.” And finally, emphasis is put on the aspect of quality in the UoF. The article “Achieving Sustainability through a Future-ready Quality

Assurance Framework” tackles issues that could influence the processes in a UoF.

While the discourse on the future of education and consequently the ideations, scenarios, configurations, and challenges of the UoF remain speculative and conjectural, we hope the book could situate such discussions on the essentials of an exciting, albeit uncertain, future which we can only insightfully debate about at the present time.

Melinda F. Lumanta, Ph.D.

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Editors

ACRONYMS

A

AAOU	Asian Association of Open Universities
ACCESS	Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support
ACH	Association for Computers and the Humanities
ADHO	Alliance of Digital Humanities Organizations
AI	artificial intelligence
AIED	artificial intelligence in education
AIRT	Academic International Research Team
ALLC	Association for Literary and Linguistic Computing
ALS	Alternative Learning System
APEC	Asia-Pacific Economic Cooperation
APEL-A/C	Accreditation of Prior Experiential Learning for Access and Credit
AR	augmented reality
ARPAED	Advanced Research Projects Agency for Education
ASEAN	Association of Southeast Asian Nations
ASTI	Advance Science and Technology Institute
AUN	ASEAN University Network
AV	augmented virtuality

B

BES	Bachelor of Education Studies
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C

CAP	Career Advancement Program
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CCA & DRM	Integrating Climate Change Adaptation and Disaster Risk Management Policies, Plans and Investments toward Inclusive and Sustainable Agricultural and Rural Development
CCE	climate change education
CCSN	Caring for the Child with Special Needs
CEDEFOP	European Centre for the Development of Vocational Training
CEP	Continuing Education Program
ChatGPT	Chat Generative Pre-Trained Transformer
CHED	Commission on Higher Education
CHum	Computers and Humanities
COARE	Computing and Archiving Research Environment
CODTL	Center for Open and Digital Teaching and Learning
CoL	Commonwealth of Learning
CoP	Community of Practice
CPD	Continuing Professional Development
CQeSS	Collaboratory for Quantitative e-Social Science
CSCW	Computer Supported Cooperative Work
CUs	constituent universities
D	
DARPA	Defense Advanced Research Projects Agency
DepEd	Department of Education
DE	distance education
DH	Digital Humanities
DMfE	Digital Marketing for Entrepreneurs

DOST	Department of Science and Technology
DOST PCIEERD	Department of Science and Technology's Philippine Council for Industry, Energy, and Emerging Technology Research and Development
DRRM	disaster risk reduction and management
DS	Doctor of Sustainability
E	
eCom	Introduction to Electronic Commerce
ECTS	European Credit Transfer System
eDiaMoND	e-Science Diagnostic Mammography National Database
EDM	Educational Data Mining
EGEE	European Enabling Grids for E-science
EMP	Educational Media Production Unit
ENRM	Environmental and Natural Resource Management
ERT	emergency remote teaching
ESL	English as a Second Language
ETT	educational transformation trajectory
F	
FAIR	findable, accessible, interoperable, and reusable
FED	Faculty of Education
FICS	Faculty of Information and Communication Studies
FiNQF	Finnish National Framework for Qualifications
FLOPS	floating point operations per second
FLP	flexible learning pathways
FLS	flexible learning spaces

FMDS Faculty of Management and Development Studies

G

GP Gurong Pahinungod

GPS global positioning system

GULF Global University Leaders Forum

GVRE Graduate Virtual Research Environment

H

HEI higher education institution

HMDs head-mounted displays

I

IAPA Impact Assessment and Poverty Alleviation

IBM International Business Machines

IBPAP Information Technology and Business Process Association of the Philippines

ICT information and communication technology

IFR International Federation of Robotics

IIEP UNESCO International Institute for Educational Planning

IL immersive learning

IOP immersive open pedagogy

IoT Internet of Things

IQA Internal Quality Assessment

IR 4.0 Industrial Revolution 4.0

IRBs institutional review boards

ISCOLAB Immersive Science Communication Open Laboratory

ITS	intelligent tutoring systems
IVLE	integrated virtual learning environment
J	
JIF	journal impact factor
L	
LA	Learning Analytics
LMS	learning management system
LOD	Linked Open Data
M	
MDGs	Millennium Development Goals
MERLOT	Multimedia Educational Resources for Learning and Teaching Online
MODeL	Massive Open Distance e-Learning
MOOC	massive open online course
MoU	Memorandum of Understanding
MR	mixed reality
N	
NCeSS	National Centre for e-Social Science
NCODEL	National Conference on Open and Distance e-Learning
NEP	New Enterprise Planning
O	
OA	organic agriculture
OAD	Occupational Associate Degree
OCIA	Office of Cyber and Infrastructure Analysis of the United States of America

ODL	open and distance learning
ODeL	open and distance e-learning
OECD	Organization for Economic Co-operation and Development
OER	open educational resources
OP	open pedagogy
OS-CAM	Open Science Career Assessment Matrix
OTLip20	Off the Lip 2020
OUR	Office of the University Registrar
OWL	Web Ontology Language

P

PAN-DLT	Pan Asia Network-Distance Learning Technology
PANdora	PAN Asia Networking Distance and Open Resources Access
PED	Personal Entrepreneurial Development
PhD	Doctor of Philosophy
PLOS	Public Library of Science
PQF	Philippine Qualifications Framework
PRC	Professional Regulatory Commission
PSciGrid	Philippine e-Science Grid
PSDT	Permaculture Systems Design Thinking
PWDs	persons with disability

Q

QA	quality assurance
QS	Quacquarelli Symonds

R

RCRANRM	Responding to Climate Risks in Agriculture and Natural Resources Management
RDF	Resource Description Framework
RNA	ribonucleic acid
RPL	recognition of prior learning
RPWE	recognition of prior work experience
RTD	roundtable discussion
R&D	research and development
S	
SAFE	Simplified Accounting for Entrepreneurs
SC	sustainability coordinator / Smart Cities
SD	sustainable development
SDEs	Schools for Distance Education
SDG	Sustainable Development Goals
SDSN	Sustainable Development Solutions Network
SG	science gateway
SIF	System Interoperability Framework
SSHRC	Social Sciences and Humanities Research Council
SST	social shaping of technology
ST	sustainability team
T	
TEI	Text Encoding Initiative
TER	technology-enhanced research
TESDA	Technical Education and Skills Development Authority
TFC	Task Force Committee

THE	Times Higher Education
TVET	technical and vocational programs
TWG	Technical Working Group
U	
UCAR	University Corporation for Atmospheric Research
UDL	Principles of Universal Design for Learning
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children’s Emergency Fund
UN	United Nations
UNDP	United Nations Development Programme
UoF	University of the Future
UNU	United Nations University
UP	University of the Philippines
UPOU	University of the Philippines Open University
URI	unified resource indicator
URL	uniform resource locator
USQ	University of Southern Queensland
V	
VART	Virtual Academic Research Team
VCoP	virtual community of practices

VO	virtual organization
VR	virtual reality
VLE	virtual learning environment
VRC	virtual research communities
VRE	virtual research environment
W	
WCAG	Web Content Accessibility Guidelines
WHO	World Health Organization
WEF	World Economic Forum
X	
XML	Extensible Markup Language
XR	extended reality
XSEDE	Extreme Science and Engineering Discovery Environment

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University of the Future: An Articulation of a Perspective

Melinda dP. Bandalaria

ABSTRACT

To ensure universities' relevance, universities must face the evolving dynamics of education. The paper raises questions on the roles that universities could possibly play in the areas of offering future-proof degrees, teaching methods, degree offerings, knowledge generation, societal engagement, and quality assurance. It is argued, from the perspective of the University of the Philippines Open University (UPOU), that higher education must be adaptive to the transformative requirements of the changing technological educational landscape while recognizing enduring aspects.



Introduction

This is an articulation of the perspectives and appreciation of the different dynamics that may impact education using the lens of how the University of the Philippines Open University (UPOU) is positioned as an open university, and the direction that the university will take as the model of the University of the Future (UoF). One could look at it as futurology in practice, or studying the current trends in order to forecast future developments, for evidence of projections of the future.

As we continue to critically reflect on the different dynamics impacting education and universities, there will surely be variations in the articulations of the UoF. There will likely be points of agreement and disagreement, but also the realization that the future is here. Actions and transformations must be taken now for universities to remain relevant and to prevent their essential societal functions from being overtaken by any emerging configuration that might fill the voids left unaddressed by the formal education system represented by universities.

Citing Boulton (2009, proposition 3), “It is crucial that the role of universities in society is understood before mechanisms to promote change are put in place”. There are two aspects being highlighted in this statement: the true role of the universities in societies and promoting change.

Promoting Transformation

In a 2020 publication by the World Economic Forum (Salyer, 2020), transformation was the term used to describe the shift to the school of the future framework, which implies taking into consideration not only the resulting configuration but also the process involved. The process is as important as the result and the process can even be part of the UoF framework or configuration.

Role of Universities

The other aspect of concern is the authentic role of universities in society, prompting the question: What exactly is the true role of universities, aside from those we are familiar with or those that have been assigned to this institution for centuries? These roles include educating people, generating knowledge, producing innovations through research and societal

engagement—concretized in our context through our passion for public service. Alternatively, it can involve expanding and sharing knowledge, inspiring innovation, and preserving cultural and scientific information for future generations, aligning with Yale University’s positioning (It’s your Yale, n.d.). While there are discussions about additional roles for other universities, such as serving as central institutions for national development, especially in developing countries, where they act as incubators of nationalism and nationalistic ideas, providers of technical expertise for nation-building, and even engines for economic growth or development, my stance is to see whether these roles are already subsumed in the three major roles I have mentioned. Nevertheless, as we continue to articulate the configuration of the UoF, another role may emerge. This is something we should keep an open mind about, as another point to consider.

This discussion centers on the traditional roles of universities. To begin, let us examine the teaching role. Over the past years, and this gained renewed attention a few months ago with an article, Google revealed plans to disrupt the conventional college degree (Bariso, 2020). Google’s \$49/month course is positioned to potentially replace traditional degrees. In 2018, TechRepublic listed 15 companies where employment opportunities exist even without a college degree (Forrest, 2018). This raises a fundamental question about the relevance of college degrees in shaping the future university landscape.

In a study conducted in 2017, which investigated the educational backgrounds of the wealthiest and most influential people in the US, involving 11,745 US leaders, the conclusion was that, for now, college dropouts dominating the world are exceptions rather than the rule (Wai & Rindermann, 2017). This aligns with my view on the importance of college degrees in the sense that they facilitate understanding of existing knowledge and provide the foundation for the construction and advancement of knowledge.

Quoting from the Organisation for Economic Co-operation and Development (OECD)’s 2018 publication titled “The Future of Education and Skills”:

Disciplinary knowledge will continue to be important, as the raw material from which new knowledge is developed, together with the capacity to think across the boundaries of disciplines and ‘connect the dots.’ Epistemic knowledge, or knowledge about the disciplines, such as knowing how to think like a mathematician, historian, or

scientist, will also be significant, enabling students to extend their disciplinary knowledge (p. 5).

This observation reinforces the notion that college degrees should remain a vital component of the UoF.

Perhaps, the more pertinent question to ask is: What kind of college degrees should we offer? In an earlier articulation, I proposed that pluridisciplinary degrees could become the new norm. An example could be a computer science degree that includes courses on the physiological makeup of the body, psychology, anatomy, and environmental studies. This approach ensures that future computing technologies consider not only the technology itself but also the user and the environment. The idea is to offer future-proof degrees that provide disciplinary knowledge serving as raw materials for the development of new knowledge and innovations. While rooted in a specific discipline, this knowledge transcends understanding other disciplines, enhancing the potential for innovations that arise from the individual's core discipline.

Given that academic disciplines are not isolated entities but are, in reality, interconnected, the convergence or pluridisciplinarity features of future-proof degrees will become the standard. Future-proof curricula support a teaching and learning strategy that integrates the acquisition of competencies essential for the future. These competencies empower individuals to meet current industry demands, adapt to the rapidly changing world of life and work, and maintain a disposition for continuous learning and critical reflection on the exponentially growing volume of information. The concept of "gig learning," emerging in response to the growing "gig economy," relies on a robust theoretical foundation, uniquely provided by future-proof degrees. It goes without saying that the future-proof curriculum aims to cultivate future-ready leaders rather than merely technically equipped workers.

The future-proof education shall put a premium on tertiary education degrees to provide a theoretical foundation on basic disciplines to further the development of industries and technologies for the welfare of the people. The curriculum serves as the platform for students to not just learn current knowledge and skills but also to theorize and contribute to the building of knowledge in the discipline that would shape the future of innovations and industries.

Method of Instruction

The second question is: How should we teach these college degrees to produce future-ready leaders? To address this inquiry, we can potentially draw inspiration from the University of Waterloo's (n.d.) future-ready talent framework. According to this framework, our training for students should instill essential characteristics, skills, and knowledge. These include the ability to expand and transfer expertise, develop oneself, build relationships, and design and deliver solutions. Each talent or skill also encompasses sub-talents and sub-skills that we must consider when instructing our students. If these values, skills, and knowledge are indicative of what future-ready leaders should possess, the question then becomes: How should we design the learning process?

The UoF will therefore demand that academic programs be aligned more closely with the cultivation of lifelong learning skills, going beyond the typical professional competency requirements. Universities must reassess their instructional methods to ensure the development of learners capable of continuous learning and adaptation throughout their lifetime. Given the recent advancements in ethical artificial intelligence, universities will need to think of approaches on how these new technologies can be tapped not only for content instruction and learner assessment but also for the development of these lifelong learning skills.

Method of Degree Offering

The third question is: How should these degrees be offered? The utilization of modern information and communication technologies (ICTs) as a foundational element in shaping the future university's structure can be considered a given. Learning is increasingly facilitated by algorithms, employing machine learning for automated assignment grading, delivering adaptive content and assessments, and concurrently reducing faculty labor to scale programs to accommodate thousands of students at a reduced cost. This aligns with the foresight outlined in the 2015 Paris Message, projecting a surge to 240 million students seeking higher education by 2030 (UNESCO, 2015).

A growing trend involves the aggregation of multiple universities, their courses, and programs forming partnerships with employers. Online education providers such as StraighterLine (<https://www.straighterline.com>) and Udemy (<https://www.udemy.com/topic/distributed-computing/>),

functioning as distributed platforms, are capitalizing on these trends, providing students with Netflix-like options for earning transferable college credits or other credentials through a monthly subscription.

Another emerging trend, potentially parallel to initiatives by Google and other companies, is the unbundling of degrees into shorter-form micro credentials that can seamlessly integrate into a broader lifelong curriculum or digital credentialing. This shift is accompanied by an observation that the market increasingly demands colleges and universities to transition from primarily offering bachelor's degrees to more flexible, lower-cost, digitally credentialized learning packages valued by employers. In the digital economy, continuous upskilling is crucial to keep pace with technological advances and the diminishing lifespan of skills. This signals a move away from traditional one-and-done degrees towards a model of lifelong learning and upskilling, a central tenet in achieving the widely embraced goal of greater alignment between education and the workforce. These considerations evoke the concept of bridges and pathways to learning, as advocated by a colleague, former Dean Alexander Flor many years ago, perhaps indicating that we are significantly ahead of our time.

Knowledge Generation

Regarding the role of generating knowledge and producing innovations through research, my articulation remains unchanged. It continues to emphasize open research, a term interchangeable with open science (Center for Open Science, n.d.), encapsulating the concept that scientific knowledge of all kinds should be openly shared at the earliest practical stage in the discovery process. This entails transparency in the research process by making data and tools openly available, fostering collaboration, publicizing the research process, and enhancing the accessibility of science to the public. Wiley (n.d.) further solidifies the concept of open research by advocating for open access, allowing researchers to openly share their work or data. In this context, open research positions research data as equally important as the published article. The efficiency of the process increases when data is fair—meaning findable, accessible, interoperable, reusable, and ethical—enabling researchers to access and analyze each other's findings, thus facilitating the informed generation of new discoveries.

Open science extends beyond sharing research results; it encompasses the entire research cycle, promoting sharing and collaboration among

stakeholders in science and innovation. The primary beneficiaries, the people, are therefore placed at the forefront of innovations. Open science aligns itself with sustainable development goals, embodying the three bottom lines: people, planet, and social profit.

Social profit, derived from the university's engagement with society, commonly known as "public service," can be considered the apex in configuring the UoF. All bottom lines converge toward a core component: the people, emphasizing openness and inclusion. The realization of this articulation will undoubtedly rely heavily on innovative technologies.

Societal Engagement

On the third role, which involves societal engagement, the question arises: Will this remain a distinct role, or will the entire configuration of the UoF be considered as societal engagement? This consideration aligns with the expectation that openness will be a key feature of the UoF's configuration.

Given the current sustainability challenges confronting the world, there is an increased anticipation for universities to actively participate in broader societal interactions. The UoF is thus anticipated to not only enhance its extension offerings but also expand them to encompass microcredentials and other open courses accessible to marginalized sectors. Now, more than ever, academics are expected to engage in broader public discourse, utilizing not only traditional forums but also digital platforms.

Quality Assurance

Another aspect to consider is the aspect of quality. A university should remain committed to quality education to remain relevant. However, what needs to evolve is how quality should be perceived and measured? If modern ICTs are central to the UoF's configuration, traditional quality frameworks may no longer be suitable. When we address quality in education, should we emphasize inputs as is often the case in most quality assurance (QA) frameworks? Should we not also give equal attention to the process, outputs, and outcomes in our evaluation of quality?

Merely looking at outputs is also insufficient, as in the case of massive open online courses (MOOCs) with low course completion rates. We must delve into the impact and outcomes of our efforts. In doing so, we need to identify

acceptable evidence and determine how to obtain it. Can we rely solely on the standard end-of-semester surveys among our students and present those results as quality indicators? When establishing quality criteria, who or what will be the sources of our data?

In most cases, the common tools for assessing quality involve surveys and forced evaluations, where instructors, learners, or administrators share their opinions and experiences (Chao, et. al., 2006). However, data from such methods often address only specific aspects of course quality, leaving out comprehensive considerations. Defining quality necessitates a holistic framework to identify these aspects, establish guidelines, and devise instruments and methods for measuring the concealed dimensions of quality. The implication is to bring to light those hidden facets of quality that we may currently overlook. Even the common QA framework for technology-enhanced and technology-enabled courses and programs predominantly focuses on input, neglecting the processes resulting from instructional delivery. The call here is for us to adopt a fresh perspective on quality education along with our efforts to configure the UoF.

Given the centrality of human development in the UoF, how do we ensure that our impacts go beyond the traditional learners? In the past, in addition to mainstream quality indicators, we have also included attributes like accessibility, inclusion, flexibility, and sustainability as other overarching features of a university that could very well be considered essential in the UoF framework. So how are we going to integrate these features as part of the major characteristics of the UoF?

The UoF should continue to prioritize QA for technology-enhanced and technology-enabled courses or programs and institutions. Moreover, universities must reconsider how broader societal concerns of access, equity, and sustainability can be incorporated and integrated into academic quality frameworks. UPOU, in particular, holds a significant role in this pursuit, given its mandate as part of the only national university in the country. Furthermore, under Republic Act 10650, it plays an increasingly strategic role and is recognized for its leadership among open universities in Asia.

Conclusion

The UoF champions crucial concepts such as future-proof degrees, future-

ready leaders, and ethical and open science. When we refer to future-proof degrees, we mean foundational qualifications or training enabling individuals to navigate career shifts throughout their lifetimes, serving as the bedrock for lifelong learning. Considering the evolving dynamics of education, the concept of future-proof degrees necessitates a corresponding future-proof education system, which should be the hallmark of the UoF.

It's important to note that in these discussions, the notion of sticking solely to a brick-and-mortar and a physical university is not implied. This prompts the question: How will universities be configured in the university of the future? Will this configuration lead to a "university in the cloud"? However, the university is not complete if we only consider the three roles. What about other aspects of universities, such as organization and governance? While we discuss the UoF, some basic assumptions may remain unchanged.

Quoting Drew Faust, the former president of Harvard University, from his 2010 address at the Royal Academy of Dublin (Harvard University, 2010):

Universities nurture the hope of the world: in solving challenges that cross borders; in unlocking and harnessing new knowledge; in building cultural and political understanding; and in modeling environments that promote dialogue and debate (para. 11).

It seems that these elements may be some of the enduring aspects that will not change in the configuration of the UoF.

I would like to end this piece with this question: Having engaged in these kinds of critical discourses, are we not already epitomizing, at least to some extent, some aspects of the UoF?

References

- Bariso, J. (2020, August 19). Google has a plan to disrupt the college degree. Inc. <https://www.inc.com/justin-bariso/google-plan-disrupt-college-degree-university-higher-education-certificate-project-management-data-analyst.html>.
- Boulton, G. (2009, 29 March). Global: What are universities for? *University World News*. <https://www.universityworldnews.com/post.php?story=20090326200944986>
- Center for Open Science. (n.d.). Open science. <https://www.cos.io/open>

science

- Chao, T., Saj, T., & Tessier, F. (2006). Establishing a quality review for online courses. *Educause Quarterly*, 29(3),32. <https://er.educause.edu/articles/2006/1/establishing-a-quality-review-for-online-courses>.
- Forrest, C. (2018, August 21). Google, Apple among 15 top companies where you can get hired without a college degree. *TechRepublic*. <https://www.techrepublic.com/article/google-apple-among-15-top-companies-where-you-can-get-hired-without-a-college-degree/>.
- Harvard University. (2010). The Role of the University in a Changing World in Speeches by President Faust. <https://www.harvard.edu/president/speeches-faust/2010/the-role-of-the-university-in-a-changing-world/>
- It's your Yale. (n.d.). About Yale. <https://your.yale.edu/about-yale>
- Organisation for Economic Co-operation and Development (OECD). (2018). The Future of Education and Skills Education 2030. The future we want. [https://www.oecd.org/education/2030/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf)
- Salyer, K. (2020, 14 January). From wall-less design to robotics training: Meet the 16 schools defining the future of education. *World Economic Forum*. <https://www.weforum.org/press/2020/01/from-wall-less-design-to-robotics-training-meet-the-16-schools-defining-the-future-of-education/>.
- Straighterline. (n.d.) Take a Smarter Line to Your Future. <https://www.straighterline.com>
- Udemy. (n.d.). Distributed Computing Courses. <https://www.udemy.com/topic/distributed-computing/>
- University of Waterloo. (n.d.) Future-ready talent framework. <https://uwaterloo.ca/future-ready-talent-framework/>
- UNESCO. (2015). Online, open and flexible higher education for the future we want. From statements to action: Equity, access, and quality learning outcomes. Paris High-Level Policy Forum (9-15 June 2015). <https://iite.unesco.org/files/news/639206/Paris%20Message%2013%2007%202015%20Final.pdf>
- Wai, J., & Rindermann, H. (2017). The Myth Of The College Dropout. *HuffPost*. https://www.huffpost.com/entry/the-myth-of-the-college-dropout_b_58f8ebb9e4b0f02c3870e7a6
- Wiley. (n.d.). Open research isn't just the future of research communications; it's the here and now. <https://authorservices.wiley.com/open-research/index.html>



Conceptualizing and Strategizing the University of the Future (UoF) in Open and Distance Education

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ABSTRACT

This chapter documents the initiatives of the University of the Philippines Open University (UPOU) in its strategic move toward the University of the Future (UoF) amidst an evolving educational landscape. It presents several strategic initiatives, including stakeholder roundtable discussions, forums on the future of higher education, and research initiatives to provide a grounded basis for conceptualizing and eventually strategizing the UoF, anchored on an approach of soliciting stakeholder engagement and knowledge-sharing among its constituents. The paper advocates for an ongoing re-imagining of the preferable futures, emphasizing a dynamic, evolving concept rather than a fixed projected vision. It suggests utilizing strategic planning tools like design thinking and futures thinking to operationalize UoF attributes within the framework of the university's deep-rooted core values. A proposed organizing framework is presented, taking into consideration the emergent UoF attributes, as it aligns with institutional values, thus, ensuring a strategic and adaptable approach to the evolving landscape of higher education.



UPOU and The Future of Higher Education

Gradual, yet monumental, shifts in the educational landscape have emerged through time as exemplified by the globalization of curriculum, worldwide distance e-learning programs, a rise of massive open online courses, the shift to Industrial Revolution 4.0, the move toward micro-credentialing, and the emergence of artificial intelligence (AI). Whether driven by technological advancements or any kind of disruption and trends, the educational sector, especially the open universities, has been informally bestowed with the capacity and the means to initiate changes primarily through expanding its purpose while remaining true to its core values and providing quality and sustainable education.

With its leadership position in open and distance e-learning (ODEL), the University of the Philippines Open University (UPOU) spearheads the initiative to document various ideations of the University of the Future (UoF). No less than the leadership of the country's premier university recognizes UPOU as "the University of the Future." It becomes imperative, therefore, to articulate what it means and strategize toward achieving it.

In tackling the future of higher education, we recognize the value of quality education and stakeholder engagement. In this chapter, we document an open university's attempt to articulate the UoF anchored on stakeholder involvement and knowledge- and resource-sharing. It presents stakeholder-wide conceptions of a UoF in the context of open and distance learning (ODL) institutions and provides an organizing framework to guide universities/institutions in their strategic directions.

Future of Higher Education

Individual and collective initiatives toward creating a roadmap for the UoF have been forwarded by various sectors through forums and research initiatives (e.g., Universities of the Future, a Knowledge Alliance Project funded by the European Commission; Futures of Education, an initiative of the United Nations Educational, Scientific and Cultural Organization [UNESCO]; Global University Leaders Forum [GULF], Forum of Universities for the Future of Europe). The future of higher education has always been a concern of the education sector as it adapts to changes in the national, analog, and industrial economy (Sucholdolski, 1974). In the current century, the future of higher education is being challenged to conform to the global and digital

knowledge economy (Levine & Pelt, 2021). More so, UoF discussions are reignited amidst the disruption caused by the COVID-19 pandemic.

In a report of the International Commission on the Futures of Education (2021), the future of education calls for a new outlook, not a mere expansion of the current education system. This new outlook requires a social contract, the starting point of which is a shared vision of the public purposes of education.

Constructing a new social contract means exploring how established ways of thinking about education, knowledge, and learning inhibit us from opening new paths and moving toward our desired futures. Merely expanding the current educational development model is not a viable route forward (p. 11).

In the Philippines, the UPOU shall be at the forefront in spearheading strategies toward redefining and reconceptualizing ODL as it adapts to the global realities as mandated by Republic Act 10650 (2014).

UoF Initiatives of the UPOU

By its nature of being open and heavily reliant on technology to bridge the distance gap, an open university is positioned to be at the helm of innovations in education. Hence, as early as 2003, during the process of digital transformation of the UPOU, former Chancellor Felix Librero emphasized the pivotal role of technology in shaping the university's learning environment. He asserted that—

For innovators like the UPOU, the future that is the digital age is here and has been here for some time now. It must be because we are in this business of designing a futuristic learning environment, employing the greatest advantages of the high-end technologies that we are frequently perceived to be ahead in the exploration of the uses of digitization in the development and delivery of instructional packages and the design of learning environments. In other words, the future is here. It has arrived ahead of schedule (Librero, 2003, as cited in Lumanta, 2015, pp. 67-68).

In 2019, Chancellor Melinda Bandalaria officially commenced the conversation on the concept of the UoF in her pre-conference message titled

“Unpacking the University of the Future” during the National Conference on Open and Distance e-Learning, wherein she articulated that—

The university of the future should be able to shape the direction of the future industrial revolution and this necessitates the revisit of the essence of universities or our core functions of producing graduates and training the manpower who will man and plan the industries (Bandalaria, 2019, para. 1).

Subsequently, during the institution’s silver anniversary celebration in 2020, the leadership of the University of the Philippines (UP) System, President Danilo Concepcion, officially recognized UPOU as the embodiment of the future of UP. In the same event, former UP President and National Scientist Dr. Emil Q. Javier echoed this and further challenged the institution: “It is now up for you, UPOU, to make real the future that was envisioned for you” (UPOU, 2021, para. 7).

In retrospect, the consistent emphasis and formal consideration by the institution’s leadership with regard to the “university of the future” have sparked several initiatives and programs aimed at engaging a wide range of stakeholders, extending beyond the boundaries of institutional leadership.

As an early initiative, UPOU held discussions among its constituents to reflect on the future direction of the University and similarly situated educational institutions. This series of discussions was organized to begin charting UPOU’s direction amidst the disruptions in the educational landscape. With the shift of most higher education institutions to remote teaching and learning (RTL), the UPOU needs to lead in the conceptualization of the so-called UoF.

In 2020 and 2021, the University conducted stakeholder-wide roundtable discussions (RTDs) in an attempt to articulate what a UoF looks like in an open university. This opportune event happened amidst the COVID 19 pandemic, wherein most higher education institutions (HEIs) shifted from traditional to RTL. The RTDs were strategically subdivided into five sessions, taking into account the University’s core functions and values.

The first session tackled quality and quality assurance (QA) in the UoF. As the premier university in the UP system, the University ensures the provision of quality education, which is a commitment that is both reflected and

instigated in the quality policy. In addition, there is a huge emphasis on quality now more than ever as it is linked with the value systems of the university—sustainability, equity, and access, among others.

The succeeding three sessions were co-organized by the University's three Faculties of Study. Each session was themed based on their academic discipline. Individual faculty members from the Faculty of Information and Communication Studies (FICS) positioned information and communication technologies (ICTs) as the focal point/underlying concept of UoF, laid out the interconnection of ICTs in various disciplines such as arts and humanities, and concluded that universities need to adopt and adapt in order for them to survive the uncertainties of UoF. The Faculty of Management and Development Studies (FMDS) presented their journey toward developing the Doctor of Sustainability program and highlighted the importance of sustainability in discussing UoF. The Faculty of Education (FEEd) deliberated on the factors and changes in the educational landscape with respect to the tri-functions of the university—instruction, research and extension, and public service.

Another notable effort to guide universities towards UoF is the Forum on the Philippine Higher Education of the Future. Jointly organized by the UPOU and the Commission on Higher Education (CHED), the forum “attempted to provide a blueprint for a more sustainable and future-ready education system in the country” through meaningful discussions on internationalization and sustainable higher education among academics and practitioners of different HEIs in the Philippines and Asia. Simultaneously, the institution has sought the thoughts, concepts, and ideas of other stakeholders, inviting them to re-imagine the future posed through the activity called the “UoF Challenge,” disseminated through the UPOU's social media pages.

In documenting its UoF journey, the UPOU developed its own page of UoF resources targeted toward sharing its own articulation of UoF as well as continuing conversations about how the university can shape the direction of the future of universities. Additionally, UPOU, as a research university has contributed and continues to add to the pool of perspectives on the future of education elicited through research initiatives. Two interconnected research studies on the UoF have been conducted by a group of UPOU researchers in an effort to provide a holistic view of what constitutes a UoF in an ODeL framework.

The UoF in Open and Distance e-Learning

ODL institutions have solidified their role in the educational landscape by how they have risen to the challenges of the past. Taking into consideration the pursuit of sustainable and quality education, open universities are advantageous as they are seen to be socially inclusive (Kanwar, 2021) and will contribute to and promote sustainable higher education through access, flexibility, and innovative capacities (Crow et al., 2006). With the flexible nature and ICT-centric approach of open universities, it is inevitable that technology-driven educational systems such as ODL institutions will be able to continue pushing the boundaries and initiate manifesting and operationalizing the transformation of future universities.

Seamless Transformation

Driven by the discourse during UPOU's RTDs on UoF, a thematic analysis of the conversations was attempted to deconstruct the reflections of the participants (Ortiguero et al., 2021). The study used the textual conversation transcripts of the event and derived the emerging themes related to the ODeL subsystems, which include (1) Course Delivery Subsystem, (2) Course Design Subsystem, (3) Student Support Subsystem, (4) Instruction Subsystem, and (5) Organization and Management Subsystem.

This is in accordance with the view that re-imagining the future requires an organizational reconfiguration. Employing concepts of systems design for educational systems, the mapped configuration shows the interplay of the ODeL subsystems and points to changes that the university must undertake to redesign itself as it transitions to a UoF. Minimal changes, which are referred to as "peripheral adjustments," are seen in the use of technology, flexible modalities, capacity building, responsive QA, and the leadership role of the university in transforming into a UoF. On the other hand, rebuilding current practices and processes to unbundle structures, enable flexible structures, and offer choices, customization, and personalization, to name a few, describes the "Radical Transformation" that UPOU needs to conquer to position itself in its envisioned UoF. A seamless UoF, as an overarching theme, serves as the guiding principle in becoming a UoF.

Notably, the study acknowledges that institutions may have varying conceptions of UoF not only because the concept of UoF is evolving, but also because institutions primarily have their inherently deep-rooted values and unique roles to fulfill.

Emerging Features

To further the understanding of and discourse on the UoF, another initiative was undertaken in UPOU, which intended to develop a general idea of how the UoF is being conceptualized by academics and other stakeholders. Through a three-round modified Delphi approach among experts, practitioners, academics, advocates, and students, the study surfaced possible features of the UoF based on perceived trends or disruptions and their impact on areas of open and distance education. Based on experts' and various stakeholders' views and a synthesis of what is being articulated in the literature, we present an integrative and research-based conceptualization of the UoF by identifying its salient features.

We venture to put in broad categories of salient features of the UoF as (1) expansive in its structure and yet flexible in terms of personalized learning; (2) able to leverage collaborative networks in its academic functional areas; and (3) able to not only keep pace with technological developments but also to develop appropriate teaching and learning technologies and advocate for their judicious use. While we make no claim as to the exhaustiveness of these categories, we feel that most characteristics often identified in the literature and other futures research could somehow be subsumed under these. Moreover, these are not to be considered mutually exclusive categories as features may be classified in more than one category. The attempt was to crystallize the emerging features toward a re-imagined configuration.

The UoF is seen to be expansive in its structure and yet flexible in terms of personalized learning

It is seen to be multi-modal in its delivery infrastructure that provides options for students to learn using various modalities and various combinations thereof, including, but not limited to, face-to-face, distance, online, or blended learning modalities. In a personalized learning environment, learners can customize learning according to their unique needs, goals, learning styles, and pace with resources within and beyond the university. The educational pathway is individualized to allow for learning ownership, self-directedness, and authentic learning. This could include recognition of prior learning and a menu-type of curricula where learners can create their own programs. Stackable credits that may originate, not just from the university, but from industry as well are also well placed in this personalized learning environment.

As it strategizes toward a reconfigured university, the UPOU has been actively exploring innovative ways to exemplify expansion and flexibility. Over the past years, the University has been involved in the development of an accreditation system for ODL, attempted to explore personalized learning through a multiple pathway initiative of one of its Faculties of Study, and most recently, the University ventured into meaningful discussions and crafting of a roadmap on micro-credentials that will be creditable toward formal and non-formal courses.

The UoF is seen to leverage collaborative networks in its academic functional areas

Collaborative networks are seen to be prominent in the UoF, reshaping the way research and innovation, curriculum design, and work placements are done. The nature of pluridisciplinarity allows for future proof degrees, skills-based programs responsive to industry needs, and engaging with industry-affiliated instructors stimulated by the blurring of industry boundaries with higher education. Such collaboration could enrich curricula by providing an avenue for students to engage in internships, mentoring, and collaborative projects. Shifting and dynamic collaborative arrangements among HEIs and other non-traditional educational entities, driven by affordances of open and distance education, are seen to characterize the UoF.

The blurring of geographic boundaries due to today's networked society allows for greater collaboration among HEIs and other institutions. With a vision toward a relevant and more connected academic institution, the UPOU strives to seek and forge areas of collaboration through an organized system under its Linkages Unit. While initial partnerships are directed at strengthening faculty, student, and material exchange, research and creative projects, it is actively leading in the creation of consortia as it builds viable and sustainable ODeL communities. Such collaborative arrangements necessitate new university formats (Canals et al., 2019).

The UoF is seen to not only keep pace with technological developments but also to develop appropriate learning technologies and advocate for their judicious use

Open and distance education has always relied on the affordance of technology. This has been the core feature of every open and distance educational institution in its operation and capacity-building primarily in its

teaching and learning functions. In the current century, universities must continue to be prime movers of new models and strategies in teaching and learning. The institution, including its faculty and staff, is expected to keep abreast of technological advancement in view of unbundling the functions and arriving at innovative functions and strategies.

Two of the most used emerging technologies to date are AI and Augmented and Virtual Reality (AR/VR). The former's prime example is ChatGPT. In the education sector, the use and/or application of AI is termed as artificial intelligence in education (AIED). There are many issues surrounding AIED, which mainly revolve around dehumanization (Felix, 2020) and privacy (Berendt et al., 2020; Renz & Vladova, 2021). The first emphasizes the importance of value and the irreplaceable role of teachers while the latter points to ethics and morality. Such issues and concerns may be due to "lack of theoretical underpinning on the implementation of AI techniques, especially to the educational process" as pointed out by Ouyang & Jiao (2021).

With its direct and wide implications for teaching, learning and instructional design, the use of AR/VR impels the UoF to explore the applicability of these technologies. HEIs, especially open universities, in the global landscape have integrated and pursued AR/VR technologies through innovations such as virtual campus tours, virtual laboratories, simulations, and design visualization, among others. While still in their exploratory phase, advanced studies on AR/VR technologies include the comparison and appropriateness of AR/VR and its impact on course learning outcomes (Hwang et al., 2019). Such new technologies can be tapped to enhance adaptive and personalized learning in the future.

As the UPOU strategically positions itself in the future, it invests in maximizing the use of AI in the educational process. Notably, there are efforts being implemented, including the use of learning analytics, chatbot, gamification, and research. In AR/VR technologies, there have been ongoing collaborations through research projects with educational training centers and other universities. Lead university researchers are enthusiastic about the virtual campus tours, use of cyberspaces for websites, and conference platforms. The institution of the Center for Open and Digital Teaching and Learning (CODTL) serves as a testament that the University has made efforts to respond to emerging trends in open and digital teaching and learning in the educational process of ODeL and promote their judicious use.

Imagining the UoF: A Possible Configuration

Any reasonable conversation about the future needs some level of common understanding as to the term “future.” Is it a time-based concept answering to the question of “when?” or is it a state of affairs that is yet to be realized? Always tentative and conjectural, the UoF concept, being no exception, can only be dealt with in terms of postulations based on predictive parameters or in terms of possibilities based on visioning. Nørgård (2022), citing Voros’ (2017) “futures cone“, argues that preferable futures are the ideal futures that “ought to happen” or that “we desire to happen”. In this regard, the value system of any university has to be considered as we imagine the UoF. Rather than deal with the concept of the UoF as something definitive, we propose to think of it as imagining or re-imagining the UoF which should include sustainability in the educational context and in the way HEIs operate in the future.

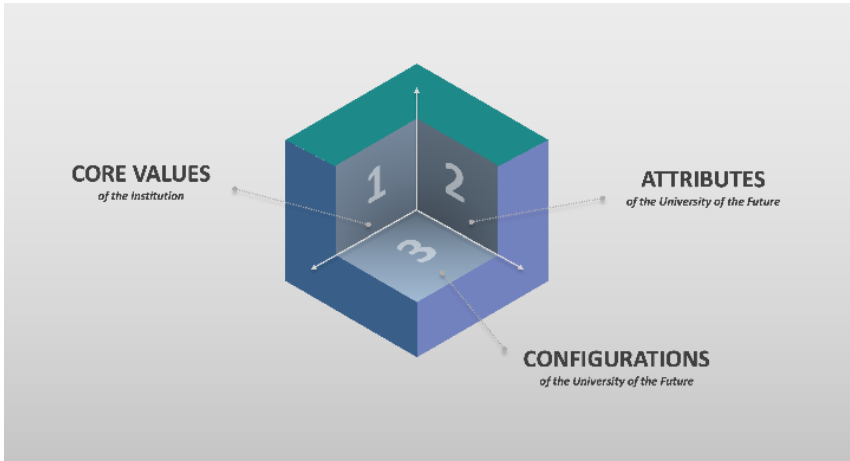
Given what we know of the possible attributes of UoF, how do we operationalize these concepts for the future? Strategic planning tools such as design thinking, futures thinking, and road mapping are available to us.

The design-thinking process starts with understanding and clearly defining the problem. It is then followed with processing the collected information and data to arrive at insights and develop assumptions. These are brainstormed to generate ideas. The ideas and assumptions are subjected to experimentation, producing several prototypes. These prototypes are tested for feedback. The process ends with identifying the next steps in refining the ideas for improvement (Foster, 2019). Adapted to imagining the UoF, designing-thinking is considered as a first step toward visioning a preferable future scenario (Markussen & Knutz, 2013, as cited by Nørgård, 2022) and is widely used in education in terms of curriculum, spaces, processes and tools, and systems (IDEO, 2012).

Toward imagining speculative futures, a value-oriented scenario needs to be established or collectively agreed upon as an initial step (Markussen & Knutz, 2013, as cited by Nørgård, 2022). Below, we present a way of conceptualizing the UoF as we imagine preferable futures or possible configurations of UoFs (Figure 1).

Figure 1

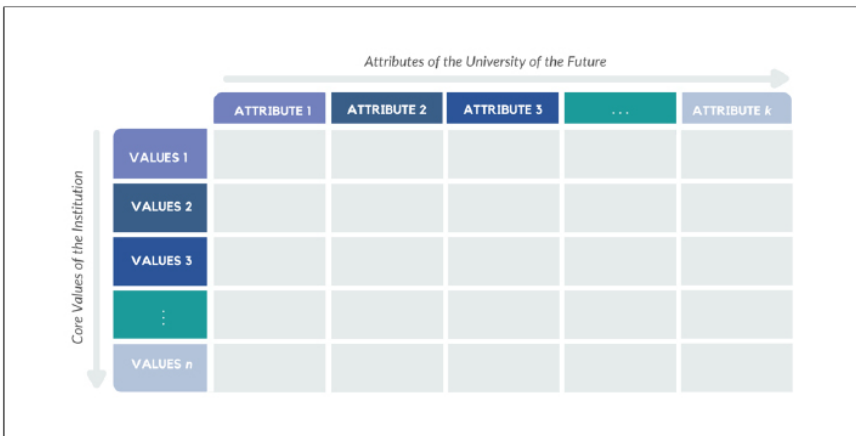
A Proposed Conceptualization of the UoF



In Figure 2, a university can use an organizing framework to evaluate certain UoF attributes vis-a-vis the core values it holds. For instance, for a given UoF attribute (e.g., flexibility, sustainability, etc.) the stakeholders can reflect on how it will affect the various organization core values (e.g., excellence, integrity, etc.) which may change over time given the constantly changing landscape of the world we live in.

Figure 2

A Proposed Organizing Framework for Strategic Planning toward a UoF



References

- Bandalaria, M. (2019). *Unpacking the university of the future*. University of the Philippines Open University. <https://www.upou.edu.ph/uncategorized/unpacking-the-university-of-the-future/>
- Berendt, B., Littlejohn, A., & Blakemore, M. (2020). AI in education: Learner choice and fundamental rights. *Learning, Media and Technology*, 45(3-4), 312–324. <https://doi.org/10.1080/17439884.2020.1786399>
- Canals, A., Burkle B., & Nørgård, R.T. (2019). Universities of the future: Several perspectives on the future of higher education. *International Journal of Educational Technology in Higher Education* 15(46). <https://educationaltechnologyjournal.springeropen.com/universitiesofthefuture>
- Crow, M. M., Hrabowski III, F. A., Sharpe, S., & Armstrong, L. (2006). The university of the future. *Issues in Science and Technology*, 22(2), 5-9. <https://www.jstor.org/stable/43314294>
- Felix, C. V. (2020). The role of the teacher and AI in education. In E. Sengupta, P. Blessinger, & M. S. Makhanya (eds.), *International Perspectives on the Role of Technology in Humanizing Higher Education* (pp. 33–48). Innovations in Higher Education Teaching and Learning (Vol. 33). Emerald Publishing Limited. <https://doi.org/10.1108/S2055-364120200000033003>
- Foster, M.K. (2019). Design thinking: A creative approach to problem solving. *Management Teaching Review*, 6(2), 1-18. <https://doi.org/10.1177/237929811987146>
- Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 1, 100001.
- IDEO. (2012). *Design thinking for educators toolkit*. UK College of Education. <https://education.uky.edu/nxgla/wp-content/uploads/sites/33/2016/11/Design-Thinking-for-Educators.pdf>
- International Commission on the Futures of Education. (2021). *Reimagining our futures together: A new social contract for education*. [Report]. UNESCO. <https://doi.org/10.54675/ASRB4722>
- Kanwar, A. (2021). *Sustainable higher education* [Video file]. In A Forum on Philippine Higher Education of the Future. UPOU Networks. <https://networks.upou.edu.ph/34787/a-forum-on-philippine-higher-education-of-the-future/>

- Levine, A., & Pelt, S.V. (2021). *The future of higher ed is occurring at the margins*. Inside Higher Education. <https://www.insidehighered.com/views/2021/10/04/higher-education-should-prepare-five-new-realities-opinion>
- Lumanta, M.F. (Ed.). (2015). *Through their voices...through the years: Thought papers of UPOU chancellors*. University of the Philippines Open University. <https://networks.upou.edu.ph/wp-content/uploads/2021/08/Through-their-Voices...-Through-the-Years.pdf>
- Nørgård, R.T. (2022). What comes after the ruin?: Designing for the arrival of preferable futures for the university. In Bengtson, S.S.E. & Gildersleeve, R.E. (Eds.), *Transformation of the university: Hopeful futures for higher education* (pp. 156-174). Routledge.
- Ortiguero, I. R. G., Lapitan, A. J. S., Manrilla, S. E. P., Hemedes, C. G., & Lumanta, M. F. (2021). A thematic analysis of UPOU's virtual roundtable discussions (VRTDs) on the university of the future. *International Journal on Open and Distance E-Learning*, 7(2). <https://ijodel.upou.edu.ph/index.php/ijodel/article/view/17>
- Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence*, 2, 100020. <https://doi.org/10.1016/j.caeai.2021.100020>
- Renz, A., & Vladova, G. G. (2021). Reinvigorating the discourse on human-centered artificial intelligence in educational technologies. *Technology Innovation Management Review*, 11(5), 5–16. <http://doi.org/10.22215/timreview/1438>
- Republic Act 10650 Open and Distance Learning Act, 16th Congress of the Philippines (2014, December 09).
- Suchodolski, B. (1974). The future of higher education. *Higher Education*, 3(3), 331-339. <https://www.jstor.org/stable/3445871>
- University of the Philippines Open University [UPOU]. (2021). *UPOU successfully celebrates its 25th anniversary*. <https://www.upou.edu.ph/news/upou-successfully-celebrates-its-25th-anniversary/>

The Disciplinary Dimension of the University of the Future

Alexander G. Flor

ABSTRACT

In its articulation of the University of the Future (UoF), this chapter attempts three things. First, it reframes how the word “future” is used in this sense and proceeds with enumerating relevant attributes associated with the ideals of universitas. Second, it predicts that Universities of the Future will progressively accommodate pluridisciplines, transdisciplines, or pandisciplines of which the information and communication sciences may be considered as one. Third, it narrates a pathway for the information and communication sciences as a pandiscipline championed by a UoF. All three are presented from the perspective of the University of the Philippines Open University (UPOU) Faculty of Information and Communication Studies (FICS) whose function is to wrap its collective mind around this area of study and unpack it as an academic discipline. Needless to say, this chapter speaks only for the Faculty with a capital F and not necessarily for the individual faculty member, some of whom will be doing their own articulation in succeeding chapters.



Reframing the UoF

The following is a perfunctory reframing of the University of the Future (UoF), not a rigorous expanded deconstruction but an attempt at that. It begins with so-called first principles or fundamental assumptions about the concept of futures and the universitas ideal.

The Temporal Perspective

If we define the UoF from a temporal perspective, what future is being referred to?

Employing first principles not attributable to any particular author or scholar, we may begin with the assumption that whatever we find in the present—including we and the institutions that we belong in—are in a state of flux. Like everything else, we are ever changing and evolving. Given the systaltic nature of evolution, we may experience ups and downs, but, in a general sense, we evolve toward better and better states until we reach an ideal state, a point which we may call perfection, for lack of a better term.

Evolution is a function of time. All things, universities included, evolve as time progresses. We encounter ebbs and flows, progressions and retrogressions. We make mistakes, learn from them, confront changes in our environments and adjust to these changes, and improve in the process. We evolve into better, fitter, and greater things, moving toward an ideal.

Hence, the future is a time where we are in a better state closer to the ideal than we are now. Given this perspective of evolution toward perfection, the future can be at any point in time, ahead of us, where the university is transformed into an improved state of being. We define this state by revisiting the ideals of a university.

Universitas

The first principle or principia primum of the Latin word, universitas, is universalism. The ideology of universalism represents all-encompassing inclusion, i.e., the acceptance, deference, or reverence for the indivisible whole or the entirety of creation. The terms universalism and university share the same root word, universe. Recently, the three Faculties of University of the Philippines Open University (UPOU) engaged in a discussion moderated

by the chancellor herself, identifying universalism as an ideology for open universities. There are interrelated attributes associated with universalism or *universitas*. These are transcendence, agility, openness, and disciplinarity.

Transcendence

The dictionary meaning of transcendence is to rise above or go beyond the limits, to triumph over restrictive aspects, to overcome or to be prior to, beyond and above the normal. Overcoming the limitations of time and space, for instance, may be an application of the term transcendence. Its synonyms are perfection, wholeness, and superiority. An example that we can relate to as part of a community of scholars is transcending or going above and beyond what is obvious, observable, or “empirical” when theorizing.

Agility

Another associated quality is agility, the ability to reposition oneself effectively or the natural fitness of an entity to adjust and adapt. Some refer to this as malleability, assuming forms or shapes that are dictated by one’s environment. In other words, the “center will hold” despite shifts in related components or the environment.

A universal person is agile. He/she accommodates diverse ideological persuasion or any survivable natural environment provided him/her. Similarly, a university should be agile enough to function even under extreme conditions of pandemics or catastrophes.

Openness

The attribute that UPOU is most associated with is openness. Decades ago, we were open enough to migrate to an online delivery system. Yet, we are aware, as a matter of fact, that online learning is not the thing that defines us or what we stand for. We are an open university not only because we are into e-learning or that our delivery system is different from those of brick-and-mortar institutions. We are also an open university because we accommodate diverse pedagogies, not limiting ourselves to the instructional model of education where the instructor is the “sage on the stage.” We can do face-to-face instruction, synchronous sessions, blended learning or flipped classrooms. We may consider a diverse array of pedagogies and are not constrained to only one.

We are an open university because of our curricula. Our program offerings are quite distinct. The Bachelor of Arts in Multimedia Studies that we offer is quite different from the multimedia arts program at De La Salle University. There is a wide difference from the Doctor of Communication program that we offer compared with the PhD in Development Communication offered in UP Los Baños or the PhD in Mass Communication offered in UP Diliman. The same is true with our Master of Information Systems, comparing it with the Master of Information Technology offered elsewhere. Additionally, we are actively working toward openness in assessment, experimenting on forms such as authentic assessment, industry-led assessment, and third-party assessment.

Disciplinarity

Related to transcendence, agility, and openness is disciplinarity. In the past three decades, our disciplinary thrusts have progressed from undisciplinarity to pluridisciplinarity, from multidisciplinarity to interdisciplinarity, and finally to transdisciplinarity, which characterize many of the program offerings of the UPOU. One notch higher than transdisciplines are pandisciplines, which we daresay will be the main offering of the UoF of which sustainability science and the information and communication sciences are prime examples.

The Information and Communication Pandiscipline

The information and communication sciences is a pan discipline. It touches upon almost every field of study in the disciplinary horizon.

Physics. Theoretical physicists such as Bohm (1980) and, more recently, Greene (2004) have long maintained the essential nature of information in the entire scheme of things. The American physicist, John Archibald Wheeler, credited for coining the term blackhole, submitted that reality is made up of information with his “It-from-bit” doctrine. Wheeler (1989) states, “All things physical are information-theoretic in origin” (p. 311).

Mathematics. Mathematicians such as Norbert Wiener and Claude Shannon likewise implied that information is fundamental to all things. Referring to information as negentropy or negative entropy, Wiener (1948) argued that information negates entropy, the innate tendency for chaos in the universe. In the same year, Shannon (1949), introduced the term bit (binary digit) as a measure of information equivalent to “one negative uncertainty,” the

main function of which is contributory to the development of systems or the progress to goal-seeking mechanisms.

Economics. Economists such as Machlup (1962) and Porat (1978) submit that we are now in the Information Age characterized by the predominance of information societies. An information society is characterized as one possessing an information economy, i.e., information-based transactions account for the bulk of its gross domestic product and/or the majority of its labor force is made up of information workers. A derivative of the information economy emerged in the so-called gig economy (Wong, 2020) where tenure, job stability, and employment benefits figured less prominently among a growing majority of information workers compared to independence, pay scale, and flexibility. Recently, the gig economy has morphed into a work-from-home economy (Bloom, 2020) or hybrid economy enabled by information and communication technology.

Biological Sciences. Among the disciplines touched by information and communication, the most significant to my mind is biology.

Recently, Harvard geneticist, David Sinclair, a leading authority in anti-aging research, declares in his Information Theory of Aging that growing old is caused by epigenetic “noise” resulting in the loss of fidelity in the transmission of genetic code to succeeding generations of cells. Epigenetic noise is again a function of entropy (Sinclair, 2020).

At the height of the pandemic, one of the most overused and abused phrases was social distancing. Few are aware that this phrase did not come from epidemiology or from public health but from the communication sciences, particularly the subdiscipline of proxemics, i.e., communicating through space (Hall, 1959).

Lastly, we cite autopoiesis, the process of self-creation, self-production, and self-maintenance within and among living systems. The process is driven by cognition (Maturana & Varela, 1987) involving both information as an entity and as a process, i.e., communication. Adopting this as its theoretical scaffolding, the UPOU Faculty of Information and Communication Studies (FICS)’ stated core function is to study, explore, and analyze how information and communication supports living systems at all levels and hierarchies, i.e., life itself. Autopoiesis is consistent with information science, human-machine interface, cybernetics, systems theory, environmental communication,

knowledge management, and networked communities—areas of study which have preoccupied the Faculty for the past decade. It also supports previous articulations on our fundamental assumptions:

Living systems are open self-organizing life forms that interact with their environment. These systems are maintained by flows of information, energy and matter.

Living systems exist at different levels, from the simple to the complex (unicellular organisms to the most highly evolved), from the biological to the social, from the singular to the composite.

Autopoiesis is the cognition-driven process of self-creation, self-organization, and self-maintenance among living systems.

Cognition within living systems is achieved through communication: the reception, processing, and transmission of internally emerging and externally sourced information. Communication is a critical function among living systems and its substance is information.

Information and communication studies are inextricably linked.

A Pandisciplinary Manifesto

Recent events have prompted the UPOU FICS to issue a Pandisciplinary Manifesto. These events are presented here as both context and impetus for a declaration of a UoF's oblation principalis.

The Technological Context

On 23 October 2019, “Springer Nature” published an article that signaled the realization of quantum supremacy, a point achieved when proof is provided that quantum computers can execute tasks that classical computers cannot. The article claimed that Google’s quantum computer running on a Sycamore processor would take 200 seconds to perform a computation that “a state-of-the-art classical supercomputer would take approximately 10,000 years” to execute (Arute et al., 2019, p. 505).

Reference was made to International Business Machines’ (IBM) Summit supercomputer, which operates at 200 petaFLOPS. For the “uninitiated”

among us, FLOPS stands for floating point operations per second. A peta is equivalent to one quadrillion (10^{15}). In other words, the Summit can perform 200 quadrillion floating-point operations in one second. IBM's Summit occupies an area as large as a football field. Google's Sycamore quantum computer, on the other hand, is roughly the size of a two-door refrigerator. However, the proof presented in the article submits that the Sycamore's execution speed is 1.5768 billion times faster than that of the Summit.

The processing power required to emulate the human brain's entire neural network is estimated by Sandberg and Bostrom (2008) at 1000 petaFLOPS. The Summit is five times slower than this but the Sycamore is 315.36 million times more powerful.

In their paper, Arute et al. (2019) were able to present comparative computational proof of quantum supremacy. At best, it may be described as an "experimental" realization due to the physical and temporal challenges of presenting irrefutable empirical proof. Nevertheless, they have demonstrated quantum supremacy's mathematical certainty. This begs the question, what are the technological implications of quantum supremacy to information science and communication science? More importantly, what would be its social consequences from the perspective of information and communication studies?

The Social Context

Nine months before the quantum supremacy paper was published by "Springer Nature," Netflix released a documentary on the dark side of social media titled, "The Great Hack." The documentary revealed how the results of the 2016 US presidential elections were influenced by Cambridge Analytica based on the investigative reporting of *The Guardian's* Carole Cadwalladr. The expose resulted in the discrediting and dissolution of Cambridge Analytica. The Great Hack systematically unwrapped and unpacked a series of disingenuous interventions and manipulations mainly based on applying ingenious algorithms on Facebook users' data. Former Chief Operating Officer Julian Wheatland downplayed Cambridge Analytica's culpability by blaming social media, "This technology is going on unabated and will continue to do so even when Cambridge Analytica is gone...Because it is moving so fast, and people do not really understand it... There is always going to be a Cambridge Analytica" (Novijam & Amer, 2018, 01:18:27).

Wheatland was not the only personality in the documentary who felt that social media technology was to blame. Republican strategist Steve Schmidt was quoted as saying, “What Facebook does is to obliterate the ability to tell the lie from the truth, where what is real, what is false is not discernable, and not knowable. And the consequences of that...are frightening” (Schmidt, 2019, The Election of Donald Trump section).

The Manifesto

What are the repercussions of these observations on the information and communication sciences? What about the pathologies associated with information and communication such as: digital overload, distraction, dementia; intrinsic bias of machine learning; black, grey and white hat hackers; digital disinformation and diversion; the commodification of the user; and the weaponization of information and communication? How will a UoF address these issues?

The following manifesto on information and communication was drafted for this purpose. It reads:

We believe...

In the essential nature of information and communication and the significant role these play in our evolution as a species and in the entire scheme of things.

That information and communication lead to cognition within living systems and thus creates, sustains and generates life.

That information determines our realities and that communication is a critical function among all living systems at all levels.

That there is more to information and communication literacy than the ability to utilize them, that literacy extends to understanding how these shape our past, present, and future, in other words, our very existence.

That information and communication bring power to the user and that this power should be used responsibly and conscientiously.

In the moral, ethical, and productive use and application of information and communication strategies, techniques, and technologies.

We declare...

That understanding and explaining the essential nature of information

and communication and their implications on our economic, social, and cultural lives are significant academic pursuits and personal endeavors.

That this knowledge should be scientifically pursued, rigorously and periodically validated, and appropriately shared.

We affirm...

That this Faculty will serve as a platform for generating this knowledge through research, promoting it through instruction and applying it through policy formulation and program planning.

That this Faculty will design and develop appropriate technologies, solutions, and applications guided by this knowledge.

The Pandisciplinary Manifesto for Information and Communication was first delivered during the Off the Lip 2020 (OTLip20) Conference organized by CogNovo and the University of Plymouth on 24 January 2020 (Flor, 2020). A month and a half later, the World Health Organization declared COVID 19 a pandemic with documented cases in 110 countries and territories all over the world (Time, 2020). Following Bateson's (1972) concept of living systems as possessing self-generating, self-organizing, self-sustaining, and self-renewing properties, the Severe acute respiratory syndrome coronavirus 2 (SARS CoV2) cannot be considered a living thing. Technically speaking, it is ribonucleic acid (RNA) encapsulated in a protein and lipid shell. RNA is a genetic code carrier, in other words, an information medium. Once this information is physically transmitted to a cell, then it wreaks havoc to its host cells and the organism to which it is part and parcel of. Consider how information contained in a compound wrapped in protein and fat has and is still causing so much misery, pain and, most importantly, uncertainty, the very thing that information is supposed to remedy.

References

- Arute, F., Arya, K., Babbush, R., Bacon, D., Bardin, J., Barends, R., Biswas, R., Boixo, S., Brandao, F., Buell, D., Burkett, B., Chen, Y., Chen, Z., Chiaro, B., Collins, R., Courtney, W., Dunsworth, A., Farhi, E., Foxen, B., & Martinis, J. (2019). Quantum supremacy using a programmable superconducting processor. *Nature*, 574, 505–510. <https://doi.org/10.1038/s41586-019-1666-5>
- Bateson, G. (1972). *Steps to an ecology of mind: Collected essays in anthropology, psychiatry, evolution, and epistemology*. University of

Chicago Press.

- Bloom, N. (2020). *How working from home works out* [Policy Brief]. Stanford Institute for Economic Policy Research. <https://siepr.stanford.edu/research/publications/how-working-home-works-out>
- Bohm, D. (1980). *Wholeness and the implicate order*. Routledge.
- Ducharme, J. (2020, March 11). World Health Organization declares COVID-19 a 'pandemic.' Here's what that means. *Time Magazine*. <https://time.com/5791661/who-coronavirus-pandemic-declaration/>
- Flor, A. (2020). ODeL and the 2020 FICS Manifesto [Editorial]. *International Journal on Open and Distance eLearning*, 6(2), iii-v. <https://ijodel.com/wp-content/uploads/2021/08/IJODEL-Vol-6-No-2.pdf>
- Greene, D. (2004). *The fabric of the cosmos: space, time and the texture of reality*. Knopf.
- Hall, E. (1959). *The silent language*. Anchor Books.
- Machlup, F. (1962). *The production and distribution of knowledge in the United States*. Princeton University Press.
- Maturana, H. R., & Varela, F. J. (1987). *The tree of knowledge: The biological roots of human understanding*. New Science Library/Shambhala Publications.
- Noujaim, J. (Producer, Director) & Amer, K. (Producer, Director). (2019). *The Great Hack* [Documentary Film]. Netflix, The Others, and Noujaim Films.
- Porat, M. (1978). Global implications of the information society. *Journal of Communication*, 28(1), 70-80.
- Sandberg, A., & Bostrom, N. (2008). *Whole brain emulation: A roadmap* (Technical Report #2008-3). Future of Humanity Institute, Oxford University. www.fhi.ox.ac.uk/reports/2008-3.pdf
- Shannon, C. (1949). *A mathematical theory of communication*. Bell System Technical Journal. American Telephone and Telegraph Company.
- Sinclair, D.A. (2020). *Lifespan: Why we age and why we don't have to*. Atria Books.
- The Great Hack (2019). Netflix Documentary. <https://bit.ly/3vs4ms2>
- Wheeler, J.A. (1989). *Information, physics, quantum: The search for links*. In Proceedings of the 3rd International Symposium on Foundations of Quantum Mechanics in the Light of New Technology. Central Research Laboratory.
- Wiener, N. (1948). *Cybernetics*. Massachusetts Institute of Technology Press.
- Wong, M. (2020). *Stanford research provides a snapshot of a new working-*

from-home economy. <https://news.stanford.edu/2020/06/29/snapshot-new-working-home-economy/>

Morphing of the Educational Landscape: Implications on the Instructional Function of the University in the Future

Ricardo T. Bagarinao

ABSTRACT

Education as a landscape can be framed as a dynamic system—i.e., it can morph in response to either an internal or external stimulus or to both. We have seen how the educational landscape changes through time with the rapidly changing information and communication technologies, shifting of global workforce demand, regionalizing and globalizing of market shifts, intensifying impacts of climate change, and the pandemic. These global phenomena are expected to influence the structure and function of the university in the future. Artificial intelligence, chatbots, and interactive multimedia materials are expected to dominate the teaching-learning processes in the future, while robotization of the industry and networked economy will create new competencies and curricula. In addition, the intensifying impacts of climate change and the pandemic may revolutionize the way the curriculum will be delivered as well as how learning will be assessed. This chapter will elucidate how these phenomena could drive the morphing of the instructional function of a university in the future.



Educational Landscape as a Dynamic System

The educational landscape can be framed as a dynamic system that changes in response to the powers or forces acting on it either internally or externally (van Geert, 2019). As a system, the landscape forms important structures and interconnections inside and outside itself. On the other hand, as a dynamic system, it can be characterized as: (a) constantly changing, (b) tightly coupled with all the forces or other systems acting on it, (c) influenced by nonlinear interactions, (d) governed by feedback, and (e) adaptive (Groff, 2013). Though the dynamism is inherent to the system, it can be driven by social, economic, cultural, technological, political, and environmental forces that every educational system has to reckon with (de Guzman, 2003). As de Guzman (2003) had indicated, any academic institutions that failed to respond to such forces may enter entropy or atrophy. For instance, Turnbull et al. (2021) had emphasized that transitioning to the online learning modality is the only option to avoid a wholesale closure of several academic institutions during the recent global pandemic. In fact, Bryson and Andres (2020) indicated that these institutions should have to rapidly adapt to the new learning environment since the traditional face-to-face modality is significantly more challenging.

But the global educational landscape is not only faced with the pandemic. Several disruptions, such as climate change and disasters and factors such as globalization and regionalization, as well as changing market forces, can also drive its transformation. Conteh (2015) reported that disasters are important drivers of educational change in South Africa. Major decisions were made to address the impacts of flooding, which is the most frequent disaster in the region that is difficult to predict. Flooding has seriously affected the education of children, and unless timely actions are taken by communities, governments, and even international organizations, children's primary education will continuously be disrupted (Conteh, 2015). Rigby (2015) also reported that the school curriculum in Cambodia must be revised so that disaster risk reduction and management (DRRM) can be integrated. Disaster risk education and resilience have been mainstreamed in schools to better prepare the students to the exacerbating impacts of disasters in the country. According to Rigby (2015), flooding in Cambodia had significantly affected the livelihoods and safety of the families as well as the education of the school children. In Indonesia, aside from revising the curriculum, education administrators had performed several structural changes, including creating and providing safer desks and chairs, using disaster-prepared classroom

doors, developing landslide-retaining embankments and other disaster-prepared facilities in schools (Rigby, 2015).

In addition, regardless of how regionalization and/or globalization is interpreted, its effect is felt virtually in every aspect of our lives today. Hence, it is imperative that schools or universities cope with and adapt to the wide-ranging changes that will inevitably be forced upon them (Litz, 2011). Academic leaders must recognize that globalization can take on many forms and thus, must use several dimensions with which to frame education in the coming years. Naidoo (2006) had added into such a scenario the impacts of industrialization, especially on higher education. She indicated that industrialization could virtually cause a rapid evolution of all higher education institutions that will try to respond to the future trends in many industries worldwide. These trends were expected to create an exponential shift in the economic growth and transform the nature of the modern-day workplace (Binkley et al., 2012). Marr (2022) argued that education must evolve in line with the shift to equip its graduates with the in-demand skills of the future such as communication, complex problem solving, and innovation necessary in responding to the new and changing circumstances in the labor market. With the rapid technological advances, Kivunja (2015) recommended that educational and curricular reforms must be done at a faster pace to create a modern workforce who are adaptable to the new working environments. Education should be able to equip employees with the learning and innovation skills necessary in the digital economy.

Thus, it is expected that the educational landscape will have a significant transformation in the future. Consequently, this transformation will affect the instructional component of the University of the Future (UoF). As the University of the Philippines Open University (UPOU) positions itself as the UoF, it means that it has to revisit its educational goals, taking into consideration these factors and how they can be integrated into its educational landscape.

The chapter aims to elucidate how these forces can drive the transformation of the educational landscape in a highly technology-driven society and intensifying climate change, which are expected to affect the instructional function of the university in the future. Three factors will be presented and discussed in this chapter: technological advances, shift in the labor market, and climate change. Implications on the instructional function of a university of these factors are likewise presented and discussed.

Educational Transformation: The Role of Advanced Technologies

In the past two decades, several institutions in higher education globally have undergone a dramatic transformation due to a myriad of factors. However, the rapid development of information and communication technologies (ICTs) in the last two decades has played a significant role in such a transformation. As Austin (2012) had indicated, these rapidly advancing ICTs had extended the reach of higher education by creating possibilities for the development of more accessible, agile, and ubiquitous learning spaces. They also support improvements on how universities develop their programs, how faculty delivers the content of their courses, and how students learn their lessons. In effect, the rapid advances in technologies have made available a plethora of new teaching-learning tools for higher education throughout the globe. Their potential for making the teaching-learning process richer, i.e., “serving as a catalyst for more critical thinking and reflection,” is enormous (Mahroeian & Daniel, 2016, p. 290).

Such influence has been exemplified by the evolving modalities practiced in the UPOU. The University has become a living testimony on how the educational landscape can be transformed with the advances in technology. Throughout its existence, UPOU’s capacity as a higher education institution has increased more easily and quickly and has become more scalable, which helps students connect to content, context, and community, thus making their learning experience more powerful and productive (Sarker et al., 2010). The University’s adoption of several internet-based and electronic tools has transformed its ways in conducting teaching-learning transactions and increased the flexibility and contextualization of its education, possibilities that are difficult to be created in the conventional educational landscape.

UPOU was established in 1995 as the fifth constituent university of the University of the Philippines (UP) system. It has been recognized as the cyber campus of UP. Since its establishment, the university has already practiced three modalities in delivering its course contents. The evolution of these delivery modes is largely influenced by the accessibility and availability of ICTs.

Between 1995 and 2000, the University’s distance education was characterized by regular face-to-face study sessions in its learning centers distributed across the nation. The internet by then was not as interactive as it is now; hence, student-to-student interactions, as well as student-tutor interactions, were done in a physical learning center. Under

this mode of delivery, the students need to travel to a learning center to be able to participate in the discussion sessions or interactions (Bagarinao & Secreto, 2019). Course content was packaged as a print-based module and was delivered either directly to the students or through a learning center.

This mode of delivery has changed when interactivity on the internet was made possible. From 2001 to 2007, the University adopted a blended form of course content delivery. The online component was done via its integrated virtual learning environment (IVLE) platform, while the face-to-face was still done in a learning center. Course packages, however, were then distributed via the existing system and the online platform. Under this mode, “students now had an option on whether they would participate in the physical study session or in the discussion forum in the online learning management system” (Bagarinao & Secreto, 2019, p. 3). Likewise, teaching and learning in this modality have become more flexible and ubiquitous. Both teachers and students, as well as tutors, can now access the learning materials anywhere at any time.

Starting in 2007, with the internet becoming highly interactive and social media having become more accommodating to content development, the University has shifted to full online learning. All interactions are now conducted via its learning management system or social media platforms, while learning materials are distributed through the virtual sites of its courses. The learning resources are likewise being diversified to include multimedia, animated, interactive, and text-based that are available on the internet. Access to lessons and discussions have become highly flexible, easy, and ubiquitous. Recently, the assessment of students’ learning has also evolved from the conventional sit-down proctored examinations to more diverse approaches, including online invigilated examinations, portfolio, and student reflections and narratives. Again, these transformations (though influenced by several factors) were largely made possible because of the presence of and ease of access to advanced technologies.

As technologies are continually and rapidly advancing in recent years, the probability of seeing a UPOU-like or an expanded UPOU-like morphing in the global educational landscape is enormous. A quick survey of the data on technology use globally can provide at least a glimpse of such possibility. For instance, Statista as cited in Johnson (2021) reported an increasing internet usage globally. According to their report, global internet use rose to 4.901 billion in 2021 from 1.1 billion in 2005, about 24% annual rate of increase within 16 years (Johnson, 2021). This surge, the author maintained, was

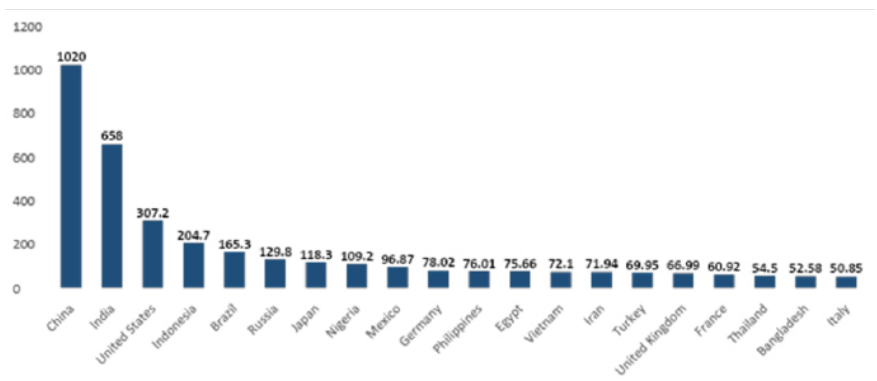
due to easier access to computers, modernization of countries around the globe, and the increased usage of smartphones. These factors have provided people the opportunity to frequently use the internet more conveniently, although Poushter (2016) had already observed a variation in the rates of access across the globe in 2016. According to him, South Korea, Australia, and Canada had showed the highest rates of access, 94%, 93%, and 90%, respectively. Rates of more than 80% were also observed in the U.S., Germany, Israel, UK, and Spain (Poushter, 2016). In the same report, some of the poorest countries, such as Burkina Faso, Pakistan, Uganda, and Ethiopia, had the lowest rates of access, 18%, 15%, 11%, and 8%, respectively.

Interestingly, age, education, and income had been observed to correlate with the overall internet access as well as in the amount of time spent online. As Poushter (2016) had indicated, individuals who are more educated, those with higher incomes, and online millennials have a higher likelihood to use more the internet in a day than their less educated, low-income, and non-online counterparts.

In terms of number of users, China and India had registered the highest users in 2022. To cite, China registered about 1,020 million internet users, while India had registered about 658 million users (Petrosyan, 2023). Figure 1 shows the number of internet users worldwide.

Figure 1

Number of Global Internet Users (in millions) as of January 2022

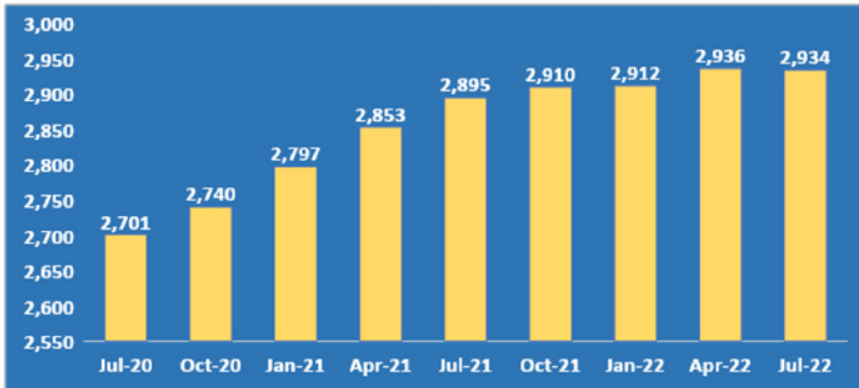


Note. Adapted from Petrosyan (2023). Source of basic data: Statista (2023).

On the other hand, social networking has been reported as the most popular online activities worldwide, where Facebook was the most popular platform based on active usage. As of the second quarter of 2022, there were more than 2.934 billion monthly active Facebook users, accounting for over half of the internet users worldwide (Kemp, 2022). Connecting with family and friends, expressing opinions, entertainment, and online shopping are among the most popular reasons for the use.

Figure 2

Quarterly Report of Monthly Active Facebook Users (in millions) for the period 2020-2022



Note. Adapted from Kemp (2022); DATAREPORTAL (2022).

Interestingly, Dixon (2022) reported that more than 50% of the users are within the 18-34 age group. In fact, they constitute the biggest demographic group on the social media platform. According to Schanzenbach et al. (2017), this age group dominates the higher education enrolment worldwide.

In the Philippines, Statista (2021) estimated that the total number of internet users will increase from 64% in 2017 to 77.1% in 2025. Although a considerable number of Filipinos still do not use the internet, 77% is already a significant number. According to the report, the total number of internet users in the Philippines as of January 2020 has increased to 73 million people, which is more than half of the total population. As Statista Research Department (2021) reported, the digital population is increasingly becoming younger. Specifically, they mostly belong to the 16 and above age group.

In terms of type of devices used in accessing the internet, mobile phones were found to be the leading device for consumers' internet access. Statista Research Department (2021) revealed that Filipinos use mobile phones not only for communication but also for access to information. It is projected that more than 71% of the population by 2025 will access the internet through their mobile phones.

These trends project an educational transformation trajectory (ETT) that lends toward internet-based and probably mobile learning platform. This is expected as academic institutions may capture the opportunities provided for by these technologies to widen their reach inside and outside their borders and to enhance teaching-learning flexibility. As Deye (2015) had indicated, the revolution of digital technologies has provided new learning opportunities that allow students to learn all the time, whether online, offline, or inside or outside the classrooms. As more academic institutions, as well as government states, appreciate and capture these opportunities, it is expected that the educational sector will gradually transition into a more technology-determined landscape. The transition may not be a problem as the present as well as incoming generations of learners are already well-immersed in this technology (Deye, 2015).

Since the schooling population has become more and more internet natives, as indicated in the Dixon (2022) report, schools and/or universities will morph by integrating technologies into their instructional processes to minimize the gap between them and their students. Technologies will become an imperative in a university's instructional landscape. For instance, Jones (2020) had indicated that artificial intelligence, chatbots, and videos would dominate in the future higher educational landscape. According to her, "artificial intelligence in education typically focuses on identifying what a student does or doesn't know, and then subsequently developing a personalized curriculum for each student" (para. 9). Shemshack and Spector (2020) noted that personalized learning is in demand, given the new technologies that involve learning analytics and big data. They argued that, given the changes in the teaching and learning environment and needs at present and in the future, the old "one-size-fits-all" approach is no longer a viable option in today's and in the future's educational processes. But developing a new approach for teaching and learning and monitoring student progress individually may be challenging to most teachers. Hence, it is here where technology can play a significant role. We have seen growth in software that could help educators quickly set up, monitor, and update

personal workbooks for each student in their class. As they had indicated, the new technologies can be the secret weapon of educators around the globe as learning would become more personalized and increasingly important. This could also morph the teachers' pre-service training and even the kind and form of public service that universities conduct to assist teachers in coping with the new approach.

In addition, the morphing of universities' instructional function under the technology-determined educational landscape will be strengthened with the increasing acceptance and appreciation of several government states on the role of ICTs in widening access to good quality education. Expectedly, more government will formulate policies that will support the use of advanced technologies in re-defining the development and implementation of university curricula. As Deye (2015) had emphasized, state legislatures will design policies to fund and support the use of technology in schools and universities. Policymakers will work together so that all students can be provided with high-quality learning options regardless of location. Governments will be funding upgrades to technology infrastructure to help schools and universities create teaching and learning spaces that engage and excite 21st century learners (Deye, 2015). As the advanced digital tools can potentially support personalized learning pathways, more academic institutions are expected to develop and offer self-paced programs where educators and learners alike can have access to teaching-learning processes at any point.

In India, for instance, Jha (2017) had reported that an online Learning Management System platform had been integrated into the web portal of several colleges and universities. This allows students to quickly register or log in so that they can easily access their course materials, attend live classes with their teachers, go through the pre-recorded lectures of their teachers at multiple times, and take their examinations. Interestingly, the government has provided computers and other gadgets to learners located in remote areas to facilitate learning. They also created data that are easily accessible by these learners. Such a move has significantly transformed India's educational system from the regionally disproportionate traditional system to a more accessible technology-driven system.

Duncan (2011) also reported that the U.S. Department of Education proposed the creation of the Advanced Research Projects Agency for Education (ARPAED) to encourage the education sector to invest in speeding

up innovations of learning technologies. ARPAED is modeled after the same agency in the U.S. Department of Defense, which facilitates the design and creation of technologies such as the internet and the global positioning system (GPS). According to the Department of Education (2011), the ARPAED will “aggressively pursue technological breakthroughs that have the potential to transform teaching and learning the way the Internet, GPS, and robotics (all areas where the Defense Advanced Research Projects Agency, or DARPA, has had a profound impact) have transformed commerce, travel, warfare and the way we live our daily lives” (p. 1). As Duncan (2011) had emphasized, the agency will offer teachers the opportunities to create learning environments where technology becomes an integral part of students’ daily learning experiences either inside or outside the classrooms. For instance, the ARPAED is envisioned to catalyze the creation of digital tutors as effective as personal tutors, following the experience of the DARPA with the Navy. Digital tutors were used to train new Navy recruits, and research studies monitoring the performance of these technologies indicate that the new recruits who used the digital tutors for only 7 weeks had dramatically outperformed their peers who were receiving traditional classroom-based instruction (Department of Education, 2011). These early results provided the impetus for developing similar technology for the education sector in the country.

Though studies on technology integration in the Philippine curriculum is still underexplored (Morales et al., 2021), there have been indications that the future of the education sector in the country is gearing toward such a direction. The promulgation of Republic Act 10650, also known as the “Open Distance Learning Act,” is a clear indication of the government’s appreciation and sensitivity to the importance of technology integration in education. The Act itself is a recognition of the state’s responsibility to expand and further democratize access to quality education. It also indicates the state’s appreciation of the role of technology in fulfilling such a responsibility and the need to adopt alternative modalities, such as open and distance learning, that can appropriately, effectively, and efficiently deliver quality higher and technical educational services to a wider spectrum of learners in the country (RA 10650, 2014). In fact, the law has recognized the technology-mediated education of the UPOU and has mandated it to be the leading institution to further the development of such a modality in the country. It is identified as the institution that should assist other higher education institutions in developing their open and distance learning programs. With this, again, the

possibility of witnessing a more UPOU-like or expanded UPOU-like morphing of instructional processes, academic programs, and educational thrusts in the country is imminent in the coming years.

Shift in Labor Market

The second factor that will possibly enhance the morphing of the educational landscape globally is the shift in the labor market. A quick survey on global employment trends indicates a change in the demand for technology-based skills as more industrial processes had shifted from traditional highly human-mediated to robot-mediated approaches. The International Federation of Robotics or IFR (2018) has reported a significant rise in the number of companies worldwide that used robots in their processes. Global average for industrial robots per 10,000 manufacturing workers had increased from 66 in 2015 to 85 in 2017 (Atkinson, 2019). Kasriel (2019) had also projected a full-scale revolution in the global workforce in the next 2 decades. She reported that the number of robots at work has reached record levels at present.

Though robotization would intensify in the next decades, it would not necessarily mean reduction in employment. In fact, Kasriel (2019) reported that, though the number of robots at work has reached record levels at present, there has been a decrease in global unemployment by 5.2%, which is the lowest level in 38 years. She highlighted the following as the reasons for such trend:

1. AI and robotics will ultimately create more work, not less, much like today.
2. There would not be a shortage of jobs but—if we do not take the right steps—a shortage of skilled talent to fill those jobs.
3. As remote work becomes the norm, cities will enter the talent wars of the future. Untethering work from place is going to give people new geographic freedom to live where they want, and cities and metropolitan regions will compete to attract this new mobile labor force.
4. Most of the workforce will freelance by 2027, based on workforce growth rates found in a Freelancing in America report in 2017.
5. Technological change will keep increasing, so learning new skills will be an ongoing necessity throughout life.

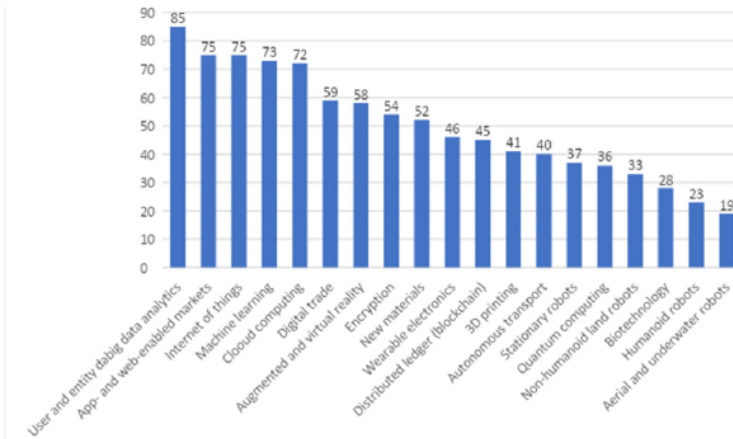
These are important trends to consider in the education sector. Schwab (2016) believed that the use of these technologies is an unavoidable wide change in the industrial sector that will affect every line of business and system production, management, and control worldwide. On the other hand, Frezzo (2017) considered these trends to play a central role in nearly all aspects of society. As more and more companies adopted this new way of doing things, new knowledge, skills, and/or competencies will be required in the workforce. This implies that university education should morph to keep up with these industry demands to have a seamless cohesion between the learner's student life and work life. Lister (2017) even emphasized that such morphing should also include basic education to produce the same impact, i.e., the seamless cohesion between the child's education and their adult life. Education should be able to prepare graduates for future life and work given that production systems under this highly technology-mediated approach would now consist of cyber-physical systems that make decisions and monitor the physical processes of factories (Bolat & Bas 2018). With this, Kasriel (2019) suggested to make it imperative for people operating constantly evolving machines to learn quickly new skills given the speed of technological changes. There is therefore a need to establish an educational system that promotes lifelong learning and the "rewiring of the system should begin with pre-kindergarten, which should be free and compulsory, while education should remain similarly accessible throughout someone's working life" (Kasriel, 2019, Solution #1: Rethink Education section, para. 2). Moreover, Kim and Park (2020) recommended that universities should be able to provide learning opportunities for older students as well as skills training for younger ones to ensure the production of the best and most inclusive outcomes and positive future of work. They argued that the "rapid technological development will make skills depreciate faster than in the past, while the new technologies will generate gaps in workers' skills and call for the acquisition of proper skills and lifelong learning" (Abstract section, para. 1).

All these requirements in the workforce are expected to transform curricula, teaching-learning processes, policies, and procedures, and even assessments of learning. University education is expected to be re-focused to include the development of skills necessary to adapt to such fast-changing technologies and skills that machines are not good at yet. This includes meta-skills such as entrepreneurship, teamwork, curiosity, and adaptability (Kasriel, 2019). In effect, university education is expected to create holistic graduates who can meet the requirements of the future work

world. Azmi et al. (2018) defined “holistic” to consist of both technical and non-technical skills and good ethics and morality. As part of the re-designing of the curriculum, they suggested the inclusion of industrial training in the academic curriculum in higher education institutions.

Figure 3

Technologies, by Projected Proportion of Companies likely to Adopt them by 2022 (in percent)



Note. Adapted from Centre for the New Economy and Society (2018). Copyright 2018 by World Economic Forum

They argued that the inclusion of such training in the university curriculum can provide an opportunity for students to apply the knowledge they learned in the lecture to the real workplace in the industry. Renganathan et al. (2012) also indicated that industrial training allows students to incorporate their work-related experience and knowledge into their formal education. In this way, students would be able to gain confidence and face challenges at work and in universities as well as develop skills necessary for teamwork, working under pressure, and dealing with people from all levels of the organization that are important in their future workplace (Khalid et al. 2014). It is necessary that universities develop these skills among their students because as what Prifti et al. (2017) had emphasized, these are the skills that new industries would be demanding. They also reported that, aside from the technical skills such as those related to information technology or information system, employers expect graduates to be equipped with behavioral skills such as collaboration, negotiation, customer orientation,

networking, and communication.

In satisfying these requirements, universities are expected to re-shape their instructional approach as well as academic program learning outcomes. As these skills can be more learned in a real work life, higher education institutions will invest more on industrial training in their instruction. According to Khalid et al. (2014), such investment is necessary because industrial training does not only provide the “students with a hands-on ‘feel’ of the actual background of expertise needed by graduates under each program such as from management, business studies, human resource, information technology in all those related profession, but also contribute to developing their generic attributes, which eventually will increase the students’ job marketability” (p. 16). They considered it as an important phase in students’ academic life since it prepares them with the knowledge and skills needed for their future career.

Climate Change

The present data and future projections of the global climate change can also provide an impetus for the morphing of the educational landscape. Climate change projections indicate a worse scenario in the future if nothing significant will be done at present. The scenarios mentioned in this chapter will be those that can either directly or indirectly affect the educational process worldwide.

As the global temperature continues to rise in the coming years (University Corporation for Atmospheric Research [UCAR], 2023), climate-related disturbances are likely to intensify, creating stronger typhoons, hurricanes, floods, drought, etc. This is likely to happen as higher temperature can increase the speed of water cycle. As the UCAR (2023) has suggested, the rate of evaporation will increase significantly with rising global temperature, which is projected to increase by 4°C in the next 20–30 years. With this change in evaporation rate, more water vapor will be stored in the atmosphere, which, in turn, will lead to more precipitation. In fact, global average precipitation was projected to increase by 28% by 2050, implying a wetter future, which may lead to higher risk of flooding in some regions of the globe (UCAR, 2023). Flooding will be intensified with increasing seawater level due to the melting of snow and glaciers in the polar regions. As seawater level increases, floodwater could not easily enter the sea, thus, slowing down its subsidence. Consequently, more and more

places will be inundated.

In addition, Chung et al. (2021) projected that storms and hurricanes will continue to intensify due to the warming of the surface of the oceans. Potts (2021) reported similar projections and even added that many hurricane- or cyclone-prone countries will be “expected to experience storm systems of greater intensity over the coming century” (para. 1). These are critical projections for educational institutions. Over the years, educational institutions around the globe had experienced infrastructure damage due to severe typhoons. In the East Asia and the Pacific, for instance, climate-related disasters had severely destroyed many critical infrastructure such as school buildings, power lines, internet towers, roads, and bridges that support university education (Krishnamurthy et al., 2019). The same authors stated that the destruction of these important infrastructure can disrupt education for days to weeks to months. The condition will be acute for countries with limited alternative modalities for education during disasters. Consequently, this will lead to missed classes, lower academic performance, and delayed completion of programs. In addition, teachers and students may be injured during the events, resulting in absenteeism. In worst cases, these disturbances can cause mortalities that may have devastating effects for long-term education (Krishnamurthy et al., 2019).

On the other hand, other regions of the world may experience a rising number and duration of drought. The World Meteorological Organization (2022) had reported an increase by 29% in the number and duration of droughts since 2000, which is higher than in the last two decades. Such an increase has affected more than 2.3 billion people who are now facing water stress while more and more people are living in regions with severe water shortages (WMO, 2022). As with typhoons, these events are critical for educational institutions worldwide. According to the Operational Analysis Division of the Department of Homeland Security’s (DHS) Office of Cyber and Infrastructure Analysis of the United States of America (OCIA), “all sectors may be impacted by cross-sector dependencies and cascading impacts from the loss of water, agricultural, and energy services” (US PHS, 2015, p. 1). Obviously, universities are operating with high dependence on these infrastructure. Thus, cessation of services provided by this infrastructure can lead to interruption of the educational processes in universities. The impacts may be acute for open universities like the UPOU that is implementing a fully online learning modality where their operation depends largely on the availability of internet services and power supply. When online learning is disrupted due to

internet interruptions or power outage, teachers and students are negatively affected. Online learners will fall behind on schoolwork (Bisharyan, 2021), be marginalized especially the underprivileged (Walravens, 2020), and develop mental stress (Alam, 2020; Bao, 2020) and/or psychological anxiety (Hasan & Bao, 2020).

To address these diverse impacts of climate change, universities need to make their instruction more flexible and inclusive. This implies that certain adjustments must be made on their academic policies, instructional design, modality, assessment, and the like. While focusing on making their program deliveries more adaptive, they must also offer courses and/or programs that can help enhance society's and their own adaptive capacity to climate change. Mocatta and White (2020, para. 1) consider universities as "vital hubs of research and teaching on climate change." Thus, they are expected to take a lead in global action to limit the impacts of climate change.

How the universities dealt with the recent global pandemic has opened the way on how they will face future concerns of climate change. Gast (2022) had indicated that while the world went into lockdown, many universities throughout the globe had stepped up in their instruction and research. The pandemic has spurred new ways of teaching and learning while the idea of future-proofing education has proliferated worldwide. Rich (2014) defined future proof as the process of future anticipation and development of methods that can minimize the effects of shocks and stresses of future events. As Gast (2022) had indicated, many universities will innovate both in their facilities for instruction and curriculum to make their education modernized and climate-adaptive.

In terms of facilities, many universities will more likely adopt the creation of flexible learning spaces (FLS), either in a physical or virtual environment. The use of FLS can address the impacts of climate change on educational infrastructure and improve flexibility on the teaching-learning process. FLS accommodates a diversity of pedagogies (Oblinger, 2006), which is important to establish teaching-learning continuity amidst climate-related disasters. Such a decision has been tested during the pandemic where most, if not all, the universities around the globe adopted several approaches in delivering their education to students, although there was a prevalence of use of the online or blended learning modality. Studies (e.g., Oblinger, 2006; Highland, 2022, Kariipanon et al., 2019) had reported students' positive learning experiences under the FLS context. With the use of

various teaching-learning modalities (e.g., explicit instruction, collaboration, experiential learning, independent work, and feedback and reflection) (Ryan & Patrick, 2001), FLS can improve the odds for effective learning (Oblinger, 2006). Highland (2022) reported that FLS support students' health and well-being, while Kariippanon et al. (2019) indicated that it will ultimately lead to improvements in academic outcomes. They purported that these approaches could lead to improvements in both students' motivation and engagement. Mulcahy (2016) implied that these spaces can inherently support educators to implement learner-centered approaches in teaching.

Online learning-providing universities can adopt the use of learning management system (LMS) that have an online-offline feature to increase their education's flexibility during a disaster. O'Connor (2020) suggested using LMS with offline feature to increase accessibility of learning even if there is no internet connection or power supply. The offline feature of the LMS can provide greater productivity and a more satisfying learning experience to learners. It can also allow a better use of time where learners can fit their study around their other responsibilities without having to worry about finding a strong internet connection (O'Connor, 2020). Thus, learners can continue experiencing their media-rich courses even if power supply or internet connections are interrupted during a disaster.

In addition to the changes on how content will be delivered, there will also be a proliferation of climate change academic programs or curricula that integrates climate change-related concepts in the future educational landscape. This is partly due to the United Nations (UN)'s call for "climate education to become compulsory in schools from 2025 to better equip children to cope with global warming in the future" (Ellerbeck, 2022, para. 1) and partly due to the increasing impact of climate change on students' mental health (Hickman et al., 2021). Both factors will pressure the government to include education in their climate change agenda. To respond to the pressure, governments will require academic institutions to integrate climate change into their education. Educational institutions must then revise their curriculum to integrate climate change-related concepts or develop programs that include climate change in the curriculum. For instance, Keating et al. (2022) reported that climate change impacts had already been integrated into a nursing education curriculum. The integration involved the revision of an applied epidemiology course for Doctor of Nursing Practice to include a module on climate change impacts on population health. The module talks about the environmental impacts of climate change

on health using epidemiological data as well as actual clinical scenarios and existing literature. Duram (2021) also reported the integration of climate change-related topics into the social sciences curriculum at Southern Illinois University. The topics, which included community resilience, historical knowledge timeline, climate justice, environmental education, climate refugees, and social vulnerability were deployed using active-learning techniques. The concepts were unified by using engaging activities that specifically address relevant climate resilience themes at the individual, local, national, and international levels. In the Philippines, Coronacion (2015) reported that climate change concepts such as climate change adaptation were already integrated into the agriculture programs of some universities in the country, albeit at a lower extent. The concepts were integrated partially into the general agriculture, animal science, entomology, soil science, animal science, food science, and horticulture courses. Complete integration was observed in the agronomy and plant pathology courses (Coronacion, 2015).

On the other hand, Gagnon et al. (2022) reported a review of the engineering curricula in Canada to determine whether they consider the development of climate competencies on students. Their work contended that basic levels of four climate competencies should be integrated into the engineering curriculum. These competencies include state of carbon capture and storage, planetary health, climate adaptation, and climate change mitigation. They argued that these competencies can be adapted to many engineering disciplines—e.g., building, civil, geological, environmental, architectural and mining. The integration of climate change into the curriculum is critical as most of the contributors to climate change are coming from this sector. As Axelithioti et al. (2023) emphasized, engineering as a professional discipline permeates in all industry. Consequently, engineers play an important role in reducing climate risks as well as in developing a climate-adaptive society by changing structural and/or industrial designs. The integration of climate change-related concepts into the engineering curriculum can empower students to take the lead in transformational engineering designs that can mitigate climate change and enhance structural and societal adaptive capacity.

As indicated in the aforementioned cases, education becomes more and more action-oriented. Educational institutions will explore various types of climate change education (CCE), which may involve a range of outward-facing activities like communicating climate change (Valdez et al., 2018) to collaborative projects in the community (Birmingham & Barton, 2014) that

can deepen students' understanding of climate change through involvement in civic action.

As a response to these changes, learning assessments must also be transformed. As Bermingham and Chainey (2022) had emphasized, the assessment systems perform a key role in supporting and shaping these curricular transformations to produce a positive effect. It is necessary to transform learning assessment to empower students to act on climate change and harness the potential of education in enhancing societal adaptive capacity to the impacts of the changing climate aside from maintaining the curricular alignment within the program. It means therefore that learning assessments should be able to capture the understanding of students on the causes of this existential threat to the planet as well as their practical actions and creative solutions to these wicked problems (Birmingham & Chainey, 2022). As the curricula becomes more and more action-oriented (Howard-Jones et al., 2021), assessments must “capture the skills and capabilities which are demonstrated in action” (Birmingham & Chainey, 2022).

All these transformations clearly highlight the role of climate change in shaping education's future. It is expected that these transformations will become widespread as the call for climate change education becomes louder and stronger with the increasing intensity of the impacts of climate change on the planet, natural resources, and people. For instance, Chang and Pascua (2017) had indicated that the United Nations Framework Convention on Climate Change or UNFCCC's call to governments to prepare their citizens to the threats and opportunities of climate change will continue to draw more and more educational institutions to develop and implement climate change education. In addition, while there has been reluctance and resistance to developing or adopting CCE (Anderson, 2010; Kastrenakes, 2014), many countries, including the Philippines, will incorporate CCE in their climate change agenda (Chang & Pascua, 2017). CCE has been looked at as key to facing the future complexities of climate change. It is seen to play an important role in raising awareness of the scale of the problem and in finding the best solutions for the phenomenon (UNFCCC, 2022). Universities, performing the triad functions of teaching, research, and community engagements (McCowan, 2020), are in the best position to take the lead in climate change action. They are not only sites for the creation of knowledge but also “institutions of teaching and learning, of formation of professionals, of services provided to communities and government, and

are micro-societies and economies in their own right” (McCowan, 2020, p. 5). Though these functions have diverse and sometimes contradictory interactions with climate change, they need to be engaged if universities are going to contribute significantly to addressing climate change.

Implications for UPOU’s Education

As UPOU positioned itself as the UoF, it has to consider these factors in the development and delivery of its education. Though it might be able to integrate advances in technology into its educational landscape, the University must look into the changing market forces as well as impacts of climate change to sustain the relevance of its education in the future. The University must consider revisiting the competencies developed among its students as well as its continuity plan in case its online learning systems (e.g., LMS, automated information management systems, etc.) are affected by the impacts of climate-related disasters. It must ensure that students are imbued with necessary skills demanded by industries in the future world of work.

Moreover, the University must establish an online learning system that is resilient to climate change. This will ensure teaching and learning continuity amidst any climate-related disasters. It has to invest on technologies with online-offline features to sustain its teaching-learning process and other processes that support it or it may maximize the use of emerging technologies such as immersive technologies, artificial intelligence, holography, or a combination of these technologies to make its educational system resilient to the impacts of the changing climate.

Concluding Remarks

In an era where technologies are rapidly advancing, market demands are shifting, and climate change impacts are intensifying, the educational landscape must morph to cope with the challenges brought about by these global events. Among global education’s most urgent challenges is the transformation of its instructional component to accommodate the changing technologies, market demands, and climate. Educational leaderships must jumpstart transformation to maximize the benefits offered by the rapidly changing technologies to education, produce a workforce who are adequately equipped with the appropriate skills and competencies for a highly competitive labor market, and create climate-adaptive education and

society.

Universities with their triad function of teaching, research, and public service play a crucial role in achieving these goals. They must revisit and re-imagine their instructional function to be able to nurture individuals who are imbued with the skills that can help them succeed in a highly technologizing labor market. Their instructional transformation may play a critical role in equalizing opportunities for individuals with diverse backgrounds and in addressing diverse social needs at the community, regional, and national levels (Vegas & Winthrop, 2020).

Moreover, there is a need to create climate-adaptive teaching-learning spaces and climate-responsive curriculum. Teaching-learning spaces should enable educators and learners to continue teaching and learning, respectively, despite the occurrence of climate change. On the other hand, the curriculum should not only enable educators to teach climate change but also to generate leaders who can engage in policy transformation and civic action addressing climate change (Rhodes & Wang, 2020). Educators should be able to transfer leadership skills to learners to affect any reformation initiatives. As Rhodes and Wang (2020) had indicated, curriculum should be enhanced by a more holistic approach where climate change action is the priority. However, the development and offering of more action-oriented academic programs must be coupled with contextualized learning assessment approach to capture learners' climate change actions done in their own realities.

All these transformations can characterize what a university instruction will be in the future—i.e., highly immersed in technology, more responsive to the impacts of climate change, and strongly blended with non-traditional teaching and assessment approaches. Morphing toward this direction, education under the UoF should be able to prepare individuals to enter a highly competitive rapidly changing global labor market.

References

- Alam, A. (2020). *Challenges and possibilities of online education during Covid-19*. Preprints 2020,2020060013.<https://doi.org/10.20944/preprints202006.0013.v1>
- Anderson, A. (2010). *Combating climate change through quality education*. Brookings Global Economy and

- Development. https://www.preventionweb.net/files/15415_15415brookingspolicybriefclimatecha.pdf
- Atkinson, R.D. (2019). *Robotics and the future of production and work*. Information Technology and Innovation Foundation. <https://itif.org/publications/2019/10/15/robotics-and-future-production-and-work/>
- Austin, A. E. (2012). Challenges and visions for higher education in a complex world: Commentary on Barnett and Barrie. *Higher Education Research & Development*, 31(1), 57-64. <https://doi.org/10.1080/07294360.2012.642840>
- Axelithioti, P., Fisher, R.S., Ferranti, E.J.S., Foss, H.J., & Quinn, A.D. (2023). What are we teaching engineers about climate change? Presenting the MACC Evaluation of Climate Change Education. *Education Sciences*, 13, 1-21. <https://doi.org/10.3390/educsci13020153>
- Azmi, I. A. G., Hashim, R. C., & Yusoff, Y. M. (2018). The employability skills of Malaysian university students. *International Journal of Modern Trends in Social Sciences*, 1(3), 01-14. <http://www.ijmtss.com/PDF/IJMTSS-2018-03-09-01.pdf>
- Bagarinao, R.T., & Secreto, P. V. (2019). *The changing profile of UPOU graduates with the changing modes of delivery: A GIS-based analysis*. Conversation Paper Series 2019-001. <https://networks.upou.edu.ph/wp-content/uploads/2021/08/Bagarinao-and-Secreto-CPS.pdf>
- Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies*, 2(2), 113-115. <https://doi.org/10.1002/hbe2.191>
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). *Defining twenty-first century skills*. In *Assessment and Teaching of 21st Century Skills* (pp. 17-66). Springer, Dordrecht.
- Birmingham, D., & Barton, A. C. (2014). Putting on a green carnival: Youth taking educated action on socioscientific issues. *Journal of Research in Science Teaching*, 51(3), 286-314. <https://doi.org/10.1002/tea.21127>
- Birmingham, D., & Chainey, J. (2022). *The critical role of assessment in creating climate-smart education systems*. Global partnership: Transforming education. <https://www.globalpartnership.org/blog/critical-role-assessment-creating-climate-smart-education-systems>
- Bisharyan, J. (2021). *Student opinion: The difficulty of online learning during NorCal's power outages*. The Davis Vanguard. <https://www.>

- davisvanguard.org/2021/01/student-opinion-the-difficulty-of-online-learning-during-norcals-power-outages/
- Bolat, Y., & Baş, M. (2018). The perception of the educational philosophy in the industrial age 4.0 and the educational philosophy productivity of teacher candidates. *World Journal of Education*, 8(3), 149–161. <https://files.eric.ed.gov/fulltext/EJ1185408.pdf>
- Bryson, J. R., & Andres, L. (2020). Covid-19 and rapid adoption and improvisation of online teaching: Curating resources for extensive versus intensive online learning experiences. *Journal of Geography in Higher Education*, 44(4), 608–623. <https://doi.org/10.1080/03098265.2020.1807478>.
- Center for the New Economy and Society. (2018). *The future of jobs report 2018*. *World Economic Forum*. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
- Chang, C. H., & Pascua, L. (2017). The curriculum of climate change education: A case for Singapore. *The Journal of Environmental Education*, 48(3), 172–181. https://www.researchgate.net/publication/316914706_The_curriculum_of_climate_change_education_A_case_for_Singapore
- Chung, M.V., Vecchi, G., & Sun, J. (2021). *Climate change is probably increasing the intensity of tropical cyclones*. Climate.gov. <https://www.climate.gov/news-features/understanding-climate/climate-change-probably-increasing-intensity-tropical-cyclones>
- Conteh, I. K. (2015). *Natural hazards and education: The impact of floods on primary school education in Zambia*. Boekenplan. <https://doi.org/10.26481/dis.20150616ic>
- Coronacion, V.N. (2015). Mainstreaming climate change adaptation in the BS Agriculture Curriculum in selected Commission on Higher Education centers of excellence in agriculture. *Journal of Environmental Science and Management*, 18(2), 62–73. https://doi.org/10.47125/jesam/2015_2/07
- de Guzman, A.B. (2003). The dynamics of educational reforms in the Philippine basic and higher education sectors. *Asia Pacific Education Review*, 4(1), 39–50. <https://doi.org/10.1007/s10639-021-10633-w>. <https://files.eric.ed.gov/fulltext/EJ776349.pdf>
- Department of Education. (2011). *Winning the education future: The role of ARPA-ED*. <https://www.ed.gov/sites/default/files/arpa-ed-background.pdf>
- Department of Homeland Security. (2015). *Drought impacts to critical infrastructure*. Department of Homeland Security's Office of Cyber

- and Infrastructure Analysis, U.S.A. <https://bit.ly/3Ec68iK>
- Deye, S. (2015). *Harnessing the power of technology in the classroom. Connected learning: A primer for state policymakers.* https://www.ncsl.org/Portals/1/Documents/educ/technology_final.pdf
- Dixon, S. (2022). *Facebook: distribution of global audiences 2022, by age and gender.* <https://www.statista.com/statistics/376128/facebook-global-user-age-distribution/>
- Duncan, A. (2011). Harness the power of technology. Learning and teaching with technology. *International Society for Technology in Education.* <https://files.eric.ed.gov/fulltext/EJ935414.pdf>
- Duram, L.A. (2021). Teaching a social science course on climate change: Suggestions for active learning. *Bulletin of the American Meteorological Society*, 102(8), E1494–E1498. <https://journals.ametsoc.org/view/journals/bams/102/8/BAMS-D-21-0035.1.xml>
- Ellerbeck, S. (2022). *Should schools teach climate change studies? These countries think so.* World Economic Forum. <https://www.weforum.org/agenda/2022/08/climate-change-schools-education/>
- Frezzo, D. (2017). *The role of technology in the education of the future.* World Economic Forum. Online: <https://www.weforum.org/agenda/2017/05/science-of-learning/>
- Gagnon, W., Liu, M.C., Bhargava, S., Kennington, A., & Howard, C. (2022). *Calling for engineering curricula that address the climate emergency: A brief case study of civil engineering programs.* Cobee 2022, Montreal. <https://bit.ly/3kdw1aU>
- Gast, A. (2022). *Four ways universities can future-proof education.* World Economic Forum. <https://www.weforum.org/agenda/2022/01/four-ways-universities-can-future-proof-education/>
- Groff, J.S. (2013). Dynamic systems modeling in educational system design and policy. *New Approaches in Educational Research*, 2(2), 72–81. DOI: 10.7821/naer.2.2.72-81
- Hasan, N., & Bao, Y. (2020). Impact of “e-Learning crack-up” perception on psychological distress among college students during COVID-19 pandemic: A mediating role of “fear of academic year loss”. *Children and Youth Services Review*, 118, 105355. <https://doi.org/10.1016/j.childyouth.2020.105355>
- Hickman, C., Clin, E.M, Pihkala, P., Clayton, S., Lewandowski, R.E., Mayall, E.E., Wray, B., Mellor, C. & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *The Lancet Planetary Health*, 5(12), e863–e873. <https://www.sciencedirect.com/>

- science/article/pii/S2542519621002783
- Highland, S.A. (2022). *Designing flexible, multiuse learning spaces: Five keys to success*. School Yard. <https://blog.schoolspecialty.com/designing-flexible-multiuse-learning-spaces-five-keys-to-success/>
- Howard-Jones, P., Sands, D., Dillon, J. & Fenton-Jones, F. (2021). The views of teachers in England on an action-oriented climate change curriculum. *Environmental Education Research*, 27(11), 1660–1680. <https://doi.org/10.1080/13504622.2021.1937576>
- International Federation of Robotics. (2018). *Robot density rises globally*. News release. <https://ifr.org/ifr-press-releases/news/robot-density-rises-globally>.
- Jha, A. (2017). *Harnessing the power of technology to promote education*. Education Technology. <https://techplusmedia.com/education/2017/11/21/harnessing-the-power-of-technology-to-promote-education/>
- Johnson, J. (2021). *Global number of internet users 2005-2019*. Statista. <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/>
- Jones, K. (2020). *Education: Technology is shaping the future – disrupting education as we know it- Visual Capitalist*. <https://bit.ly/3GebtHT>
- Kariippanon, K.E., Cliff, D.P., Lancaster, S.J., Okely, A.D., & Parrish, A. M. (2019). Flexible learning spaces facilitate interaction, collaboration and behavioral engagement in secondary school. *PLoS ONE*, 14(10), e0223607, (p.2). <https://doi.org/10.1371/journal.pone.0223607>
- Kasriel, S. (2019). *What the next 20 years will mean for jobs – and how to prepare*. World Economic Forum. <https://www.weforum.org/agenda/2019/01/jobs-of-next-20-years-how-to-prepare/>
- Kastrenakes, J. (2014). *States are fighting new science curriculum teaching climate change and evolution*. The Verge. <http://www.theverge.com/2014/5/19/5730600/states-debate-ngss-science-standards-teaching-climate-change-evolution>
- Keating, S.A., Vetter, M.J., Klar, R.T. & Wright, F. (2022). Integrating climate change in the curriculum: Using instructional design methods to create an educational innovation for nurse practitioners in a Doctor of Nursing Practice Program. *The Journal for Nurse Practitioners*, 18(4), 424–428. <https://doi.org/10.1016/j.nurpra.2021.11.009>
- Kemp, S. (2022). *Facebook statistics and trends*. Datareportal. <https://datareportal.com/essential-facebook-stats>
- Khalid, N., Hamid, N.A.A., Othman, N. Awang, A.H. & Nor, M.F.M. (2014).

Importance of soft skills for industrial training program: Employers' perspective. *Asian Journal of Social Sciences & Humanities*, 3(4), 10–18. [http://www.ajssh.leena-luna.co.jp/AJSSHPDFs/Vol.3\(4\)/AJSSH2014\(3.4-02\).pdf](http://www.ajssh.leena-luna.co.jp/AJSSHPDFs/Vol.3(4)/AJSSH2014(3.4-02).pdf)

Kim, J. & Park, C.Y. (2020). *Education, skill training, and lifelong learning in the era of technological revolution*. ADB Economics Working Paper Series. No. 606. <https://www.adb.org/sites/default/files/publication/559616/ewp-606-education-skill-training.pdf>

Kivunja, C. (2015). Teaching students to learn and to work well with 21st century skills: Unpacking the career and life skills domain of the new learning paradigm. *International Journal of Higher Education*, 4(1), 1–11. <https://files.eric.ed.gov/fulltext/EJ1060566.pdf>

Krishnamurthy, K., Choi, S., Benavides, F. & Cortes, J.S. (2019). *It is getting hot: Call for education systems to respond to the climate crisis*. UNICEF East Asia and Pacific Regional Office. <https://uni.cf/3IFvD5m>

Lister, J. (2017). *Crossing boundaries: The future of science education*. *Scientific American*. <https://blogs.scientificamerican.com/observations/crossing-boundaries-the-future-of-science-education/>

Litz, D. (2011). Globalization and the changing face of educational leadership: Current trends and emerging dilemmas. *International Education Studies*, 4(3), 47–61. <https://files.eric.ed.gov/fulltext/EJ1066562.pdf>

Mahroeian, H., & Daniel, B. K. (2016, June). The dynamic landscape of higher education: The role of big data and analytics. In H. H. Song & K. Singleton (Eds.), *Proceedings of EdMedia+ Innovate Learning* (pp. 1320-1325). Association for the Advancement of Computing in Education (AACE).

Marr, B. (2022). *The 2 biggest future trends in education*. Forbes. <https://www.forbes.com/sites/bernardmarr/2022/01/21/the-2-biggest-future-trends-in-education/?sh=65d127a12d6f>

McCowan, T. (2020). *The impact of universities on climate change: A theoretical framework*. Centre for Global Higher Education Working Paper Series (p. 11). <https://www.researchcghc.org/perch/resources/publications/final-working-paper-55.pdf>

Mocatta, G. & White, R. (2020). *This is how universities can lead climate action*. The Conversation. <https://bit.ly/3Kd04dr>

Morales, M.P.E., Avilla, R.A., Butron, B.R., Ayuste, T.O.D., Masangcay, D.B. & Laureano, R.A. (2021). Technology integration traditions,

- transitions and best practices in Philippine higher STEAM education. *Philippine Journal of Science*, 150(5), 1265–1278. <https://bit.ly/3gnDQJ9>
- Mulcahy, D. (2016). Policy matters: de/re/territorialising spaces of learning in Victorian government schools. *Journal of Educational Policy*, 31(1), 81–97. <https://doi.org/10.1080/02680939.2015.1099077>
- Naidoo, V. (2006). International education: A tertiary-level industry update. *Journal of Research in International Education*, 5(3), 323–345. <https://www.learntechlib.org/p/64704/>.
- Oblinger, D.G. (2006). *Space as a change agent*. In D.G. Oblinger (Ed.), Learning spaces (pp. 1.1–1.4). EDUCAUSE. <https://www.educause.edu/ir/library/pdf/PUB7102.pdf>
- O'Connor, M. (2020). *Using your LMS for offline learning*. Synergy learning. <https://synergy-learning.com/blog/using-your-lms-offline-learning/>
- Petrosyan, A. (2023). *Countries with the highest number of internet users 2022*. <https://www.statista.com/statistics/262966/number-of-internet-users-in-selected-countries/>
- Potts, L. (2021). *Intensity of tropical cyclones is probably increasing due to climate change*. High Meadows Environmental Institute. <https://environment.princeton.edu/news/intensity-of-tropical-cyclones-is-probably-increasing-due-to-climate-change/>
- Poushter, J. (2016). *Smartphone ownership and internet usage continues to climb in emerging economies*. Pew Research Center. <https://pewrsr.ch/3KxkUld>
- Prifti, L., Knigge, M., Kienegger, H. & Krcmar, H. (2017). A competency model for “Industrie 4.0” employees. In Leimeister, J.M. & Brenner, W. (eds.). *Proceedings. 13th International Conference on Wirtschaftsinformatik*, February 12-15, 2017, St. Gallen, Switzerland, St. Gallen, S. 46-60. <https://www.wi2017.ch/images/wi2017-0262.pdf>
- Renganathan, S., Ambri, Z., Karim, B.A. & Su Li, C. (2012). Students’ perception of industrial internship programme”. *Education + Training*, 54 (2/3), 180-191. <https://doi.org/10.1108/00400911211210288>
- Republic Act 10650. (2014). *Open Distance Learning Act*. <https://www.officialgazette.gov.ph/2014/12/09/republic-act-no-10650/>
- Rhodes, D. & Wang, M. (2021). Learn to lead: Developing curricula that foster climate change leaders. In Reimers, F.M. (ed.), *Education and climate change*. International explorations in outdoor and environmental education. Springer, Cham. <https://doi.org/>

org/10.1007/978-3-030-57927-2_2

- Rich, B. D. (2014). Principles of future proofing: a broader understanding of resiliency in the historic built environment. *Preservation Education and Research*, 7, 31–49. https://www.researchgate.net/publication/333856761_The_Principles_of_Future-Proofing_A_Broader_Understanding_of_Resiliency_in_the_Historic_Built_Environment
- Rigby, B. (2015). *Drivers of change in safe schools*. Plan International, 8pp. <https://bit.ly/3pxOoHO>
- Ryan, A.M. & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Education Research Journal*, 38(2), 437–60. <http://aer.sagepub.com/cgi/doi/10.3102/00028312038002437>
- Sarker, F., Davis, H., & Tiropanis, T. (2010). *The role of institutional repositories in addressing higher education challenges*. <http://surl.li/dqyaj>
- Schanzenbach, D.W., Bauer, L. & Breitwieser, A. (2017). *Eight economic facts on higher education*. The Hamilton Project. https://www.hamiltonproject.org/papers/eight_economic_facts_on_higher_education
- Schwab, K. (2016). *The Fourth Industrial Revolution: What it means, how to respond*. World Economic Forum. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>
- Shamshack, A. & Spector, J.M. (2020). A systematic literature review of personalized learning terms. *Smart Learning Environments*, 7(33), 1–20. <https://slejournal.springeropen.com/articles/10.1186/s40561-020-00140-9>
- Statista Research Department. (2021). *Number of internet users, Philippines 2017-2026*. <https://www.statista.com/statistics/221179/internet-users-philippines/>
- Statista. (2023). *Number of internet users of selected countries as of January 2022* (graph). <https://www.statista.com/statistics/262966/number-of-internet-users-in-selected-countries/>
- Turnbull, D., Chugh, R., & Luck, J (2021). Transitioning to e-learning during the COVID-19 pandemic: How have higher education institutions responded to the challenge? *Education and Information Technologies*, 26, 6401–6419. <https://link.springer.com/content/pdf/10.1007/s10639-021-10633-w.pdf>
- United States Department of Homeland Security [US DHS].

- (2015). *Drought impacts to critical infrastructure*.
https://content.govdelivery.com/attachments/USDHSFACIR/2015/04/30/file_attachments/386553/Drought+Impacts+to+Critical+Infrastructure.pdf
- United Nations Framework Convention on Climate Change (UNFCCC). (2022). *Climate change education*. <https://unfccc.int/blog/climate-change-education>
- University Corporation for Atmospheric Research [UCAR]. (2023). *Predictions of future global climate*. <https://scied.ucar.edu/learning-zone/climate-change-impacts/predictions-future-global-climate>
- Valdez, R. X., Peterson, M. N., & Stevenson, K. T. (2018). How communication with teachers, family and friends contributes to predicting climate change behavior among adolescents. *Environmental Conservation*, 45(2), 183–191. <https://doi.org/10.1017/S0376892917000443>.
- Van Geert, P. L. C. (2019). Dynamic systems, process and development. *Human Development*, 63, 153–179. <https://doi.org/10.1159/000503825>
- Vegas, E. & Winthrop, R. (2020). *Global education: How to transform school systems?* Brookings. <https://www.brookings.edu/research/global-education-how-to-transform-school-systems/#footnote-8>
- Walravens, S. (2020). *Why online learning is failing our nation's most vulnerable students*. Forbes. <https://www.forbes.com/sites/geekgirlrising/2020/06/08/new-report-shows-impact-of-digital-divide-on-low-income-students/?sh=12e944611701>
- World Meteorological Organization (WMO). (2022). *State of the global climate 2021*. WMO-No. 1290. https://library.wmo.int/doc_num.php?explnum_id=11178

Exploring Short Courses in an Evolving Educational Landscape

J. Aleta R. Villanueva

ABSTRACT

Recent results of the Edu-Hack: K-12 Teacher Journeys and EDUkussion webinars revealed the far reach of the University of the Philippines Open University (UPOU) while also indicating teacher interests and concerns in programs and pedagogies suited to the needs of K-12 students and teachers during the COVID-19 pandemic. Quick survey results indicate areas the Faculty of Education (FEd) can directly engage in through offering non-formal short courses and in collaboration with K-12 education experts. As such, non-formal short courses were conceptualized to be in touch with the realities of full-time community-based education workers, para-teachers, and teacher-leaders who may benefit from non-formal course offerings that serve to address their on-the-go professional development needs. These non-formal short courses have been developed and implemented to potentially serve as a flexible pathway to a full-time study in the formal degree programs. At a time deemed suited for the course participants and in keeping with the Sustainable Development Goal 4 on Quality Education, these courses contributed to the supply of qualified teachers, especially in least developed countries. The development of these short courses entailed implementing a varied set of webinars during the pandemic and post-webinar surveys and a review of existing short courses abroad to ascertain the types of short courses that may be developed to cater to the local setting and are premised on experiential learning and constructivist approaches to learning how to teach. Through the institution of these short courses as a form of micro credentials, UPOU's FEd responds to the call for inclusivity by creating entry pathways to university-based teacher education in support of equal access for all types of lifelong learners.

Recent results of the Edu-Hack: K-12 Teacher Journeys and EDUkussion webinars during the pandemic reveal the far reach of University of the Philippines Open University (UPOU) through the UPOU Networks while also indicating teacher interests and concerns in programs and pedagogies suited to the needs of K-12 students, especially in this new normal. Quick survey results indicate areas the UPOU Faculty of Education (FEd) can directly engage in by offering non-formal short courses and collaborating with FEd faculty affiliates/adjuncts and other K-12 education experts. Currently, there are UPOU Bridge Courses in English, massive open online courses (MOOCs), and professional development webinars that address certain content and skill areas but limited offerings to target the needs of teachers and practitioners working in alternative settings. Teacher education courses in FEd have catered to specific student populations who aim for degree programs and thus are able to satisfy entry requirements or course prerequisites and then enroll in sustained periods of study. However, we have yet to package courses that match the realities of full-time community-based education workers, para-teachers, and multitasking teacher-leaders who may benefit from non-formal course offerings as stand-alone short courses that serve to address their professional development needs but without the commitment of completing a full study program within a specified time period. The underlying concept of short courses under the Faculty of Education Continuing Education Program (FEd-CEP) is likened to the current views on microcredentials catered to adult learners and professionals, which serve as “a steppingstone to achieving a degree but may also do so for enjoyment” (OECD, 2021, p. 3), for professional growth and development or for those in sheer pursuit of their interest as they explore a career shift. Hence, this paper foresees that through the institution of FEd-CEP short courses, UPOU continues to fulfill its mandate as the genuine means of widening access and inclusive spaces for adult learners through ODEL and in the spirit of lifelong learning.

This chapter explores the possibilities of instituting and developing non-formal, short courses. The non-formal offering under the FED-CEP seeks to target potential course participants who are after retooling and upscaling their pedagogical knowledge and teaching skills, which can be easily translated into their ongoing practice. The short courses also serve to acclimatize course participants to the UPOU learning culture. As a set of stand-alone short courses, these also seek to build on the effect and motivation of target course participants by fostering their confidence and capitalizing on both formal and informal ways of knowing, their practical skill set and other sources

of knowledge in order to further contribute to knowledge sharing within their own communities of practice. Additionally, these short courses are premised on an experiential learning and constructivist approach to learning how to teach—that is, the pathways are neither necessarily linear, nor the skills to learn how to teach are viewed as a set of cumulative skills to acquire before one can learn how to teach. Rather, it acknowledges the current experience-rich workplace and community settings as a seedbed of lived experiences in learning how to teach. The short course becomes a venue for validating these learnings while acquiring a set of practical skills to teach better and address the diverse needs of students already experiencing learning loss due to the pandemic. Likewise, one can also imagine the dynamics among short course participants coming from diverse backgrounds, each with differing personal and professional goals and having unique takeaways from their learning experiences. Engagement in these short courses does not necessarily satisfy “earning a ‘good grade’” but rather having concrete evidence of attainment, specifically a set of learning badges or an actual certificate attesting to their newly gained practical knowledge and tools. As such, no teacher is left behind in the vision of UPOU as a university of the future.

In the bigger picture, the resulting short courses and certificate degree program completers are in keeping with the Sustainable Development Goal 4: Quality Education by contributing to “the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states” (UN, 2020). The short course offerings also respond to the call for inclusivity by creating pathways of entry to university-based teacher education in support of “equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university” (UN, 2020). Potentially, when combined with other short courses, there may be a crediting scheme that includes a certificate as recognition of prior learning (RPL) or prior work experience (RPWE) and for crediting towards a formal degree program. The certification earned may become entry credits along a flexible entry pathway to a full-time study in the formal FEd degree programs and at a time deemed suited for the student. In other words, we are looking at short courses leading to a graduate certificate degree but earned flexibly. Thus, essentially, the short courses become the means to restructure internal processes and guidelines for entry to the university while also allowing us to rethink our ways of engaging with our stakeholders, including identifying key partners and networks in developing

and delivering short courses. In a way, these illustrate the selected keys to the design of higher education institutions moving toward the future, as discussed by Kloos et al. (2022).

The next sections will discuss schemes and possibilities for the RPL and the possible institution of a formal degree program, a potential offshoot of the development and delivery of short courses. What follows is a proposed program development cycle grounded on a design-based thinking approach.

Continuing Education Program: Schemes and Possibilities

Recognition of Prior Learning

Through the institution of an RPL scheme, the FEEd-CEP seeks to provide open access to teacher education degree programs to a marginalized sector of teachers, homeschooling parents, para-teachers, and community-based education workers in alternative learning set-ups. The institution of an RPL may be undertaken through both top-down and bottom-up approaches. In a top-down approach, existing courses and their coverage may be examined and then grouped to form certificate programs of which entry requirements may be stipulated, giving due credence to possible evidence of prior learning as well as work experience and with a corresponding entry point system. An example would be how the University of Southern Queensland (USQ) put together its undergraduate and graduate certificate courses, as seen here: <https://www.usq.edu.au/study/short-programs>

If we are to put together an Undergraduate Certificate Course in e-Learning similarly, it could draw from selected courses under the Bachelor of Education Studies (BES) program's former Alternative Education System teaching track. A combination of other courses with entry credentials from FEEd's undergraduate programs and courses from the Diploma programs may be devised to develop other graduate certificate course, such as a Graduate Certificate Course in Social Studies Teaching or Language Arts Teaching in the Alternative Delivery Mode. In such Graduate Certificate courses, what needs to be devised are schemes for the RPL and RPWE as part of admission/ entry requirements as well as possible exit certifications to be earned.

In a bottom-up approach, courses are created with clear content coverage and requirements under a specific cluster. These courses, when completed,

can become building blocks for due crediting under an RPL scheme and through proper academic advising and learning support. With the strategic negotiation of in-course requirements under these FEd degree programs, students are foreseen to gradually complete a menu-like degree program to be instituted later on as a Master of Arts or a Graduate Certificate/Diploma in Teaching and Learning in OdeL programs, which students may consider taking in the future. A parallel example of this bottom-up approach in the K-12 system would be accommodating homeschoolers in a regular school program by tailor-fitting subjects they can take based on their choices and past record grades. In the case, of course, of participants in these short courses, the RPL scheme may be instituted through developing a point system at the program level as a means to give due credit to prior work skills, formal knowledge gained and credited through the non-formal courses, their track record of experience, teaching practice or expertise through a portfolio submission, and a study plan to complete a suitable degree. Other implementing guidelines on the RPL may be proposed for institutions by benchmarking with USQ and other universities with years of practice in flexible learning options (refer to USQ Recognition of Prior Learning) and with existing policies that have guided the awarding of certifications in keeping with course quality and overall academic integrity.

In either of these approaches, the FEd-CEP may rely on professional competencies expected of a teaching workforce and based on standards set by the Commission on Higher Education and other reliable frameworks within the ASEAN region.

Towards the Institution of Certificate Degree Program through the CEP Short Courses

All non-formal courses may be taken as stand-alone, single, short courses likened to professional development training during summer school or in-service, school-based professional development implemented before school opening and with additional sessions spread out in the school year.

Under the FEd-CEP, however, we would like to continue the development of these other non-formal, short courses with a possible end in mind. Should course participants continue to engage with the FEd-CEP, they can be advised to decide on possible course combinations toward earning a certificate. Examples of horizontal and vertical certificate courses for completion are illustrated in Figure 1.

Figure 1

Sample Course Combination/Scheme towards a Certificate in Teaching and Learning

	Cluster 1 + 2	Cluster 1 + 3
V e r t i c a l v v v v	<ul style="list-style-type: none"> All about Inquiry Learning 	<ul style="list-style-type: none"> Implementing Language Learning Support Programs
	<ul style="list-style-type: none"> Designing Integrated Curriculum 	<ul style="list-style-type: none"> Doing Online Language Learning Support & Advising
	<ul style="list-style-type: none"> Teaching Philosophy for Children 	<ul style="list-style-type: none"> Teaching Academic Writing to the Adolescent Learner
	<ul style="list-style-type: none"> Facilitating Discourse for Critical Thinking 	<ul style="list-style-type: none"> How to Teach Critical Reading

Horizontal > > > >				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
V e r t i c a l v v v v	<ul style="list-style-type: none"> Design based Thinking in Schools 	<ul style="list-style-type: none"> Personalized Instruction through Reading Remediation 	<ul style="list-style-type: none"> How to Teach Critical Reading 	<ul style="list-style-type: none"> Understanding the Child with LD
	<ul style="list-style-type: none"> Introduction to Multi-grade/ multi-age Teaching 			
	<ul style="list-style-type: none"> Introduction to Classroom-based Action Research 			
	<ul style="list-style-type: none"> Designing Reading Remediation Programs 			

In the long term, non-formal courses, when completed under specific parameters, may serve as pathways to education degree programs through an entry scheme of RPL, which UPOU is in a position to develop. For example, it can be stipulated that enrolment in at least four non-formal courses, either horizontally or vertically, shall earn the participant a Certificate of Teaching and Learning. The certificate can then become part of the student’s portfolio to satisfy a pathway/entry point requirement to the Professional Teaching Certification (PTC), BES, or Master of Arts (MA) programs under the FEEd at

UPOU. Alternatively, these non-formal short courses, when completed, serve as pathways to earn a certificate in teaching and learning.

Examples of course combinations leading to a Certificate in Teaching and Learning or as entry credits to a foreseen Master of Arts in Teaching and Learning are seen in Figure 1.

Other Possibilities

1. Course Development, Teaching, and Service Learning Options

UPOU FEd faculty affiliates/adjunct and REPS will become initial course developers working with experts from the educational industry as co-developers and potential course FICs, resource persons, and tutors. For the course material development, UPOU students from Bachelor of Arts in Multimedia Studies (BAMS) or BES can opt to do the Gurong Pahinungod Service-Learning Option by taking part as members of the course design team to produce multimedia materials, digital learning objects, remote learning modules, short quizzes, and virtual learning community site maintenance and participation. The FEd-CEP can, therefore, become a venue for online volunteering, which can then serve as crediting points for recognition under the National Service Training Program (NSTP).

2. Possible Partnerships with Private Schools, Local Government Units, and DepEd Education Specialists

These non-formal courses under the FEd-CEP may also be offered to/accommodated as part of in-service faculty development with public and private schools that are interested in hands-on teacher training and with corresponding certificates to be earned from UPOU.

To qualify further, the next section discusses the program development phase of the Continuing Education Program of UPOU-FEd, where these non-formal courses are to be subsumed.

Program Development Cycle

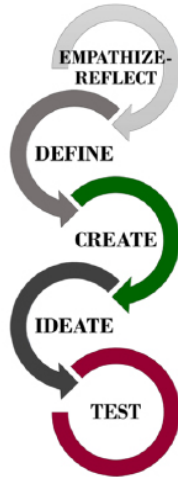
Empathize > Reflect > Research

The pandemic has provided the time and space for the proponent to empathize, reflect, and daydream, but also identify a clear task at hand

after a “thought-provoking meeting” with Dean Ricardo Bagarinao and other affiliate faculty members acting as program chairs within FEd.

Figure 2

Design Cycle of Design-based Thinking to be adapted for the FEd-CEP Program Development



Note. Adapted from What is Design Thinking? | IxDF (interaction-design.org) the Interaction Design Foundation, CC BY-NC-SA 3.0.

The Proponent’s “Circling” Questions in the time of the Pandemic

- How are teachers, parents, students, and schools adapting to the current scenario?
- What are their pressing concerns? How has UPOU helped in troubleshooting and finding solutions?
- What are the predicted/perceived needs in the short term? Long term?
- How do we as FEds position ourselves to respond through research and extension work? Through teaching? And in our own special ways?
- How does the current scenario define UPOU-FEd’s role as a caring, innovative, and responsive academic community? How can these be translated in very concrete terms/action points?
- Given the predicted scenario that most teacher education institutions will maintain Distance Education (DE) program offerings, how else can UPOU-FEd maintain its niche?

- WHO our students/graduates are because of the teacher education programs WE CRAFT and the kind of teaching WE DO.
- What are the unexplored areas and how can we use these as creative spaces “to grow ideas-actions” or “keep being organic”?

The initial non-formal courses for institution in this paper are based on the results from a series of quick surveys (and in two parts) put forth through the UPOU Networks evaluation form (see Table 1). The options/list of courses were based on the proponent’s knowledge of possible course content that may be rightfully offered given the proponent’s network of K-12 practitioners and experts, some of whom are FEd faculty affiliates/adjunct. The course content is related to formal teacher education courses. The respondents were mainly teachers/faculty members from the National Capital Region (NCR) and Cavite, Laguna, Batangas, Rizal, Quezon (CALABARZON) areas.

Table 1

Part 1 Quick Survey Results from Four EduHack-K12 Teacher Journeys/ EDUKussion Webinars

Survey Options (choose top 5)	Top Responses	Aug 18	Aug 11	Aug 4	Jul 30	Ave	Rank
Quick Survey: Certificate/non-formal courses <small>These short courses under the Faculty of Education run fully online for 4-8 weeks, approx. 2-3 hours a week of course participation.</small> <hr/> Which certificate/non-formal short courses will you be interested in joining? Please tick TOP 5 from the list below.	Remedial Reading Instruction Effective Storytelling & Read aloud Introduction to Progressive Educ Multigrade/age Teaching Inquiry Learning Projects for Homeschoolers Online Language Learning Support Academic Writing for Adolescents	70.4	79.1	65.5	61.4	66.51	1st
<input type="checkbox"/> Remedial Reading Instruction <input type="checkbox"/> Effective Read-aloud and Storytelling <input type="checkbox"/> Introduction to Progressive Education <input type="checkbox"/> Multi-age/multigrade Teaching <input type="checkbox"/> Inquiry Learning Projects with Homeschoolers <input type="checkbox"/> Online Language Learning Support: How to's <input type="checkbox"/> Understanding and Engaging Children with Autism <input type="checkbox"/> Teaching Academic Writing to Adolescent Learners <input type="checkbox"/> Malikhaing Pagsusulat (Writer's Workshop in Filipino) <input type="checkbox"/> Doing Writer's Workshop with Homeschoolers <input type="checkbox"/> Math and Reading Games for K-3 Children		45.9	54.5	38.6	37.7	30.56	7th
		61.9	57.3	65.5	69.2	63.47	2nd
		47.9	40.1	47.5	52.0	46.87	5th
		50.6	43.1	50.1	51.6	48.85	4th
		51.4	46.8	56	55.2	52.35	3rd
		39.5	33.2	42	46.3	40.25	6th

Note. Collated from EduHack Evaluation Forms with the assistance of Lexter Mangubat, Multimedia Center

Highlighted items reveal the top five choices of non-formal courses from the webinar participants who attended a series of Edu-Hack EduKussion/K12 Journeys sessions. The respondents were teachers from different parts of the Philippines, with major attendees/viewers from NCR and CALABARZON.

The top three choices for non-formal course topics are Remedial Reading Instruction, Introduction to Progressive Education, and Online Language Learning Support. The next three choices are Inquiry Learning Projects for Homeschoolers, Multigrade/Multi-age Teaching, and Academic Writing for Adolescents.

Additional data were also gathered during a quick survey after the webinar Voices of Alternative Learning System (ALS) Teachers. Suggested topics were provided by ALS Teacher-Resource Speakers through the moderation of Asst. Prof. Ched Arzadon in the Facebook Messenger ALS Support Group as seen in Figure 3.

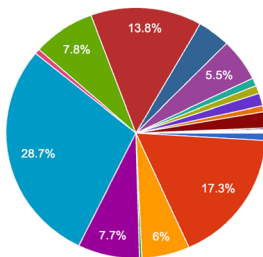
Figure 3

Screenshots of Selected Results from the Evaluation Form of the 2020 EDUkussion Voices of ALS Teachers Webinar

PARTICIPANT LOCATION

Your location (Region or Country)

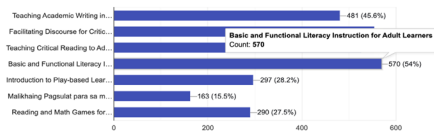
1,055 responses



- ARMM (Autonomous Region in M...)
- NCR (National Capital Region)
- Region 1 (Ilocos Region)
- Region 2 (Cagayan Valley)
- Region 3 (Central Luzon)
- Region 4A (CALABARZON)
- Region 4B (MIMAROPA)
- Region 5 (Bicol Region)
- Region 6 (Western Visayas)
- Region 7 (Central Visayas)
- Region 8 (Eastern Visayas)
- Region 9 (Zamboanga Peninsula)
- Region 10 (Northern Mindanao)
- Region 11 (Davao Region)
- Region 12 (SOCCSKSARGEN)
- Region 13 (Caraga Region)
- CAR
- Sultanate of Oman
- Indonesia
- Japan
- Laos
- Saudi Arabia

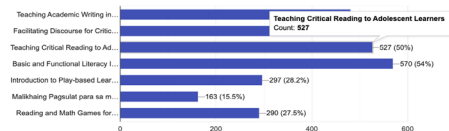
BASIC AND FUNCTIONAL LITERACY INSTRUCTION FOR ADULT LEARNERS
54.0%

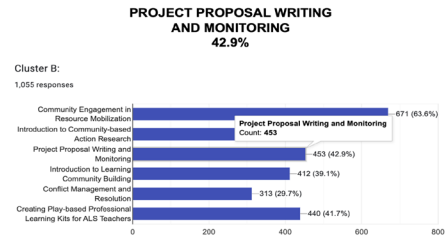
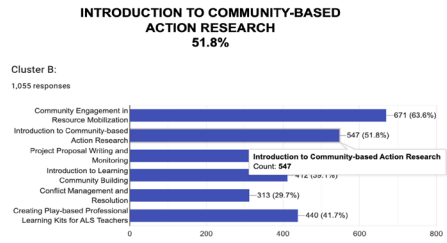
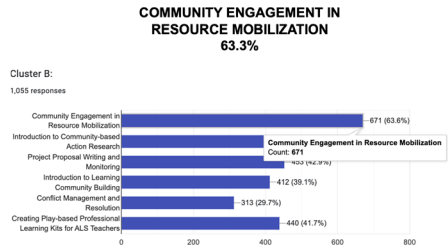
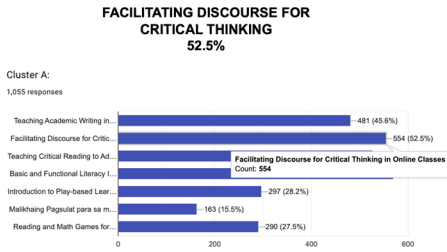
Cluster A:
1,055 responses



TEACHING CRITICAL READING TO ADOLESCENT LEARNERS
50.0%

Cluster A:
1,055 responses





Define: Program Design Cycle

What follows briefly define the program design cycles and corresponding milestones for each design cycle of phase of the FEd-CEP. Figure 4 is a visual representation of the program design cycle phases.

1. Program Design Cycle 1

Focus is on the development and delivery of non-formal short courses to harness the creation of networks with foreseen course developers and teachers or home-grown experts from DepEd and education organizations/societies; groundwork of target course participants.

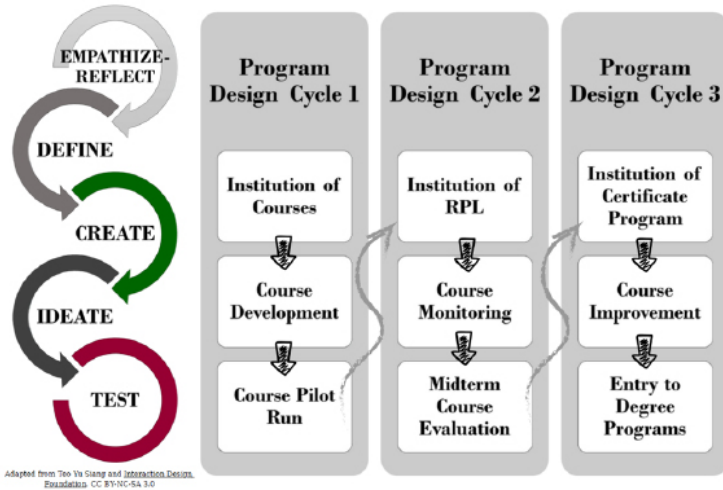
Milestones:

- at least two courses developed for each cluster in Moodle rooms or Google classrooms
- an up-and-running prototype of virtual learning community site which serves as an open classroom

- a core group of members from volunteer course
- participants and active members of the learning community site
- a prototype of an Edu-Fair event for knowledge sharing among course participants

Figure 4

Essential Ingredients of the FEEd-CEP Program Design Phases



2. Program Design Cycle 2

Focus in ongoing course development of other courses under each cluster and monitoring of course teaching and delivery especially a set of courses which serve as PD/in-service training in an identified school. A midterm evaluation of courses will also be put in place.

Milestones:

- maintenance of initial milestone with add-ons
- midterm evaluation report and a draft action plan for course improvement
- draft proposals for the institution of: Certificate in Teaching and Learning, Master of Arts in Teaching and Learning, and/or Graduate Certificate/Diploma in Teaching and Learning, EdD (by practice-based independent research study)

3. Program Design Cycle 3

Focus is on course improvements and decision-making whether or not proposals for the institution of certificate degree program are in fact

essential and relevant.

Milestones:

- maintenance of the initial milestones with improved prototypes
- bottom-up approach of RPL schemes defined in a draft proposal
- first batch of graduates
- EduFair event: sharing of course improvement

Create > Ideate

This section identifies and displays the prospective courses for development over a 3 to 5-year period. Final course offerings will depend on the midterm evaluation of each program design phase. As such, the program development continues alongside course evaluations. The contents that follow are expectedly ‘a big lot’ but this is a given during the early stages of create-ideate. These are part and parcel of building a prototype set of non-formal, short courses to groundwork as basis for the development of other courses as the FEd-CEP establishes rapport and assess perceived needs of its target course participants.

1. Target Course Clusters, Course Participants, and Courses for Institution

The non-formal, short courses are highlighted in Table 2 with the courses in bold font as being proposed for Year 1 institution to jumpstart building blocks for RPL while pilot testing courses which cater to current interests and needs, as well as informal working knowledge and experience of a unique teaching workforce. Target course participants are specifically those who are well-placed in their contexts/workplaces and eager to learn, innovate, and go beyond barriers in order to best support their students in unusual circumstances.

Table 2

Suggested Short Courses for Institution: Goals, Course Titles, and Target Participants

	Cluster 1 School and Community- based Education Program Development	Cluster 2 K-6 Teaching & Learning	Cluster 3 Teaching & Learning - HS/ Adult Learners	Cluster 4 Working with Special Children/ Youth in Difficult Circumstances
Goals	<ul style="list-style-type: none"> - Develop knowledge of school-based alternative learning programs - Design school-based alternative learning programs - Develop and implement guidelines for monitoring of school-based programs 	<ul style="list-style-type: none"> - Enhance knowledge and understanding of transformative pedagogies suitable for K-6 learners in alternative settings - Equip with teaching strategies and skill sets for pilot testing - Discuss ways to adapt pedagogies and strategies to suit context of learners 	<ul style="list-style-type: none"> - Enhance knowledge and understanding of transformative pedagogies suitable for adolescent and adult learners in alternative settings - Equip with teaching strategies and skill sets for pilot testing - Discuss ways to adapt pedagogies and strategies to suit context of adolescent and adult learners 	<ul style="list-style-type: none"> - Enhance knowledge and understanding of children with special needs - Develop a positive mindset and a set of basic skills to handle students in need - Discuss ways to advocate for students with special needs

<p>Target participants</p>	<ul style="list-style-type: none"> - School administrators, Curriculum Coordinators Education Program Specialists 	<ul style="list-style-type: none"> - K-6 Teachers Home-schooling Parents Gurong Pahinungod ALS Teachers 	<ul style="list-style-type: none"> - ALS Teachers Center/home-based online Tutors Homeschooling Parents Gurong Pahinungod Learning Support Teachers/ESL Teachers 	<ul style="list-style-type: none"> - Parents of Special Children, Home-schooling Parents, Para-teachers working with children/youth in difficult circumstances
<p>Suggested course topics/ titles</p>	<ul style="list-style-type: none"> - Introduction to Multigrade/ multi-age Teaching+ - All about Inquiry Learning+ - Principles and Practices for Home-schooling+ - Designing Reading Remediation Programs+ - Designing Integrated Curriculum** - Introduction to Blended Learning - Community-based Resource Mobilization for the ALS 	<ul style="list-style-type: none"> - K-6 Multigrade/ Multi-age Inquiry Learning Projects+ - Facilitating Discourse for Critical Thinking in K-6 Blended/ Online Learning - Personalized Instruction through Reading Remediation+ - Reading & Math Games for Children 	<ul style="list-style-type: none"> - Creating ePortfolios+ - Teaching Academic Writing to the Adolescent Learner+ - How to Teach Critical Reading - Online Language Learning Support & Learning Advising+ - Facilitating Discourse for Critical Thinking in HS Online Classes** - Teaching Philosophy to Adolescent Learners - Community Engagement in Resource Mobilization 	<ul style="list-style-type: none"> - Understanding and Engaging Children with ADHD - Understanding and Engaging Children and Youth with Autism - Understanding Individuals with Learning Disabilities - Engaging Teacher and Parent Partnerships - Behavior Modification for Children with Special Needs+

			- Radio-based Instruction for Distance Learning	
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Note. *As rightfully labeled, these are suggested/possible courses for development at different stages of the FEd-CEP Program Development Cycle, +Years 1-3, then **Years 4-6 respectively, and the other courses depending on the results of course level and program level evaluation.

2. Target Course Developers and FICs

Target course developers are from FEd’s network of K-12 teacher experts and other home-grown experts in both formal and non-formal education sectors. The goal is to forge partnerships/linkages with education experts well-placed in their professional organizations or academic societies outside of UPOU. This means working with the current givens as the pool of UPOU faculty members already handle most of the formal courses. However, full-time faculty members may serve as course pack reviewers or volunteer course coordinators as part of their public service

Test: Sample Short Courses for Development

This section displays the brief course outlines, providing content of initial non-formal, short courses for development (see Figure 5). These courses were selected on the basis of these criteria:

1. Content validity and relevance: Course developers and partner professional education providers/professionals responding to the rising student and teacher needs due to the shift to remote teaching, and the experienced learning loss from the pandemic
2. Practicality: Probability of enrollment and course participation given prospective course participants from Metro Manila and CALABARZON area schools and potential ALS Mobile Teachers, Gurong Pahinungod (GP) full-time teacher volunteers from the Pahinungod Systemwide GP program
3. Feasibility: Funding requirement with minimal capital investment as courses will be developed as course-writing load of full-time

faculty or affiliates/adjuncts or as part of an academic program improvement (API)-funded project

Figure 5

Sample Short Courses for Development and Delivery: Pilot Phase



Possibilities and Implications on Current Teacher Education Program Development

While the FEd continues to streamline formal education programs from the undergraduate towards higher degree programs by coursework and by research, the continuing education program serves as a bridge through which it can tailor-fit non-formal courses to grow a teaching workforce able and adaptable to work in specialized and alternative settings. The current flavor of the initial courses is geared towards upskilling Filipino teachers and paraprofessionals to better address critical thinking and literacy needs of Filipino learners as well as develop alternative program offerings. Through its initial proposal of cluster of courses, the program is foreseen to possibly accommodate other underserved population of the teaching workforce in need of mentoring, peer support, and validation within a community of practice.

Each member of the FEd is therefore enjoined to capitalize on his or her school and community-based networks in the private sector or non-government organizations for other short courses to be crafted and made accessible. Program chairs are likewise enjoined to examine their program

entry requirements alongside learning modules within existing courses. Stand-alone short courses may be determined from these, which can serve as entry credit qualification to formal degree programs.

Conclusion

Teacher education at UP need not be a one-size-fits-all solution, especially within UPOU, as it is imperative for the FED to continue exploring ways to accommodate the needs of a spectrum of teaching professionals and education practitioners. This article demonstrates that the continuing education program is a concrete path to enable stakeholders to attain their goals in support of teacher-career trajectory, academic mobility, agency, and teacher identity development. It presents possibilities for short courses to become a bridgeway from the non-formal to formal teacher education offerings. Future work along these lines must look into policies, implementing guidelines and schemes for the RPL and RWE to add value to hard-earned work and certification of professional development. The purpose is not solely for the rightful earning of qualifying entry credits but for the meaningful experience of learning and validation within a community of practice. With UPOU's current advocacy for microcredentials, the offering of short courses serves as a seedbed to test administrative barriers versus enablers of change and nimble workarounds. Is the university of the future a mere fantasy we create to believe that higher education programs are still relevant and therefore a way to justify our existence? Is becoming the "university of the future" a mere rhetoric? Or will we dare to push our boundaries so that the imagined future we are capable of enacting will actually benefit the teacher-lifelong learners of the present who cannot afford to wait on us. This thought paper posited that short courses could be the way to go from here to there.

References

- Kloos, D.C., Alario-Hoyos, C., & Franco Pasqualin, L. (2022). Keys to the university of the future. https://e-archivo.uc3m.es/bitstream/handle/10016/36562/Keys_ITHE_2022.pdf?sequence=1
- Organisation for Economic Cooperation and Development. (2021). Micro-credential innovations in higher education: Who, what and why? OECD Education Policy Perspectives, No. 39, OECD Publishing, Paris. <https://doi.org/10.1787/f14ef041-en>.
- The Interaction Design Foundation (2021). What is design thinking? <https://www.interaction-design.org/literature/topics/design->

thinking#the_five_stages_of_design_thinking-2

University of the Philippines. (2021). Edu-Hack: Navigating a turbulent educational landscape -UPOU Networks. <https://networks.upou.edu.ph/eduhack/>

United Nations. (2020). Sustainable development goals: Goal 4 targets and indicators. https://sdgs.un.org/goals/goal4#targets_and_indicators

University of Southern Queensland (2020a). Recognition of prior learning. <https://www.unisq.edu.au/study/apply/recognition-of-prior-learning>

University of Southern Queensland (2020b). Short programs.<https://www.unisq.edu.au/study/degrees/opportunities/short-programs>

Flexible Learning Pathways and the Future of University Education

Zoe Yra C. Aluag and Ricardo T. Bagarinao

ABSTRACT

The proliferation of short-term online courses, massive open online courses, and open education resources, coupled with the global promotion of open education, can drive the morphing of university instruction in the future. These developments and the United Nations (UN)'s call for inclusive education can create several more flexible pathways for learning. Flexible learning pathways or FLPs can strengthen formal-to-nonformal education connection in a university. FLPs are multiple thoughtfully designed educational routes that cater to the needs of diverse learners. These pathways serve as both entry points and avenue for re-entry into formal university education where prior learning experiences can be validated and accredited towards a formal degree. But will university education move towards this direction? The paper seeks to discuss the potential of FLPs in addressing the demand for a more inclusive and flexible future education, creating a learning opportunity for all. Consequently, it will explore the concept of FLPs, showcase some current practices, and examine how this approach could define future university education. Moreover, the paper will outline the potential challenges and barriers that may impede the effective implementation of FLPs.



The Need to Revolutionize the Future of Education

In spite of the substantial increase in global literacy rate in the last six decades (from 67% in 1970 to 87% in 2020), basic education is still a challenge among developing countries (World Bank, 2022). Roser and Ortiz-Ospina (2016) reported that the world's poorest countries—Nigeria, Guinea, Somalia, and South Sudan—have exceptionally large segments of illiterate population, which has become a binding constraint to their economic development. In the Philippines, although literacy rate is very high at 96%, there is still a segment in the population aged 10 and above who is illiterate (Carpena, 2022). This is critical as there exists a strong relationship between education and income (Wolla & Sullivan, 2017). Many countries use education as fuel for social and economic development in this market-driven world. The United Nations Educational, Scientific and Cultural Organization (UNESCO)'s Education 2030 Agenda reflects this critical concern when it recognized education as a main driver of development and encouraged ministries of education throughout the globe to “commit with a sense of urgency to a single, renewed education agenda that is holistic, ambitious, and aspirational, leaving no one behind” (UNESCO, 2017, p. 7). Likewise, Sustainable Development Goal (SDG) 4 has fully captured this vision of ensuring an inclusive and equitable quality education that promotes lifelong learning opportunities for all.

The call to provide lifelong learning opportunities for all will indicate a changing profile of learners in the future and universities must revolutionize their educational systems to be able to address the diversity of their needs. In fact, there are already changes in the profile of learners in higher education in recent years, especially in higher education institutions (HEIs) that provide online learning. For instance, Ortagus (2016) and Barnes (2022) reported that virtual classrooms are receiving diverse groups of learners from working adults, full-time employees, parents, married individuals, and the like, as opposed to traditional learners who are single, unemployed, and, on the average, 18 years old. A similar profile could be observed at the University of the Philippines Open University (UPOU), an online learning HEI in the Philippines. Learners consist of individuals with ages ranging from 20 to 60 years old, with a predominance of single females who are working. This diversity of learners' profiles must be considered by universities as it may imply that these learners have different levels of learning capacity and needs. It means that universities must provide more student-centered, well-articulated, highly flexible, and more inclusive higher education opportunities

that allow learners to pursue a learning pathway tailored to them (Martin & Godonoga, 2020). Thus, it is possible that education in the university of the future will be characterized by various flexible learning pathways to address the call for providing education for all without compromising the quality of their education amidst the diversity of learners' learning capacities.

It is expected that flexible learning pathways (FLPs) can revolutionize the link between formal and nonformal structures of education in a university in the future. FLPs are multiple well-designed learning pathways that meet the needs of diverse learners. As such, FLPs can be seen as entry and re-entry points for a formal university education where knowledge, skills, and competencies acquired through nonformal and informal education will be recognized, validated, and accredited. But could this be the way forward for university education?

The paper aims to elucidate on the potential of FLPs in responding to the need for a more flexible and inclusive future education that can create opportunities for learning for all. As such, it will discuss the concept of FLPs, present FLPs practices, and discuss how such an approach can characterize future university education. It also presents some potential challenges and/or barriers that universities need to address to effectively implement FLPs in the future.

Flexible Learning Pathways: The Concept

Flexible learning pathways are multiple well-designed learning pathways that can serve as entry and re-entry points for all ages at every educational level. They can serve to strengthen the link between formal and nonformal structures by recognizing, validating, and accrediting knowledge, skills, and competencies acquired through them (Martin & Godonoga, 2020). They are tailored-fit to the student's individual learning needs. However, they are not simply learning pathways; they are coherent and well-articulated in such a way that they can elevate the significance of learning that occurs outside of formal education (UNESCO, 2017). FLPs are considered learner-centered where students are responsible for their own learning activities that meet their individual needs.

There are important concepts associated with FLPs. The European Union (2015) associated the idea of recognition of prior learning with FLPs for ease of transfer between institutions or programs. The traditional educational

system follows a very rigid structure with three levels: primary, secondary, and tertiary. However, this structure can only work effectively if students already have a predetermined path in their selected area of study. Moreover, dividing education into this hierarchy creates institutional obstacles that limit learning alternatives and choices (European Centre for the Development of Vocational Training [CEDEFOP], 2012).

In 2014, the CEDEFOP also added the concepts of transferability and articulation to FLPs. According to them, transferability can take two sides in FLPs—the learners' side and the institution's side. On the learners' side, transferability can refer to the capacity of learners to apply their acquired knowledge and skills to new situations such as a new occupation or educational environment. On the institution's side, it can refer to the capacity of educational and training systems to support learners' access and movement among different programs, levels, and systems. This involves validating learning outcomes acquired in another system or nonformal or informal settings. Related to this are the concepts of horizontal permeability, which is the notion of moving sideways between different learning opportunities or subjects at the same level of education, and vertical permeability, which pertains to the opportunity to continue or move up to higher levels of learning (Martin & Godonoga, 2020).

On the other hand, the idea of articulation refers to the systematic coordination among educational institutions to ensure efficient and effective mobility of students between them while creating seamless learning experiences for them (Martin & Godonoga, 2020). This involves the inking of agreements between institutions about their study programs or curricula. This is a critical step because “for individual HEIs, there are tensions between collaboration and competition in their relationships with other institutions” (Brennan, 2021, p. 11). In addition, each institution has a need to achieve recognition for the distinctiveness of their programs as well as for achieving a good match between their curricula and learners' needs. Hence, the inked agreements can effectively facilitate learners' movement between institutions. For instance, the relevance of agreements can be emphasized in the collaboration of secondary basic education and/or vocational institutions with HEIs when it comes to equitable access (Martin & Gaede, 2022). In this case, preparatory programs, recognition of prior learning, and even open entry policies can be effectively introduced as alternative paths for promoting flexible access to higher education. The agreements between these institutions may be focused on implementing

alternative approaches to admission such as contextual admission or the use of compensatory entry criteria so that those disadvantaged students with some prior learning experiences can be granted access to their degree programs. This will be discussed further as we talk about the relationship between FLPs and universities.

Aside from transferability and articulation, the idea of quality assurance (QA) is also of great importance to FLPs. According to Martin and Godonoga (2020), QA can facilitate recognition of prior learning as it can help establish trust between and among institutions of learning. Having a common framework of assessment for vocational education and higher education, QA can support comparability and transparency, which can be useful in either horizontal or vertical permeability of learners. This can be possible because the use of a common framework in QA can strengthen the coherence between academically oriented higher education and vocational education and training as Martin and Godonoga (2020) emphasized. It can also raise the value of informal and/or nonformal education and thus facilitate their recognition in students' progression to higher education.

Currently, FLPs established in various academic institutions have a wide range: from online courses, which allows students to access course content and participate in discussions and assignments remotely, using digital technologies (Smith & Brame, 2014); blended learning, which combines face-to-face instruction with online learning, creating flexibility for students in engaging with their course content in both environments (Smith & Brame, 2014); competency-based education, which allows students to progress through a course or program based on their ability to demonstrate mastery of specific skills or competencies, rather than on the basis of seat time or credit hours (Açıkgöz & Babadoğan, 2022); prior learning assessment and recognition, which allows students to receive academic credit for learning that they have acquired through work experience, nonformal learning, or other experiences outside of the traditional classroom (Wihak, 2007); micro-credentialing, which allows students to earn credentials or badges for specific skills or competencies rather than completing an entire course or program (McNamara & Sun, 2021); to open educational resources (OER), which provide students with access to free or low-cost educational materials, such as textbooks, videos, and interactive resources, that can be used to supplement or replace traditional course materials (McNamara & Sun, 2021). These pathways of flexible learning are expected to dominate university education in the future.

The Global Push for Flexible Learning Pathways

The future education of a university is expected to be characterized by diverse forms of FLPs as the push for inclusive, flexible, and equitable education grows each year. The push may be grounded on the UN's call for education for all as part of the SDGs. The intensification of strategies to attain SDG 4, which promotes and ensures more inclusivity and equity of quality education and lifelong learning opportunities for all, creates pressure among HEIs. Such pressure was enhanced when the Times Higher Education (THE) created a ranking system for universities worldwide that assesses their performance on SDGs. According to THE (2023), about 1,799 universities across 104 countries participated in the ranking process, which is more than 300% of the number of participating universities 3 years ago. The number is expected to increase annually. This highlights the growing interest of universities to contribute to the attainment of SDGs, including the goal for inclusive and equitable quality education to build or maintain their institutional reputation globally, and hence, the possibility of creating multiple FLPs to accomplish it.

On the other hand, there is a global call for countries to identify and formulate policies that will support the establishment of FLPs in higher education. A global research project on SDG 4, led by the UNESCO International Institute for Educational Planning (IIEP), was recently launched as an initiative to help countries identify and develop policy frameworks and policy instruments that enable FLPs in higher education for a variety of students—whatever their age, gender, financial situation, education level, and skills are (Martin & Furiv, 2020). This is also in line with UNESCO's Education 2030 Agenda, which sets to put a new vision for education for the next 15 years.

The agenda urges countries to establish an education system that is well-integrated and provides FLPs including entry and re-entry of students at all ages and educational levels (Martin & Godonoga, 2020). As Martin and Godonoga (2020) suggested, these initiatives can make higher education systems more accessible and more effective in achieving their missions and objectives as well as become better suited to serve the needs of their communities. Research, however, points to the fact that creating FLPs is a complicated process, driven by a range of factors at the national, institutional, and even individual levels. A suitable mix of regulations, policy frameworks, and instruments, as well as well-designed implementation procedures to guarantee that these routes are represented in HEIs'

practices, are essential to establish successful FLPs (Martin & Godonoga, 2020). Though at present, only a few countries had policies supporting FLPs (Martin & Godonoga, 2020), it is expected that more and more countries will join the bandwagon, given their experiences during the pandemic. The pandemic has opened several issues in education, including the rigidity of the structure and process, exclusivity, and inequality (Sharma, 2020) and governments around the globe are finding ways to reduce these gaps. In the Philippines, a review of the open and distance learning law and the free internet law has been proposed to make it more responsive to critical events such as the pandemic (Cordero, 2022). Policy responses such as these will likely shape the way education will be implemented in the future to make it more inclusive, flexible, and equitable.

The recent discussion on micro-credentials among universities worldwide may facilitate the implementation of FLPs in the future. With the increasing need for upskilling, re-skilling, re-training, and re-tooling employees at present to meet the competencies needed for the technology-mediated industrial processes, production operations, education, and even decision-making processes, more and more universities will be offering these micro courses soon. At UPOU, for instance, this has become part of its strategic programs. Each Faculty of Study has been encouraged to offer micro courses in collaboration with certain industries or with an intention to credit them as an admission qualification for its potential students. Although the idea is by no means new (Wang, 2022), governments might look at them to quickly meet the skills training needs of the recent labor market or as means for equitable access to education. They may see them as a potential response to the need to develop a labor force equipped with market-relevant competencies (Berdahl, 2021). With this perspective, governments may encourage, if not require, universities, especially those that received support from public funds to develop micro courses that can potentially upgrade the skills of the labor force or democratize access to good quality education; hence, the proliferation of FLPs in the future education of universities.

Flexible Learning Pathways: Practices and Milestones

Three cases are presented in this section—the FLP systems of Finland, Jamaica, and Malaysia as these cases were well-studied recently by the IIEP of UNESCO. These three are among the eight cases subjected to an in-depth analysis by the Institute. All three cases provide an in-depth analysis of how national policies, either centrally or de-centrally implemented, had affected the establishment of FLPs and their influence on institutional practices.

The Finland Case

In Finland, FLPs had been part of the national policy agenda for more than a decade. Currently, their overarching objective is to improve the accessibility and availability of higher education (Moitus et al., 2020).

In this case of FLP implementation, the government plays a critical role in the establishment of flexible pathways to education. It can be noted that, though HEIs in Finland have a high level of autonomy, it was the government that has developed several projects and implemented policies to support FLPs and continuous learning. Some of the key projects are part of previous Prime Minister Juha Sipilä's government program (Table 1).

Other instruments supporting FLPs in Finland include (a) funding model, (b) Finnish National Qualifications Framework (FiNQF), (c) European Credit Transfer System (ECTs), and (d) national QA of higher education (Moitus et al., 2020).

Finland is also known to provide free education and a study grant system. Aside from this and the legislative support, Finland's funding model proved to be the central steering mechanism that drives different HEIs to cooperate and provide continuous learning activities for learners (Moitus et al., 2020). Before, universities and universities of applied sciences (UASs) are mainly funded based on the number of students who completed their degrees without any delay; however, with the new funding model, they are incentivized for cross-institutional study initiatives (Moitus et al., 2020).

In the study by Moitus et al. (2020) reviewing Finland's FLPs in higher education, it was indicated that the Finnish National Framework for Qualifications (FiNQF), as well as the European Credit Transfer System (ECTS), is the basis and regarded as one of the preconditions in curriculum drafting. Both of these tools are also useful in the recognition of prior learning (RPL) processes and implementing transfer (Moitus et al., 2020). On top of that, QA in Finland is also an essential factor in assessing FLPs through field-specific and thematic evaluations, which, in turn, help significantly improve current policies and practices (Moitus et al., 2020).

Table 1

Examples of Previous Government-Funded Key Projects Developing Aspects of FLP in Finland

Name of project, years, participants	Project aims	Flexibility of the learning pathway	Practice	Achievements	Source
<p>Alternative path to university project</p> <ul style="list-style-type: none"> • 2018–2020 • 11 participating universities 	<p>To revise the existing Open University route and develop routes for secondary level students and guidance and advice services related to these routes</p>	<p>The paths are open to students (a) who do not have matriculation examination; (b) whose grades are not high enough for regular university admission; (c) who want to update their competence in the business world or implement a career change; (d) with upper secondary education, both general upper secondary and vocational students, to get familiar with</p>	<p>The Open University collaborated with universities in the country. Open University studies then become viable routes to degree studies for those who are not eligible to apply or would not be selected in a certificate admission or an entrance examination. Instead of retaking the entrance examination, they can take the Open University studies and use them as their admission</p>	<ul style="list-style-type: none"> • About 11 universities have participated in the project • Admitted about less than 1% of the degree students in the country 	<p>www.avoin.jyu.fi/en/open-university/projects/alternative-path</p>

	<p>Defa project</p> <ul style="list-style-type: none"> • Digital Education for All • 2019– 2021 • five participating universities 	<ul style="list-style-type: none"> • Opening first-year studies to everyone is being piloted in the field of information science – part of the introductory and basic studies can be taken as MOOC courses. • Aims to develop the digital offering of UAS studies to enable open year-round studying and flexible possibilities for specialization and cross-institutional studies 	<p>university studies and subjects without losing the status of a first-time applicant.</p>		<ul style="list-style-type: none"> • An alternative MOOC pathway created for information science Bachelor’s studies (in some universities as a part of the open studies pathway) • Opening of Campusonline.fi digital course platform by Finnish UASs 	<p>credentials toward a university degree. Students take Open University studies in one year and then they can seek admission to a university.</p>	<p>www.helsinki.fi/fi/projektit/digital-education-for-all</p>	<p>www.eamk.fi/en/project2/</p>
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	<p>https://bit.ly/cross-institutional</p>	<p>info.digicampus.fi/?lang=en</p>
<ul style="list-style-type: none"> • A variety of tools for recognition of work-based learning, digital pedagogics, guidance, and mentoring 	<ul style="list-style-type: none"> • University and UAS rectors have signed a framework agreement on teaching cooperation in December 2019 • Pilot models and support material 	<ul style="list-style-type: none"> • An online learning platform made available for registered students • Training, seminars, articles
<p>RiikE project</p> <ul style="list-style-type: none"> • Cross-institutional study development project), 2017 – 2019, • all Finnish HEIs 	<ul style="list-style-type: none"> • Through cross-institutional study pilots, aims to develop joint models of cross-institutional study and thus support students in utilizing the course provision other than their home HEIs. 	<ul style="list-style-type: none"> • Aims to create a digital cloud learning environment to support year-round study opportunities and to develop the physical and digital learning landscapes at campuses
<p>DigiCampus</p> <ul style="list-style-type: none"> • A shared digital learning environment, pedagogy, and services for HEIs • 2018–2020 • 17 universities and UASS 		

<p>TOTEEMI project</p> <ul style="list-style-type: none"> • Learning about work and for work • 2017 –2019 • 18 universities and UASs 	<ul style="list-style-type: none"> • Aims to create structures and practices to support higher education students' entry into the labor market 	<ul style="list-style-type: none"> • Conceptualization of work and study approach and models for student support, career counseling, and workplace cooperation • Research reports on combining work and studies 	<p>www.amktoteemi.fi/en</p>
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Note. Adopted and modified from Flexible learning pathways in higher education: Finland's country case study for the UNESCO International Institute for Educational Planning (IIEP-UNESCO) SDG4 project in 2018–2021 by S. Moitus, L. Weimer, & J. Välimaa. 2020, Finnish Education Evaluation Centre.

In line with these national projects, the government had also revised corresponding legislation to steer the development of policies at the institutional level (Table 2).

Table 2

A Summary of Legislative Regulatory Framework for FLP in Finland

Aspect of FLP	Corresponding legislation
General enablers for flexible learning pathways: study grant systems	<ul style="list-style-type: none"> • Financial aid is available in the form of study grant; government loan guarantee and some students can also be granted housing supplement. • All Finnish students enrolled in HE receive a monthly student grant (average/monthly: EUR 250.28); for full-time students that make satisfactory study progress and are in need of financial assistance. Financial aid is also available for studies abroad and for adult basic education. • Adult education allowances and scholarships for qualified employees are in place to support adults in developing their professional abilities and updating their competencies. Adult education allowance can only be granted for full-time study in degree or non-degree education. Adult education is also supported in the form of job alternation leave and study leave systems.
Co-operation between secondary level and HEIs	<ul style="list-style-type: none"> • The new Act on General Upper Secondary Education obligates the providers to organize part of the upper secondary studies in cooperation with HEIs for instance in the form of introductory and orientation courses.
Student admissions: open pathway, transfers, and other alternative pathways	<ul style="list-style-type: none"> • The HE legislation regulates the joint admissions system and defines the general eligibility criteria to apply to Bachelor's and Master's degree programs at universities and UASs. • Since 2015, there has been an obligation for HEIs to admit transfer students. • There is no legislation on the open studies pathway or the quota for this pathway. These decisions are to be taken by the HEIs.
Legislation on higher education degrees and continuous studies	<ul style="list-style-type: none"> • The names and lengths of the HEI degrees are regulated in the Decree of Degrees; however, HEIs can decide whether applicants are admitted into Bachelor's or directly into Master's degrees.

	<ul style="list-style-type: none"> • Since the beginning of 2020, the work-experience requirement for UAS Master's degrees was lowered from 3 years to 2 years (152/2018). • In addition to degree education, universities, and UASs may offer professional specialization studies (at minimum of 30 ECTS) that are targeted to professionals already in working life who wish to deepen their expertise. • Earlier, it was possible for HEIs to provide commissioned education only for citizens outside EU; now the HEIs can offer continuous studies to all.
<p>Recognition of prior learning</p>	<ul style="list-style-type: none"> • Based on the Universities Act, students have the right to obtain information on how the assessment criteria are applied to their study attainments. • In institutional Degree Regulations, HEIs define more precisely the goals and processes for recognition of prior learning.
<p>Cross-studying and institutional cooperation</p>	<ul style="list-style-type: none"> • Since 2018, teaching cooperation between HEIs as well as the possibility to purchase education from other institutions became possible by regulations (HE 23/2017); earlier cooperation mainly concerned joint provision of language studies.
<p>Guidance, counseling, and career guidance</p>	<ul style="list-style-type: none"> • The HEIs must arrange tuition and study guidance in a way that enables full-time students to complete their degrees within the prescribed normative time (Amendment 315/2011). • As a new aspect, based on the Act on General Upper Secondary Education, higher education applicants are now entitled to one-year post-application guidance provided by the HEI in question.

Note. Adapted and modified from Flexible learning pathways in higher education: Finland's country case study for the UNESCO International Institute for Educational Planning (IIEP-UNESCO) SDG4 project in 2018–2021 by S. Moitus, L. Weimer, & J. Välimaa. 2020, Finnish Education Evaluation Centre.

The Jamaica Case

Over the last decade, Jamaica has implemented policies that supported increased student participation and progression through the FLP framework.

According to the study by Barrett-Adams and Hayle (2021), such policies include the Career Advancement Program (CAP) and the Occupational Associate Degree (OAD). Under these policies and in line with their K-13 curriculum, students were given the option to pursue technical and vocational programs (TVET) to improve their qualifications for a formal bachelor's degree or a job. For instance, CAP ensures that students are equipped with the required qualifications and/or skills to move into another level of higher education or enter the job market by adding 2 years to their studies (Barrett-Adams & Hayle, 2021). It follows a 2+2 model, where the first 2 years of a 4-year bachelor's degree are equivalent to an associate degree. Then, the students can take the additional 2 years either as part-time or full-time learners while working to earn a bachelor's degree. As Barrett-Adams and Hayle (2021) emphasized, this system is the most advanced use of the credit transfer system in the country as students with an associate degree will only need to study for another 2 years in any university or community college to earn his or her chosen bachelor's degree.

It is interesting to note that even their Ministry of Labor and Social Security is strongly supporting these programs, where it created an information system known as the Labor Market Information System, which is helpful for FLPs graduates. The system links certified individuals to potential local and overseas employers, which makes graduates' entry into the labor market much easier than the conventional way of application (Barrett-Adams & Hayle, 2021).

The Malaysia Case

Lifelong learning is an important component of Malaysia's development plan. It is regarded as an important investment that could propel the development of its knowledge-based economy (Sirat et al., 2020). Viewed as such, the government began to re-focus its national educational agenda on developing more flexible pathways, especially for the nontraditional disadvantaged students (Table 3).

This agenda paved the way for the implementation of the following lifelong learning initiatives in the country: Accreditation of Prior Experiential Learning for Access and Credit (APEL-A & APEL-C), Open Distance Learning, and Massive Open Online Courses (MOOCs). The APEL-A provides access to academic programs through recognition of nonformal and informal learning, work, and life experiences, whereas APEL-C enables learners to transfer course credits to reduce redundancy (Sirat et al., 2020).

Table 3

New Strategic Objectives for Higher Education in Malaysia

National policy	Objective
Malaysian Education Blueprint 2015-2025 (2015)	<ul style="list-style-type: none"> • Focuses on providing lifelong learning opportunities through reskilling and up-skilling to meet changing skills demands and to recognize the potential of those outside the work force
Eleventh Malaysia Plan 2016-2020 (2016)	<ul style="list-style-type: none"> • Focuses on lifting up the bottom 40% of households and other disadvantaged groups by increasing the share of these groups with a higher education degree from 9% to 20% by 2020
Higher Education 4.0 Initiative (2018)	<ul style="list-style-type: none"> • Developed by the Ministry of Higher Education, it focuses on producing a competent and skilled work force for the 4th Industrial Revolution
Malaysia's Shared Prosperity Vision (2019)	<ul style="list-style-type: none"> • Emphasizes existing policies on lifelong learning

Note. Adapted from Flexible learning pathways in Malaysian higher education: balancing human resources development and equity policies by M. Sirat, A.K. Alias, H. Jamil, W.Z. Saad, M.S.B. Yusoff, M. Shuib, M. Selvanathan, M. Muftahu, M. Ghasemy, & M. Mohamed. 2020. Commonwealth Tertiary Education Facility (CTEF).

On the other hand, the ODL initiative ensures that ODL programs of individuals are accredited according to existing policies and guidelines. Though the accreditation process focuses on curriculum design, development, and delivery, assessment of student learning, student selection, and support services, academic staff, educational resources, program management and program monitoring, and quality improvement (Sirat et al., 2020), the initiative provides opportunities to individuals who have earned their qualifications through ODL to enter formal education. Similarly, the MOOC credit transfer system, which was established in 2016, allows crediting of all courses obtained through MOOCs. The credit for these courses is now eligible for credit transfer (Sirat et al., 2020).

Compared with Finland and Jamaica, Malaysia has a centralized higher education system (Martin & Godonoga, 2020). Therefore, the government allocates finances for program implementation, as well as incentivizing MOOCs (Sirat et al., 2020). They also fund the Malaysian Qualification

Agency, which is responsible for the development and implementation of guidelines regarding FLPs (Sirat et al., 2020). As these guidelines are initiated by the government, information about the initiatives on FLPs is widely disseminated at the institutional level.

Flexible Learning Pathways and Future Education in Universities

The strong support from governments, coupled with the increasing demand for an immediate re-skilling and retooling of the labor force in response to the growing technologization of the global market, can reshape university education in the future. Universities may respond in three ways to such a demand. One, offer more short-term courses via their nonformal continuing education program system, MOOCs, or micro-credentialing system. However, many universities, especially those who wish to contribute to the attainment of the SDGs, may maximize the use of these courses instead of just simply seeing them as a means to improve the qualifications of an individual. It is possible that they will consider these courses to be credited toward their degree programs to maintain their position and global reputation vis-à-vis the SDGs. Being educational institutions, they may consider it important to find ways to connect these short-term courses with their formal programs to make their education more inclusive, where individuals, especially the disadvantaged and marginalized, can find ways to earn a university education. As such, universities that have an existing transfer of credit system, such as the one practiced at UPOU and other HEIs in the country will expand the coverage of this system. Currently, this transfer of credit system only considers formal degree courses previously taken by the students. With the need to connect the nonformal with the formal education, universities may now include crediting of courses taken through MOOCs, micro-credentialing programs, nonformal continuing education programs, and other short-term programs.

Two, universities may revisit their admission policies for their formal degree programs. The current practice in some universities in the country and abroad requires potential students to take and pass an admission test, a qualifying examination, or meet certain grades before they can be accepted into the program. However, universities may reconsider these requirements in view of democratizing good quality education through the establishment of FLPs. The micro courses, for instance, can be used as substitutes for examinations or grade requirements for the admission of students into a university. As micro qualifications, they can have an assessment component

that can be used to evaluate the skills and readiness of the students for the degree program that they are applying for. Likewise, industries have important inputs in the creation of these micro courses (Pacific Community, n.d.); thus, the high standard and relevance of the courses will be ensured.

Moreover, with the changes in the educational landscape with emphasis on inclusivity and flexibility, many universities may open the admission of some of their academic programs, especially those at the pre-baccalaureate associate levels as part of their FLPs. According to Nelson (n.d.), opening the admission of these programs can widen the reach of university education. It can allow the inclusion of students who do not have the grades needed for a more selective admission process due to some difficulties during their high school education, students who have some mental concerns related to a competitive admission process, and/or students who are unable to finance the costs for taking the admission exam.

Three, universities in the future may strengthen their collaborations with each other and the important players in the labor market. This collaboration can streamline their programs and processes, as well as ease students' social mobility—an important ingredient for fostering sustainability. Although institutions have found themselves in a wide range of educational challenges today, their reactions to various disruptions need not be independent and isolated from one another (Lundy & Ladd, 2020). Their experience with the global pandemic may have offered them tremendous opportunities to collaborate and partner with other institutions, including the industries to stay relevant and strategic in the future. These collaborations can foster an important channel that can facilitate the movement of students between and among universities. For instance, if a needed competency is absent in one university, the student can be allowed to take and develop it in another university, where the courses that lead to such development will be credited toward the program of the student in his or her home unit. Though this is done at present through exchange student programs, there are only few universities that are given an opportunity to establish this program. Most of the time, the courses are not credited toward the program of the student in his or her home university. Or, in some cases, the student needs to take and pass a validation exam for the crediting of the courses. The collaboration can greatly facilitate not only the development of competencies but also the transfer of credits across universities.

As education is heralded as an important means of achieving sustainable

human development due to the number of positive contributions it brings across SDGs, the ease of moving horizontally or across universities can strongly support students' development of the much-needed competencies as well as earn the needed quality education necessary to attain a sustainable livelihood. With the recent shifts of universities' thrusts, which include the implementation of programs that focus on social justice and promoting sustainability (Appe & Barragán, 2017), easing students' mobility across universities as a form of university's FLPs is highly possible. Having programs on social justice and equity in education, universities may allow their students to get courses that can help improve their employability from other universities. This is important because education is always seen as a means to escape from poverty. Diedham and Ofei-Manu (2015) emphasized that good quality education can clearly aid in poverty reduction and support the economic growth of impoverished households, and developing nations, in general. Polacheck (2007) also pointed out that each additional year of study or schooling of individuals will strengthen their earning potential by an average of 10%. Thus, allowing students' mobility from one university to another can greatly increase the value of the qualifications of students, especially those coming from poor families.

Meanwhile, universities will continue to strengthen their collaboration with the labor market key players in the future. With the goals of enhancing innovations in technology-education integration, as well as maintaining the relevance of their education, universities will continue to establish linkages with the industry, government, nongovernment organizations, and/or other public sectors. Universities will perceive such collaboration as their contribution again to the attainment of SDGs and the country's innovation system. The collaboration itself will be perceived to drive knowledge production and flows of technology, as well as information between the universities and their partners (Reyes-Rios, 2022), and thus improve the quality of their education. With the rapidly changing labor market demands due to the integration of technologies into the various market processes, these key players will need to upskill their employees. This will incentivize the universities to enhance their FLPs to address this demand. Consequently, this will lead to the development and offering of more short-term courses or micro courses, which will dominate university FLPs.

Flexible Learning Pathways: Potential Challenges and Barriers

IIEP-UNESCO's research identified some challenges to the provision of FLPs:

“growth in demand for higher education, growth in numbers and types of providers, diversification of higher education institutions and programs, diverse student population” (Martin & Godonoga, 2020, p. 11). The rising demand for higher education has been observed, especially in middle-income countries, as they believed that a well-educated work force can increase a country’s competitiveness towards the sustainable development agenda and overall economic and social development (Martin & Godonoga, 2020). Considering the pattern of employment, it is apparent that the level of educational attainment and first-hand work experience can highly affect one’s income. As a result, following this trend, students in their late twenties looking to expand their knowledge represent more than one-third of all undergraduate students, mostly across Europe (Brennan, 2021).

To keep up with the demand, there has also been an increase in the numbers and types of providers, especially in the private sector (Martin & Godonoga, 2020). Because of this, the higher education sector has become more diversified. Institutions vary in terms of study orientation, levels of qualification, course offerings, and academic programs offered. Alongside these differences are the alternative forms of delivery, including distance, blended, or e-learning, which have been brought about by the emergence of digitalization, especially in the current COVID-19 pandemic (Martin & Godonoga, 2020).

As mentioned earlier, the need for upskilling and reskilling is one of the reasons for the surge in the number of nontraditional students enrolled in higher education. Apart from these, there are adult learners, returnees, and other people, who want to pursue higher education for reasons of their own, causing a more diverse student population. This entails a demand for HEIs to provide more opportunities for flexible learning to be able to respond to different learning needs (Unger and Zaussinger, 2018 in Martin & Godonoga, 2020).

According to Unger and Zaussinger (2018) in Martin & Godonoga (2020), the problem with the current measures on FLPs is that they are usually “based on singular institutional initiatives rather than on a coherent strategy covering all dimensions and goals associated with flexible learning” (p. 14). In some contexts, the process of transferring or even cross-registration or cross-study is reviewed subjectively, and most times, on a case-by-case basis.

For the successful implementation of policies, effective governance is important (Ferreyra, et al., 2017). However, there are multiple institutional actors involved in the decision-making process and a strict administrative hierarchy is usually followed (Martin & Godonoga, 2020). This makes coordination with a competent authority that could implement an overarching and coherent strategy or framework that serves as standard guidelines for all educational institutions an obstacle in the development of most education reforms.

Different organizations, ministries, or departments involved cause a buffer that makes collaboration, consultation, and overall communication inefficient (Ferreyra et al., 2017). The poor coordination among relevant institutions and authorities leads to a more fragmented system, which constrains articulation and makes development and implementation of FLPs even more complex (Martin & Godonoga, 2020).

Another thing to consider is the level of autonomy an institution has. Higher education governance varies in every country. The government's role in policymaking depends on the level and distribution of autonomy in an educational institution (Ferreyra et al., 2017). For countries whose institutions have high levels of autonomy, often initiatives for policies supporting FLPs take place within and among themselves (Martin & Godonoga, 2020). This highly affects the dissemination of information limited especially to disadvantaged learners.

Another factor affecting the segmentation of education is competition among HEIs (Brennan, 2021). Increase in competitiveness is often fueled by ranking systems implemented and the need to be differentiated in a market-driven environment (Walls & Pardy, 2010 in Martin & Godonoga, 2020). Since they all have different objectives, this may likely diminish their willingness to interact and collaborate with one another, thereby affecting permeability and flexibility in learning.

Lastly, aside from bureaucratic and economic hurdles, there are also institutional factors affecting permeability and transferability. Some of them are rigid course schedules, admission requirements, and curricula, among others (Martin & Godonoga, 2020). Permeability is also influenced by the failure to adopt provisions on transfer credit policies, which remain essential to address the occupational and professional needs of nontraditional learners (Handel & Williams, 2012). In a report by the Organisation for

Economic Cooperation and Development (OECD, 2014), they mentioned that articulation from vocational to academic programs remains problematic even when standards are set by authorities.

Concluding Remarks and Recommendations

The future of universities' education will be shifted to address social justice and sustainability. With the shift, universities will create a system, which makes their education more flexible and highly inclusive. One way to do it is to establish FLPs in its educational program. These pathways, which will include open admission, development and offering of micro courses, establishment of recognition of prior learning and transfer of credit system, and ease in students' mobility (e.g., university to university, program to program, university to industry, etc.) will characterize the future education of universities. Such future university education trajectory will be made possible because universities will become more responsive to the call for an inclusive, flexible, and sustainable education for all.

However, the effectiveness of policies supporting FLPs requires strong administrative capacity and coordination from all relevant stakeholders, as well as participation from those who design, implement, and benefit from these policies (Martin & Godonoga, 2020).

Some countries have fragmented elements of FLPs already embedded in their policies. But because of the level of autonomy an institution has, government policies overlap, and sometimes, contradict the institutional level (Martin & Godonoga, 2020). For Finland, a more comprehensive policy approach to FLPs, including a national definition for FLPs, is one of their recommendations to resolve this problem (Moitus et al., 2020). Institutions should also not limit FLPs programs as add-on activities. Instead, the programs need to be fully integrated into the mainstream activities in higher education (Moitus et al, 2020).

According to Handel and Williams (2012), higher education providers can have successful permeability between other providers, if institutions have a shared "transfer-affirming culture." More than that, offering academic support to students might lead to a more favorable learning outcome (Handel & Williams, 2012). To do this, the lack of information about the alternative pathways that students can take should also be addressed. By having adequate guidance, students can make better informed decisions,

which may in return lower dropout rates and improve retention rates (OECD, 2016).

When it comes to information and guidance services, studies found that there is still a lack of awareness regarding existing flexible and alternative pathways in the system (Moitus et al., 2020). Social inequalities remain a challenge for HEIs (Brennan, 2021). This problem applies particularly to those who are from disadvantaged backgrounds. On their initiative, some universities and colleges developed their own programs to ensure fair access for disadvantaged students. To support and solidify this commitment to social equity, the government should also tailor national information and guidance services to help students navigate different pathways (Moitus et al., 2020).

Lastly, there are still limited studies involving FLPs. While there are attempts and, for some, existing policies that foster FLPs, the government should invest more resources, especially when it comes to monitoring and evaluation systems (Moitus et al., 2020). Data need to be gathered to monitor the effectiveness of FLPs in helping students enter, pass through, and finish higher education (Barrett-Adams & Hayle, 2021). This is essential to all countries practicing and implementing FLPs to improve sharing of good practices among different countries. At the same time, this would help in sustaining the project over the long term.

References

- Açıkgöz, T. & Babadoğan, M.C. (2022). Competency-based education: theory and practice. *Psycho-Educational Research Reviews*, 10(3), 67–95. <https://files.eric.ed.gov/fulltext/EJ1326834.pdf>
- Appel, S., & Barragán, D. (2017). Universities, NGOs, and civil society sustainability: preliminary lessons from Ecuador. *Development in Practice*, 27(4), 472–486. <https://doi.org/10.1080/09614524.2017.1303035>
- Barnes, E. (2022). *Addressing the changing faces of college students*. Fierce Education. <https://www.fierceeducation.com/leadership/addressing-changing-faces-college-students>
- Barrett-Adams, D. B., & Hayle, C. (2021). Integrated higher education in support of flexible learning pathways in Jamaica. <https://unesdoc.unesco.org/ark:/48223/pf0000378001/PDF/378001eng.pdf.multi>

- Berdahl, L. (2021). *Why faculty need to talk about microcredentials*. [Online]. <https://www.universityaffairs.ca/career-advice/the-skills-agenda/why-faculty-need-to-talk-about-microcredentials/>
- Brennan, J. (2021). *Flexible learning pathways in British higher education: A decentralized and market-based system*. Report for the IIEP–UNESCO Research ‘SDG 4: Planning for flexible learning pathways in higher education. International Institute for Educational Planning, UNESCO. <https://www.qaa.ac.uk/docs/qaa/about-us/flexible-learning-pathways.pdf>
- Carpena, J.M.A. (2022). *Improving literacy through the use of ICTs*. <https://www.dlsu.edu.ph/improving-literacy-through-the-use-of-icts/> [Online Resource]
- European Centre for the Development of Vocational Training [CEDEFOP]. (2012). *Permeable education and training systems: Reducing barriers and increasing opportunity*. Publications Office of the European Union. https://www.cedefop.europa.eu/files/9072_en.pdf
- Cordero, T. (2022). Gatchalian wants review of free internet, distance learning laws. *GMA News Online*. <https://www.gmanetwork.com/news/topstories/nation/848933/gatchalian-wants-review-of-free-internet-distance-learning-laws/story/>
- Diedham, R.J. & Ofei-Manu, P. (2015). The role of education in the sustainable development agenda: Empowering a learning society for sustainability through quality education. In Zusman, E., Olsen, S. & Bengtsson, M (eds.). *Achieving the Sustainable Development Goals: From Agenda to Action* (p. 93–129). Institute for Global Environmental Strategies. https://www.iges.or.jp/en/publication_documents/pub/bookchapter/en/4931/05_Ch5_Achieving_the_SDGs_.pdf
- European Union. (2015). *Dropout and completion in higher education in Europe main report*. Publications Office of the European Union. <https://doi.org/10.2766/826962>
- Ferreira, M. M., Avitabile, C., Álvarez, J. B., Paz, F. H., & Urzúa, S. (2017). *At a crossroads: Higher education in Latin America and the Caribbean*. World Bank. <https://documents1.worldbank.org/curated/en/271781495774058113/pdf/114771-PUB-PUBLIC-PUBDATE5-2-17.pdf>
- Handel, S., & Williams, R. (2012). *The promise of the transfer pathway: Opportunity and challenge for community college students seeking the baccalaureate degree*. <https://files.eric.ed.gov/fulltext/>

ED541978.pdf

- Lundy, K. & Ladd, H. (2020). *Why collaboration is key to the future of higher education*. EY Parthenon. https://www.ey.com/en_ph/strategy/strategies-for-collaborating-in-a-new-era-for-higher-education
- Martin, M., & Furiv, U. (2020). COVID-19 shows the need to make learning more flexible. *University World News*. <https://www.universityworldnews.com/post.php?story=20200324115802272>
- Martin, M. & Gaede, M. (2022). Paving flexible learning pathways: From policy to practice. *University World News*. <https://www.universityworldnews.com/post.php?story=20221104131753258>
- Martin, M., & Godonoga, A. (2020). *SDG 4-policies for flexible learning pathways in higher education: Taking stock of good practices internationally*. IIEP UNESCO Working Papers, International Institute for Educational Planning, Paris, France. <https://unesdoc.unesco.org/ark:/48223/pf0000372817>
- McNamara, B. & Sun, Q. (2021). *Micro-credentialing in adult learning: International Considerations*. Paper presented at the American Association for Adult and Continuing Education (AAACE) Commission for International Adult Education (CIAE) Annual Pre-Conference (70th, Miramar Beach, FL, Oct 4-5, 2021). <https://files.eric.ed.gov/fulltext/ED625472.pdf>
- Moitus, S., Weimer, L., & Välimaa, J. (2020). *Flexible learning pathways in higher education: Finland's country case study for the UNESCO International Institute for Educational Planning (IIEP-UNESCO) SDG4 project in 2018–2021*. Finnish Education Evaluation Centre. https://karvi.fi/app/uploads/2020/09/KARVI_1220.pdf
- Nelson, V. (n.d.). *What does college “open admission” mean?* College Parent Central. <https://www.collegeparentcentral.com/2013/02/what-does-college-open-admission-mean/>
- Organisation for Economic Cooperation and Development [OECD]. (2014). *Skills beyond school: Synthesis report*. OECD Reviews of Vocational Education and Training. <http://dx.doi.org/10.1787/9789264214682-en>
- Organisation for Economic Cooperation and Development [OECD]. (2016). *Education in Colombia: Reviews of national policies for education*. OECD Publishing. <https://www.oecd.org/education/school/Education-in-Colombia-Highlights.pdf>
- Ortagus, J.C. (2016). From the periphery to prominence: An examination of the changing profile of online students in American higher

- education. *The Internet and Higher Education*, 32, 47-57. <https://doi.org/10.1016/j.iheduc.2016.09.002>
- Pacific Community. (n.d.). *Micro-qualifications*. <https://eqap.spc.int/micro-qualifications>
- Polachek, S. W. (2007). *Earnings Over the Life Cycle: The Mincer Earnings Function and its Applications*. IZA Discussion Paper No. 3181. <https://docs.iza.org/dp3181.pdf>
- Reyes-Rios, C. (2022). *Higher education and industry collaborations: A primer*. United States Agency for International Development. <https://bit.ly/4040x6G>
- Roser, M., & Ortiz-Ospina, E. (2016). "Literacy". OurWorldInData.org. <https://ourworldindata.org/literacy>
- Sharma, N. (2020). *Torn safety nets: How COVID-19 has exposed huge inequalities in global education*. World Economic Forum. <https://www.weforum.org/agenda/2020/06/torn-safety-nets-shocks-to-schooling-in-developing-countries-during-coronavirus-crisis/>
- Sirat, M., Alias, A. K., Jamil, H., Saad, W. Z., Yusoff, M. S. B., Shuib, M., Selvanathan, M., Muftahu, M., Ghasemy, M., & Mohamed, M. (2020). *Flexible learning pathways in Malaysian higher education: balancing human resources development and equity policies*. Commonwealth Tertiary Education Facility (CTEF). https://www.ctef.com.my/images/Publications_2020/FLP_2020.pdf
- Smith, B., & Brame, C. (2014). *Vanderbilt University Center for Teaching*. <https://cft.vanderbilt.edu/guides-sub-pages/blended-and-online-learning/>
- The World Bank. (2022). *Literacy rate, adult total (% of people ages 15 and above)*. <https://data.worldbank.org/indicator/se.adt.litr.zs>
- Times Higher Education [THE] (2023). *World university rankings 2023*. <https://www.timeshighereducation.com/world-university-rankings/2023/world-ranking>
- United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2017). *Education 2030 Incheon Declaration: Towards inclusive and equitable quality education and lifelong learning for all*. UNESCO Institute for Lifelong Learning, (p. 6). https://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf
- Wang, L. (2022). *Micro-credentials: An important part of a bigger ecosystem*. <https://bangkok.unesco.org/content/micro-credentials-important-part-bigger-ecosystem>
- Wihak, C. (2007). *Prior learning assessment & recognition in Canadian*

universities: View from the web. *Canadian Journal of Higher Education*, 37(1), 95-112. <https://files.eric.ed.gov/fulltext/EJ771050.pdf>

Wolla, S.A., & Sullivan, J. (2017). *Education, income, and wealth. Page One Economics*. <https://research.stlouisfed.org/publications/page1-econ/2017/01/03/education-income-and-wealth>



Immersive Open Pedagogies in the University of the Future

Roberto B. Figueroa, Jr. and Alexander G. Flor

ABSTRACT

This paper delves into the immersive open pedagogies program of the University of the Philippines Open University (UPOU), shedding light on the rationale, past, present, and future of the initiative. It offers a comprehensive overview of the university's open pedagogical approach, highlighting its commitment to inclusivity and accessibility and enhancing learning experience. The article chronicles how the program came into existence as well as the projects that contributed to building its portfolio. It also discusses current endeavors, detailing the strategies, methodologies, and technologies while reflecting on how the program can help strengthen the foundations necessary to establish UPOU as the university of the future.



Institutionalizing Immersive Open Pedagogies Research and Practice at UPOU

Since its inception and founding in 1995, the University of the Philippines Open University (UPOU) has adopted instructional technology and mediated pedagogy to enhance access to quality higher education. It has pioneered online learning and its attendant pedagogies to the point that the expertise is fairly well-distributed among its faculty members and is an indispensable mainstay in its teaching-learning model. The fruits of its pioneering labor were seen during the pandemic when many higher education institutions (HEIs) shifted into emergency remote teaching and received assistance from UPOU's established practices and guidance. Furthermore, as academic institutions started reopening their physical halls at the beginning of 2023, the prospect of returning to traditional in-person classes became less exciting among higher education stakeholders, including parents who were exposed to the economics of remote learning, students who have experienced its affordances and flexibilities as well as faculty members who have witnessed that this system can indeed work. However, the currently established methods of remote learning have their limits. A real concern is the choice of pedagogy for online laboratory or hands-on courses for both general education and specialized courses. Furthermore, supplementing or virtualizing courses and other learning activities that would provide context-based and situated learning like educational tours have continued to become a challenge with the current range of technologies being used.

However, these limitations can be bridged by recent advances in technology that aim to augment spatial limitations. Virtual reality (VR) and augmented reality (AR), which are both collectively called extended reality (XR), have been rising in prominence as tools for teaching and learning. These technologies have started to transform training in medicine (Riva, 2003) by providing realistic simulations for doctors and other practitioners to safely train their skills on operations that involve extremely fragile and sensitive parts of the human body (Vigialoro et al., 2021). Another networked set of immersive environments called the metaverse is becoming increasingly popular because of the emerging importance of smart cities. XR in education is now known as immersive learning (IL), the process of providing a learning activity or creating a learning experience using simulated, artificial, or virtual environments. These environments enable participants to be immersed in simulated experiences within the actual but virtual learning environment resulting in higher student satisfaction, motivation, and learning outcomes

(MacCallum et al., 2019; Merchant et al., 2014; Violante & Vezzetti, 2015). Thus, XR is becoming instrumental in building digital competitiveness in the education sector.

Digital twins and the metaverse have fed the minds of future thinkers. An example is the MetaOmniCity framework (Kuru, 2023) which emphasizes the formation of virtual societies or MetaSocieties that could influence and be influenced by the physical components of Smart Cities (SCs) through their digital twins and the Internet of Things (IoT). This cyber-physical existence and dynamics would allow students in SC schools to collaborate in hybrid laboratory activities. For example, a group consisting of students who are attending the physical laboratory and its digital twin can fabricate objects using a 3D printer. Students attending in the metaverse can operate the physical 3D printer by interacting with its digital twin while students attending from the physical lab can also change the model of the object being printed by interacting with it through their avatars in the metaverse. As wearable computing becomes more prevalent and ubiquitous, metaverse transactions can be seamless as XR glasses can be worn by students in a non-obtrusive way. As proof of this, the company Rayban just released stylish glasses that would make their wearers use AR without having to worry about ergonomics or being unfashionable (Sag, 2022).

An Introduction to Immersive Open Pedagogies

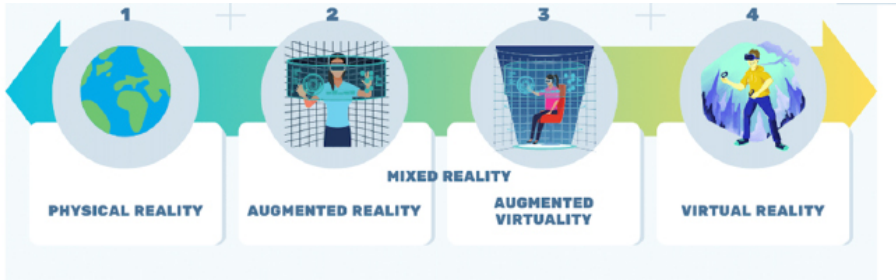
The term *immersive open pedagogy* was coined by the authors when they were conceptualizing a center for immersive learning in the context of the open university. It was defined as an “educational approach that integrates the principles of open pedagogy with immersive learning.” In order to appreciate the extent of its epistemology, it is good to dissect it and understand its component concepts. We can simply define immersive learning as learning with the help of immersive technologies. This is a different contextualization of the word “immerse” where it can also refer to learning while being physically immersed in a social group or place.

Immersive technologies such as VR and AR refer to both the environment and the tools used to create or traverse them. Immersive technologies are also dubbed as XR. Milgram and Kishino’s reality-virtuality continuum describes these technologies (1994). Figure 1 shows an illustration of this continuum. The “real environment” is on the leftmost side of the continuum and is also called physical reality. Moving to the right, we can see VR and AR,

which are popular forms of immersive technologies.

Figure 1

Reality-Virtuality Continuum by Milgram and Kishino (Illustrated by Roberto B. Figueroa Jr. CC-BY-ND)



Virtual reality systems like the Oculus Quest and HTC Vive virtually transport users to various digital worlds through a combination of hardware and software that creates a real-time, computer-generated 3D environment that users can navigate and interact with. Augmented reality integrates text, visuals, music, and other virtual objects with physical reality. It is also called mixed reality (MR) since it combines virtual and tangible objects. Augmented virtuality (AV) refers to a combination of technologies that allow real world objects to be represented in real time in the virtual world and interact with it. It used to be a hypothetical concept until head-mounted displays (HMDs) like the Oculus Quest 2 arrived. The boundaries are blurring increasingly as technologies evolve as we already see MR dominating the market.

Then, there is this newcomer that does not really belong to a single point in the continuum, the metaverse. We can say that even though it was not included in the continuum, the metaverse utilizes the same immersive technologies. One really comprehensive definition from Dr. Stylianos Mystakidis (2022, p. 486) is this:

The Metaverse is the post-reality universe, a perpetual and persistent multiuser environment merging physical reality with digital virtuality. It is based on the convergence of technologies that enable multisensory interactions with virtual environments, digital objects and people such as virtual reality (VR) and augmented reality (AR). Hence, the Metaverse is an interconnected web of social, networked

immersive environments in persistent multiuser platforms. It enables seamless embodied user communication in real-time and dynamic interactions with digital artifacts. Its first iteration was a web of virtual worlds where avatars were able to teleport among them. The contemporary iteration of the Metaverse features social, immersive VR platforms compatible with massive multiplayer online video games, open game worlds and AR collaborative spaces (para. 1).

While its definition is expanding and evolving, we would suggest treating it as social XR for now. Immersive learning is simply learning with these technologies.

What about open pedagogy? While the term can mean the contextualization of IL for open universities like UPOU where education is delivered through open and distance e-learning (ODEL), there are other important elements of it that we need to explore. Tietjen and Asino (2021) defined open pedagogy (OP) through a framework that describes the concept as a comprehensive approach that values learners' diversity and culture and treats them as design partners. It is a participatory pedagogy that involves numerous stakeholders and heavily relies on open licensing to enable crucial actions like changing, reusing, and remixing, despite potential cross-cultural conflicts. Promoting knowledge-building, OP encourages learners in diverse settings to share, review, modify, and contribute information. OP also promotes collaboration through sharing, reviewing, and editing. We at the UPOU embrace these explications of open pedagogy and are mindful of three principles of our immersive open pedagogy (IOP)-initiatives: open projects, open data, and open educational resources (OER).

So why is there interest in IOP at our university? The UPOU had been doing IL projects since the late 2014 albeit from individual scholars or practitioners. However, the COVID-19 pandemic made policymakers and decisionmakers look into immersive technologies like VR and AR as next-generation tools that we should consider in remote learning contexts. This led to the strategic move to propose a center for immersive open pedagogies at our university. After several rounds of presentations and revisions at various levels of the institution, the Immersive Open Pedagogies Program was born. The program was envisioned to guide the equitable and inclusive implementation of immersive technology-aided pedagogies at the university by leveraging on the powerful capabilities of extended reality for simulating real-world

experiences and dealing situations that were collectively referred to as DICE by leading VR researcher, Jeremy Bailenson (2018). DICE stands for dangerous, impossible, counterproductive, and expensive situations and are the ones identified by Bailenson to be appropriate training contexts for VR. This would eventually lead to opening up plans for the university of the future to train students in fields that are currently impossible to tackle due to unavailability of expensive equipment (like medicine and aviation) or the danger of conducting training sessions (like those involving high elevations and risky depths).

Envisioning IOP's Evolution into a Center for the University of the Future

True to the nature of the UPOU, it can leverage on immersive technologies with emphasis on openness through a program for IOPs.

As mentioned earlier, the qualifier “open” highlights the learner-centered emphasis on pedagogy. The plural “pedagogies” is applied for the diversity of approaches and combinations emergent from this IL initiative. The phrase “open pedagogies” differentiates this program from any other IL establishment or undertaking anywhere in the world. It also supports and reinforces UPOU’s commitment to develop OERs and support the open-science and open-source movement. Moreover, building immersive OERs would ensure access, affordability, inclusion, and equity for learners. This involves not only searching for the cutting-edge and modern but also curating what can be readily used by disadvantaged populations and looking for ways of providing more access for as many people as possible to these kinds of technologies and resources.

Having pioneered in ODeL in the Philippines and Southeast Asia, UPOU is positioned to explore the pedagogical applications of IL among the university’s constituent units, given its experience in prototyping, evaluating, and using immersive technologies through some of its past and present academic, research, and public service projects. Research and development (R&D)—defined as the set of innovative activities undertaken by organizations in developing new services or products, and improving existing ones—can be argued as an appropriate approach to introducing this novel set of technologies in its pedagogical environment. An immersive learning R&D program allows the university to diffuse this innovation efficiently and effectively to its constituents and tap economies of scale along with networking and spatial transcendence. However, we envision the program

to be elevated as a center in the near future.

Given that the field of IOPs is multidisciplinary in nature, a center would have the financial and administrative autonomy and capacity to invite and host fellows not only from the fields of educational and immersive technology but also from critical fields (such as economics and environmental sciences) that are needed to make these developed resources as accessible, inclusive, ethical, sustainable, and eco-friendly as possible. Allowing UPOU to explore and trail-blaze into these cutting-edge technologies while being guided by the ethos of open and inclusive education will likewise pave the way for the development of learning models, accumulation of lessons learned, and methodical application of immersive technologies for inclusive, learning-centered, open education. As a center, it can more effectively diffuse innovative resources and technologies systematically from faculties of study and other units in the university to other constituent universities (CUs) of the University of the Philippines (UP) system, HEIs, and technical-vocational education and training (TVET) centers in the country.

While the program serves its current purpose of streamlining related projects, a center can help project a stronger identity to external partners, which will create a conducive environment for successful grant applications from international funding agencies and facilitate partnerships and other forms of collaboration with external academic and corporate entities. Establishing a center can solidify UP's pioneering work in this very exciting field. As a reference, Tokyo University has recently announced the establishment of the Department of Metaverse Engineering, which has secured its place as a pioneer in a related field. Therefore, it is crucial that this center be considered in earnest and approved at the earliest opportunity. However, the program sees the need to strengthen its portfolio to get recognition that could help it achieve its vision.

Initiatives

To achieve this, the current strategy at the IOP program is to build on the existing IL literature as well as past projects of the university and strategically add to their diversity while maintaining its focus on its unique nature. These projects include developing AR-enabled learning materials for nursing communication programs in the Philippines and Thailand. This resulted in two publications: "Augmented Reality in Nursing Education: Addressing the Limitations of Developing a Learning Material for Nurses in the Philippines

and Thailand” (Pugoy et al., 2016) and “The Talking Comic Strip: Technology-Enhanced Learning for English Communication” (Pugoy et al., 2020). Virtual reality projects included the simulated scenarios during the era of Jose Rizal, which was from an earlier thesis by Cantada (2011); the VR tour projects regarding campus-related information and language learning conducted by Dr. Figueroa and colleagues (2020, 2022a, 2022b) as well as spatial related studies on forest ecosystem services using VR tours (Figueroa, 2023).

The positive outcomes from the aforementioned studies emphasized the potential of such immersive technologies in facilitating language learning and offered a promising direction for the reimagining of the pedagogical landscape. The current endeavors of the IOP program are primarily focused on sustaining institutionalized research projects. The principal objective is to generate comprehensive and practical knowledge that can be efficiently incorporated into ODeL practices. The IOP program is currently involved in a range of research projects, each one designed to uncover new strategies and methodologies that will enhance the pedagogical practices of the UPOU. Among the notable projects, one initiative explores the utilization of technology-enhanced learning tools like the metaverse to foster a more collaborative and interactive learning environment. These projects are not only paving the way for innovative teaching practices but are also contributing significantly to the body of knowledge in the field of ODeL.

The IOP’s key current projects include:

- The IOP 3D Website
- The UPOU VR Tour
- Philippine VR Tours
- Perma-Garden VR Tour
- Digital Twins and Metaverse Projects
- Building Networks and Communities of Practice

The IOP 3D Website

The IOP 3D website embodies the IOP program’s commitment to harnessing technology in order to create engaging pedagogical tools. This project aims to design and create an interactive, 3D website to provide an immersive experience for students at UPOU.

UPOU VR Tours

The UPOU tours, both in A-Frame and 3DVista formats, are virtual campus tours that allow prospective and current students to explore the university campus from the comfort of their own homes. This initiative was developed in response to the need for accessibility and inclusivity in ODeL.

Philippine VR Tours

The Philippine Tours project is a virtual tour initiative that aims to give students a glimpse of the diverse cultural and natural heritage of the Philippines. This project utilizes advanced VR technologies to create immersive experiences of various locales in the country.

Perma-Garden VR Tour

The Perma-Garden VR Tour project uses VR to provide an interactive, 3D tour of a permaculture garden. Students learn about permaculture principles and practices through firsthand, although virtual, experience.

Digital Twins and Metaverse Projects

Digital twins and metaverse exhibits have become notable tools in the realm of sustainability education within IOPs. Digital twins, essentially virtual replicas of physical systems, offer a way for students to engage with complex sustainability issues in a hands-on, immersive manner. They provide a safe environment where learners can experiment, test hypotheses, and see the immediate implications of their actions without the risk or resource expenditure inherent in real-world experiments. In a similar vein, metaverse exhibits offer a broader, more interconnected immersive experience. These shared virtual spaces allow learners to interact not just with individual systems but with an entire world built around sustainability principles. They provide a context in which the interconnected nature of sustainability challenges becomes apparent, promoting a holistic understanding of the field. Both of these tools have been employed in past IOP projects, with promising results.

Building Networks and Communities of Practice

The IOP program has been instrumental in fostering affiliations and partnerships with various networks, each aiming to enrich the landscape of IL and collaborative practice. A noteworthy alliance is with the Mixed,

Augmented, and Virtual Realities in Learning Special Interest Group of the Japan Association for Language Teaching. This association hosts regular events that serve as dynamic platforms for collaboration, fueling interest among the community of practice (CoP).

Beyond this, a recent strategic partnership with the International Journal for Information Technology in Governance, Education, and Business has been formed. Both entities have committed to co-editing annual issues dedicated specifically to IL laboratories and their multifarious projects. This collaboration will allow a wider dissemination of research findings, innovative concepts, and best practices in the field. This was a byproduct of the recent formation of a CoP among various stakeholders, administrators, and researchers of IL laboratories. The CoP is supported by virtual events in the metaverse and an annual hybrid gathering titled: “World Immersive Learning Labs Symposium.”

These partnerships and networks are a testament to the IOP program’s commitment to fostering a vibrant and innovative learning community. They provide opportunities for collaboration, knowledge sharing, and mutual learning, propelling the program forward in its mission to redefine IOPs.

Challenges and Opportunities

The IOP program, despite its innovative nature and promising potential, has faced an array of challenges and opportunities throughout its development. A core challenge, which has been a recurring theme since the inception of the program, is the lack of a dedicated physical facility or a laboratory equipped with development and testing hardware and software for IL applications. This has been addressed by the allocation of space for an IL laboratory and other relevant spaces at the newly built multimedia center building.

Even with the availability of infrastructure and funds as well as UPOU’s strong administrative support, the team will still have to contend with delays associated with the government procurement process as well as finding the right person for each role related to running the laboratory. Being a relatively new field, developing applications for extended reality requires specific design and information technology-related skills. It may be difficult to hire somebody who would be able to immediately start to develop applications that will be used in the project. Thus, it is important to incorporate capacity building and training of future professionals in its IT-related academic programs. The growing interest in the convergence of virtual and physical

systems through the IoT, artificial intelligence, and blockchain technology will definitely need constant planning in anticipation of future trends, such as the increasing ability to influence and manage physical systems and environments through multi-user environments like the metaverse.

As the program gears up to support UPOU as the university of the future, it has been actively co-hosting several international symposia and workshops on IL since 2022 in collaboration with international and interdisciplinary organizations. While joining these organizations can also provide international funding and networking opportunities, another goal is the establishment of a worldwide network of immersive laboratories. Establishing this network would create more opportunities for learners to access immersive technology-enabled learning platforms anytime and anywhere, which can truly manifest the open, inclusive, collaborative, and accessible nature of the program.

Our Way Forward

In addressing the challenges and in seizing opportunities in the field of science communication, an important stride has recently been made with the approval of a 2-year project funded by the Department of Science and Technology's Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST PCIEERD) and UPOU. This project aims to establish the program's IL lab named Immersive Science Communication Open Laboratory (ISCOLAB), an innovative endeavor that will focus on developing immersive OERs for environmental and sustainability science communication. By leveraging the capabilities of immersive technology, ISCOLAB endeavors to enhance the accessibility and engagement of science communication, particularly in the realm of environmental sustainability. This project is expected to pave the way for a more dynamic and interactive approach to delivering complex climate information, thereby making these data more comprehensible and actionable for a larger audience.

The initial focus will be on environmental and sustainability science communication, a critical area that requires innovative approaches to ensure that crucial information reaches various stakeholders effectively. As ISCOLAB commences, it presents a promising future direction for IOPs. With the support of DOST PCIEERD and UPOU, the project pioneers an initiative that aligns with the global advancement of immersive OERs. It not only offers an innovative solution to the current challenges of science communication but also sets a precedent for future projects in this field related to nation

building while strengthening one of the important pillars of the university of the future: sustainability. The successful implementation of ISCOLAB could provide a template for other open universities to enhance their pedagogical strategies, further broadening the impact of this groundbreaking initiative and bringing us closer to an imagined university of the future.

References

- Bailenson, J. (2018). *Experience on demand: What virtual reality is, how it works, and what it can do*. WW Norton & Company.
- Cantada, R. P. (2011). *Exploratory approaches to the design and development of a game for a distance education course in Philippine history* [Unpublished master's special project]. University of the Philippines Open University. Retrieved January, 14, 2012.
- Figueroa Jr., R. B., Gil, F. A. P., & Taniguchi, H. (2022a). Piloting virtual reality photo-based tours among students of a Filipino language class: A case of emergency remote teaching in Japan. *Avant*, 13(2)
- Figueroa Jr., R., Gil, F. A., Taniguchi, H., & Esguerra, J. R. (2022b). Virtual reality photo-based tours for teaching Filipino vocabulary in an online class in Japan: Transitioning into the new normal. *International Journal in Information Technology in Governance, Education and Business*, 4(1), 29–41. <https://doi.org/https://doi.org/10.32664/ijitgeb.v4i1.95>
- Figueroa Jr, R.B.(2023). Immersive capability and spatial presence in virtual reality photo-based tours: Implications for distance education. *Asian Association of Open Universities Journal*, Vol. 18 No. 3, pp. 201-217. <https://doi.org/10.1108/AAOUJ-12-2022-0171>.
- Figueroa Jr., R. B., Mendoza, G. A. G., Fajardo, J. C. C., Tan, S. E., Yassin, E., & Thian, T. H. (2020). Virtualizing a university campus tour: a pilot study on its usability and user experience, and perception. *International Journal in Information Technology in Governance, Education and Business*, 2(1), 1–8.
- Kuru, K. (2023). MetaOmniCity: Towards urban metaverse cyberspaces using immersive smart city digital twins. *IEEE Access*, 11, 1–26.
- MacCallum, K., Parsons, D., & Crow, T. (2019). *Innovative learning opportunities with virtual reality game development*. International Conference on Information Resources Management 2019, Auckland, New Zealand.
- Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on

- students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education*, 70, 29–40.
- Milgram, P. & Kishino, F. (1994). A taxonomy of mixed reality visual displays. *IEICE Transactions on Information and Systems*, 77(12), 1321-1329.
- Mystakidis, S. (2022). Metaverse. *Encyclopedia*, 2(1), 486–497.
- Pugoy, R. A. D., Ramos, R. C., Figueroa Jr, R. B., Rivera, M. H. C., Siritarungsri, B., Cheevakasemsook, A., & Kaewsarn, P. (2016). Augmented reality in nursing education: Addressing the limitations of developing a learning material for nurses in the Philippines and Thailand. *International Journal on Open and Distance e-learning*, 2(1).
- Pugoy, R. A. D., Ramos, R. C., Figueroa, R. B., Siritarungsri, B., Cheevakasemsook, A., Noimuenwai, P., & Kaewsarn, P. (2020). The talking comic strip: Technology-enhanced learning for English communication. *Innovating Education in Technology-Supported Environments*, 135-149.
- Riva, G. (2003). Applications of virtual environments in medicine. *Methods of Information in Medicine*, 42(5), 524-534.
- Sag, A. (2022). *Insights and strategy. Ray-Ban stories review: Comfortable but limited*. Forbes. <https://www.forbes.com/sites/moorinsights/2022/04/28/ray-ban-stories-review-comfortable-but-limited/>
- Tietjen, P., & Asino, T. I. (2021). What is open pedagogy? Identifying commonalities. *International Review of Research in Open and Distributed Learning*, 22(2), 185-204.
- Viglialoro, R. M., Condino, S., Turini, G., Carbone, M., Ferrari, V., & Gesi, M. (2021). Augmented reality, mixed reality, and hybrid approach in healthcare simulation: A systematic review. *Applied Sciences*, 11(5), 2338.
- Violante, M. G. & Vezzetti, E. (2015). Virtual interactive e-learning application: An evaluation of the student satisfaction. *Computer Applications in Engineering Education*, 23(1), 72-91.

The Future of Educational Research in a Technology-mediated Collaborative and Distributed Research Environment

Roel P. Cantada

ABSTRACT

In the early 2000s, researchers envisioned a globally interconnected research ecosystem known as a virtual research environment (VRE). This chapter critically examines the realization of this vision within the last two decades, specifically focusing on the impact of VREs on educational research in comparison to their contributions to science, social science, and digital humanities. Addressing this inquiry, the chapter reflects on the conceptualization of VREs and their implications for resource-poor educational research environments, further compounded by challenges arising from the COVID-19 pandemic. Additionally, it explores innovative approaches to bridge the distance between researchers, their research subjects, and facilities, emphasizing its relevance to research mentoring. Particularly, the chapter revisits and refines the 2005 vision of a VRE for Asian Distance Education researchers proposed by Santosh Panda, Felix Librero, and B. Bbatpurev, reconceptualizing its potential application to the evolving landscape of the University of the Future.



Back to the Future of Research in Universities

In this chapter, we embark on a journey to envision the future landscape of research in distance education, taking a reflective glance at our research infrastructure history dating back two decades. The notion of the future, however, is not uniform; it weaves a tapestry woven from past, present, and future threads, shaped by diverse perspectives and contexts. While affluent research institutions might perceive the content herein as old news, for resource-deprived counterparts, these discussions represent uncharted territories, possibly yet to unfold. Our disparities create opportunities; those lagging behind, by over two decades in some instances, gain the unique advantage of learning from the pioneers' triumphs and pitfalls.

This exploration was instigated by the challenges magnified by the COVID-19 pandemic. During the quarantine, researchers found themselves severed from their labs and traditional fieldwork, mirroring the physical disconnect experienced in distance education between students and educators. A pressing question emerged: Can technology bridge this chasm? This chapter casts a wide net, delving into various disciplines such as sciences, social sciences, computer science, and digital humanities, where attempts have been made globally to surmount similar distances. As an endeavor into the future, this chapter explores possibilities yet to be experienced in our university.

The core audience of this chapter comprises distance education researchers. It is our aspiration that this narrative serves as a bridge, connecting the past, present, and future of researchers across diverse disciplines within universities. This bridge is constructed by translating the intricate languages of technical and social knowledge production processes, that is, subcultures of research from varied fields into the domain of distance education, fostering a symbiotic exchange of ideas and insights.

Research in a University

Research, the process of discovering or generating new knowledge, stands as one of the fundamental pillars of a university, complementing the twin functions of teaching and extension work. On the one hand, teaching embodies the transmission of accumulated wisdom, both from the annals of university knowledge and fresh insights derived from ongoing research endeavors. On the other hand, extension work encompasses a diverse array

of university activities beyond research and teaching, spanning community engagement and public service initiatives. Through extension work, the outcomes of research can be harnessed and leveraged to enrich and propel society forward, contributing significantly to its advancement.

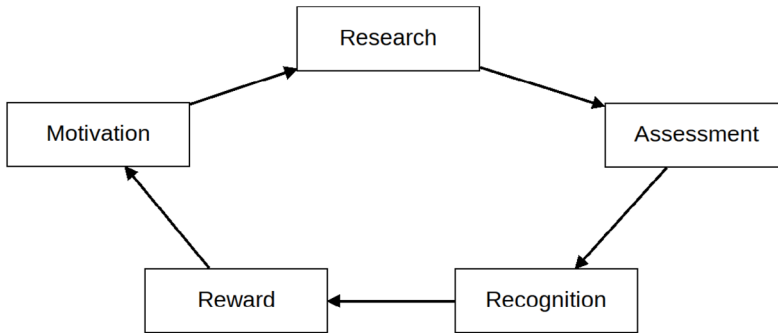
Conaco (2016) conceptualized research as a cyclical process, involving steps such as formulating inquiries about a phenomenon, generating hypotheses, methodically planning approaches to be used in answering the inquiry, conducting experiments, analyzing data meticulously, and ultimately, reporting findings. This perspective provides a researcher's lens, emphasizing the iterative and dynamic nature of the research process.

In contrast, Mintrom (2008) offered an administrative viewpoint, delineating a comprehensive model of research as an input-output system. It encompasses research inputs, transformative processes, research outputs, and associated by-products, leading to product and service development. This structured model echoes the linear model of research, attributed to Vannevar Bush by Stokes (1997), underlining the sequential progression from inquiry to tangible outcomes.

This journey from research to tangible products and services aligns with the overarching goal of universities: fostering sustainable national development through innovation, as articulated by Vidican (2009). The imperative for universities to bolster national economies has intensified in the wake of the knowledge economy era. However, demarcating the boundaries between research and specific forms of extension work, particularly in commercial contexts, proves challenging. Questions arise, such as whether research concludes upon patent creation or if it extends into the intricacies of commercializing patented innovations. This evolving landscape prompts critical examination and reevaluation of the intersection between research, innovation, and their transformative societal impacts.

University Rewards or Incentive System

The process of research within a university is not merely a pursuit of knowledge or a fulfillment of academic duties; it is entwined with a complex system of rewards that motivates researchers to persist in their endeavors. O'Carroll et al. (2017) thought of this research reward system as a virtuous cycle as illustrated in Figure 1.

Figure 1*Research reward cycle*

These rewards, both material and reputational, constitute a significant driving force. At the University of the Philippines (UP), researchers are incentivized through workload credits, honoraria, awards, grants, credits for promotion, and even royalties from patents and copyright works. For example, at UP Los Baños, the author or inventor may receive 1/3 of the gross income from the work as royalty, a third goes to her/his constituent university, and another third to the UP System (Cruz et al., 2008). And a positive evaluation of a faculty member's research output is crucial to her/his tenure and promotion. Furthermore, the individual prestige of researchers and the university influences grant applications, donations, and student enrollment, reflecting the interconnectedness of research outcomes and institutional reputation.

However, these rewards are tied to metrics such as the h-index and journal impact factor (JIF). The h-index, reflecting both the number of publications and their citations, is believed to indicate the productivity of researchers and impact of published work (Conaco, 2016). But it is criticized as an unreliable metric for comparing performance and ranking of researchers from different disciplines due to significant variation in the citation behavior (Albion, 2012; Bornmann & Daniel, 2008; Tahamtan & Bornmann, 2019). That is, one cannot compare the typical h-index of physicists with social scientists and humanities researchers, much less so with education researchers. It is said that there are differences in the publishing practices of researchers from different disciplines with scientists and social scientists oriented towards journals while humanities outputs more books. And the amount of output for different publication formats differs as books take longer to produce, thus

affecting citation per year (Borgman, 2007). In a study of Google Scholar h-index's appropriateness for benchmarking against the professoriate in education, it was found that, in Australia, the United States, and the United Kingdom, the median h-index for total participant full-professors in education is 30, the lowest is 1 (yes, 1 for a full professor!) and the highest is 115 (Merga et al., 2020). Another study reported indicative h-index benchmarks for Australian education professoriate that compared values for professors and associate professors. The h-index benchmarks for participant professors are marginal =6, typical = 9, and superior = 13 while those for participant associate professors are marginal = 4, typical = 6, and superior = 8. The study illustrates the importance of career length in the same field of study (in this case, education) when using h-index to compare researchers (Albion, 2012).

Similarly, the JIF, based on citations (Conaco, 2016), varies widely by discipline, indicating the importance of considering the context when evaluating research impact. For example, Albion (2012) stated that previous studies in Australia showed that the JIF of a core set of 11 education journals nominated by expert panels ranged from 0.14 to 2.60 (Goodyear et al., 2009), compared with, let's say, journals from the biological sciences with a median of 5.63 and a range of 3.37 to 30.3 (Jarwal et al., 2009). Unfortunately, we do not have comparable data from the Philippines (see Tecson-Mendoza [2015] for the issues and challenges faced by journals published in the Philippines).

Moreover, citation counts permeate various aspects of academia, including university rankings. Institutions like UP are ranked based on research reputation, impact, and international research networks, incorporating metrics like citations per faculty (QS Quacquarelli Symonds Limited, 2021; O'Callaghan, 2023). But citations are narrowly circumscribed by the rankers to their preferred indexing databases like Scopus, that in turn heavily favor some disciplines over others. Thus, the question arises whether these quantitative measures align with the core objectives of research—advancing knowledge and addressing complex societal challenges (Waters, 2023; see also Biagioli & Lippman, 2020 for abuse of the research metrics).

Amidst these complexities, the evaluation and reward system within universities significantly shape research priorities, collaborative practices, publication standards, research quality, and acceptance of open research concepts (Miedema, 2022). Notably, this discussion does not address

the disparity of challenges met by researchers in different contexts, particularly that of researchers separated by distance from colleagues, facilities, participants, and objects of research. Collaboration and research productivity hinge on bridging this distance, necessitating researchers to focus their attention away from publications and turning to building alternative research environments. Is there a corresponding reward system for researchers helping other researchers collaborate at a distance?

Perhaps the experiences of researchers who built virtual research environments (VREs) can offer a model for such an alternative reward and incentive system. Exploring this topic may also suggest a potential pathway to surmount the challenges posed by physical separation and to foster collaborative research in a digitally interconnected world.

Vision of a Virtual Research Environment for Asian Distance Education Researchers

In the ever-evolving landscape of research within universities, envisioning the future necessitates building upon existing foundations. Fortunately, we have the foresight provided by a groundbreaking proposal: the VRE for Asian Distance Education (DE) researchers, conceived by Santosh Panda, Felix Librero, and B. Bhatpurev in 2005. This section embarks on a detailed analysis of this proposal, juxtaposing it against recent advancements in virtual research environments, technological innovations, and collaborative research paradigms.

Distilling the Essence of the Vision in Three Core Objectives

Within the proposed VRE, three fundamental objectives emerge, encapsulating the essence of Panda et al.'s vision (2005):

- a. Technological Advancements
 - i. Forge an online/virtual research platform tailored for Asian DE researchers, replete with an array of online resources, tools, methodologies, and avenues for research collaboration; and
 - ii. Establish symbiotic connections with global VREs and online repositories, fostering cross-cultural knowledge exchange and collaborative initiatives.
- b. Human-Centric Focus
 - i. Cultivate a collaborative research ecosystem by nurturing the

- mentorship of novice researchers; and
- ii. Offer accessible and impactful online research training programs, encouraging vibrant discussions, critical reflections, and diverse contributions to enrich the VRE dynamically.
- c. Policy Formulation and Standardization
 - i. Formulate robust policy guidelines for institutional research, ensuring adherence to rigorous standards of quality and ethical research practices; and
 - ii. Propose benchmarks and standards for collaborative virtual research and research training, thereby ensuring consistency and excellence in scholarly pursuits.

A Holistic Approach to Addressing Research Challenges

A distinctive aspect of this proposal lies in its holistic approach. Beyond fostering collaboration among seasoned researchers, it uniquely emphasizes nurturing the synergy between novices and experts. Furthermore, the systematic selection of research topics, questions, and problems emerges as a cornerstone imperative. This systematic approach serves a dual purpose: prioritizing immediate research needs within resource-constrained environments and fostering collaboration by identifying overarching research puzzles that invite multifaceted contributions from diverse experts.

In summary, the general aim of this VRE proposal is to develop an “online/virtual research platform for Asian DE researchers which can provide for online resources, tools, methodologies, research questions and problems, mechanisms for research collaboration, researching online and training for online research” (Panda et al., 2005, p. 1).

Extending the Horizons of the Vision by Embracing Openness in Research

A notable observation surfaces regarding the limited emphasis on openness within the original proposal, primarily confined to the realm of open-source technologies. In the contemporary scholarly landscape, embracing openness encompasses, among others.

- a. Open data and transparency—encouraging the sharing of datasets and findings, fostering transparency, and enabling reproducibility;
- b. Open science practices—promoting transparent methodologies, ensuring rigor, and enhancing the credibility of research outcomes;

and

- c. Open educational resources (OER) and open access—facilitating knowledge dissemination and accessibility, aligning with the global movement toward inclusive education and scholarly discourse.

The Pan Asia Network-Distance Learning Technology (PAN-DLT) umbrella project of this VRE proposal clearly advocates for OER and Open Access as shown in its PAN Asia Networking Distance and Open Resources Access (PANdora) site at <http://www.pandora-asia.org/>. So, it is quite puzzling why these concepts are not carried over to the VRE proposal. Nonetheless, this is a forward-thinking vision that inspires us to embark on a journey to bridge this gap, aligning the VRE proposal with the principles of open data, open science, and open education. This endeavor enriches the scholarly tapestry, hopefully contributing to the relevance and impact of our research projects in the digital age.

What is a VRE?

Numerous scholars have attempted to define a VRE, painting a comprehensive picture of its multifaceted nature. One of the foundational definitions by Borda et al. (2006) characterizes a VRE as a constellation of online tools, systems, and processes that harmoniously interoperate. Its purpose is to seamlessly enhance the research process, both within and beyond institutional confines. Pothen (2007) and Carusi and Reimer (2010) add depth to this concept, emphasizing its role in nurturing virtual research communities (VRC). VREs are not merely portals; they are dynamic platforms where collaborative research finds its digital abode. Trudeau (2016) underscores the global nature of VREs, highlighting their capacity to unite researchers across vast distances and diverse boundaries. Candela et al. (2014) elaborates further, describing a VRE as a web-based working environment. It offers a spectrum of services, data, and computational resources integrated by a standard-based, service-oriented framework (Allan, 2009) that caters to the eclectic needs of researchers, educators, subject-matter experts, and users spanning various disciplines and geographies (Joint Information Systems Committee [JISC], 2016).

Crucially, a VRE transcends the confines of a conventional web portal. While it may appear as a website, its complexity lies in the fact that its constituent tools and resources can reside anywhere globally, interconnected through standardized interoperability protocols. VREs are bespoke, intentionally

crafted to align with the unique requirements of research communities. They evolve continuously, adapting to the ever-shifting needs of research. Rather than standalone entities, VREs are integral parts of a broader research environment, seamlessly integrating into the fabric of cyberinfrastructure.

To illustrate, consider MyNetResearch, an early attempt at a collaborative research portal. Stein Brunvand and Mesut Duran (2010) briefly described some of its features as follows:

With the free membership, users can create and share projects, files and online resources as well as connect and communicate with colleagues. However, the free account only allows you to be the owner of one active project at a time while upgrading to the premium membership means that you can have up to 50 concurrent projects actively running. In addition, the paid subscription a.k.a. premium membership comes with the ability to create and administer online surveys, a bibliography creator, a grant locator that facilitates the process of finding funding for different projects, research methods advisor tool, literature search, and a citation analyzer (p. 110).

In spite of these features, it faltered, underscoring a crucial lesson: a successful VRE must be organically embedded within existing infrastructure and research culture. Michael Fraser's (2005) warning resonates: an isolated VRE risks becoming a neglected web portal. The community must have a sense of ownership of the VRE. And that the development of VREs demands customization, ensuring that the tools and services precisely align with the research communities' needs. Frameworks like gCube (see <https://www.gcube-system.org/home>) offer a dedicated pathway for this customization, allowing researchers to delve deep into the technical requirements of VRE development. Another software technology used for this purpose is Sakai. It was originally designed as a virtual learning environment (VLE) but repurposed to create a prototype VRE for educational research (Laterza et al., 2007). Although the result of that project suggests that reusing VLEs or learning management systems (LMSs) as VREs may not be a good idea as some of the core design of the VLE framework may not be modifiable enough to meet the demands of a novel research project.

Contextualizing the VRE necessitates delving into its historical roots. The term "scientific collaboratory," coined in 1989, laid the foundation for collaborative research. Collaboratories embody a vision: a borderless nexus

where researchers interact, share data, access instruments, and collaborate seamlessly, regardless of physical location (Wulf, 1993). Themes such as scientific databases, remote instruments, collaboration technology, and modeling tools have persisted, evolving alongside technological advancements.

In essence, a VRE is not an isolated entity but a vital component of a larger system: the cyberinfrastructure. Cyberinfrastructure is a specialized information and communication technology infrastructure for research, akin to roads and utilities for transportation and basic services (Jankowski, 2009a). It amalgamates diverse resources, including cutting-edge supercomputers and high-bandwidth networks, creating a cohesive framework for research and discovery characterized by broad access and “end-to-end” coordination (National Science Foundation, 2005).

The concept of cyberinfrastructure finds tangible expression in American initiatives that succeeded one another like the TeraGrid (see <https://web.archive.org/web/20100920033626/https://www.teragrid.org/>), Extreme Science and Engineering Discovery Environment (XSEDE, see <https://web.archive.org/web/20220104164444/https://www.xsede.org/>), and the Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS, see <https://access-ci.org/>), illustrating the limited lifecycle of grid projects as it follows funding, rapidly changing computer technologies, and completion of research objectives. The Philippines, through initiatives like Philippine e-Science Grid (PSciGrid) and Computing and Archiving Research Environment (COARE) under the Advance Science and Technology Institute (ASTI) of the Department of Science and Technology (DOST), has embraced this paradigm, fostering national research excellence (DOST-ASTI, n.d.).

The description of PSciGrid, which was operational from 2001 to 2010, clearly reflected the themes of collaborative distributed research:

PSciGrid was initiated to address the science and technology community's need to have a concerted effort towards fully harnessing ICT infrastructure that can benefit the country's local research and development, and essentially, for researchers and scientists to participate in cutting-edge collaborative scientific research that aims to solve global problems... This facility is intended to offer computational and data grid services to national, educational and research institutions that require high-speed computing to process

the large amount of data that they handle. (DOST-ASTI, n.d.)

To elaborate on grids further, the Research Council UK ([RCUK], n.d.) stated that a “grid allows different computational and data resources to work together seamlessly across networks, enabling people to share them, often across traditional boundaries, and form virtual organizations.” Furthermore, Ian Foster, Carl Kesselman, and Steven Tuecke (2001) said that the “real and specific problem that underlies the Grid concept is coordinated resource sharing and problem-solving in dynamic, multi-institutional virtual organizations” (p. 200). They are talking about “sharing” as “direct access to computers, software, data, and other resources, as is required by a range of collaborative problem-solving and resource-brokering strategies.” This sharing they said:

is, necessarily, highly controlled, with resource providers and consumers defining clearly and carefully just what is shared, who is allowed to share, and the conditions under which sharing occurs. A set of individuals and/or institutions defined by such sharing rules forms what we call a virtual organization (VO). (pp. 200-201)

Grid technology is global. For instance, ASTI’s national grid is connected to the EUAsiaGrid, which is in turn connected to the European Enabling Grids for E-science (EGEE) project (Lin & Yen, 2011).

These endeavors underscore a fundamental truth: cyberinfrastructure are not mere technological marvels but amalgamations of technical expertise and socio-cultural innovations.

e-Science and e-Research, terms often used interchangeably, encapsulate the essence of this digital research renaissance. e-Science emphasizes computational grids, while e-Research extends its purview to encompass diverse sciences and humanities. Both terms, however, encapsulate a shared vision: a seamless integration of technology, methodology, and collaboration, defining the future landscape of research.

Grid Services

Among global computer networks, the grid stands as a distinct entity, separate from the ubiquitous World Wide Web. While the Web functions as a platform for information sharing, the grid emerges as a service designed

to pool computational power and data storage capacities over the Internet. As articulated by Wouters and Beaulieu (2006), the grid transcends mere computer communication, aiming to transform the global network into one vast computational resource. It is regarded as an infrastructure that facilitates adaptable, secure, and coordinated sharing of resources among diverse groups of individuals, institutions, and resources (Koschtial, 2021). Grid technology is seen as an enabler of virtual organizations that conduct collaborative and distributed e-research.

To comprehend the multifaceted contribution of grids to the VREs, it is essential to recognize the three fundamental grid services outlined by Chiang et al. (2011):

1. Computing grid—involves the collaborative sharing of computing resources.
2. Data grid—facilitates seamless data discovery and metadata management across diverse research organizations. Although distributed data storage may be a better label for this service.
3. Collaboration grid—enhances communication among remote collaborators, fostering effective teamwork. This may be alternatively labeled as a social network for collaborative research.

Grid computing, in essence, empowers researchers to execute complex analyses on a vast scale. By utilizing grid-enabled technologies, researchers gain access to a distributed network of computers, often numbering in the hundreds or even thousands, located across different organizations and countries. This distributed computing model is indispensable for research generating massive datasets, reaching petabytes or larger, and speeding up computations that would have lasted years on a single machine. Within this paradigm, VREs serve as gateways, enabling researchers to upload data, workflows, and codes for computation. The VREs then interface with grid middleware, coordinating computations across multiple computers globally. For this synergy to work seamlessly, both data and computation must be inherently grid-enabled, allowing for parallel processing by different computers.

The interplay of computing grids, distributed data storage, and social networks forms the comprehensive technical infrastructure of a research environment. Different disciplines appear to favor the use of one over the other services. Notably, certain research domains, particularly digital humanities and digital

social research, predominantly leverage distributed data storage, especially in preserving textual and digital artifacts for scholarly study. However, this trend may be indicative of a phase in non-natural sciences, lagging behind the natural sciences in adopting these technologies. With the proliferation of complex information processing, such as large language models, and the advent of movements like Learning Analytics and Educational Data Mining, computational services are expected to gain prominence within social sciences and educational research.

Yet, the evolution of grid infrastructure and its technical nuances lie beyond the scope of this discussion. For in-depth insights into early grid and VRE architecture, interested readers are directed to Allan's (2009) seminal work, "Virtual Research Environments: From Portals to Science Gateways." It is imperative to note that the landscape has transformed significantly since 2009, marked by shifts such as the move from open-source grid computing software to software-as-a-service models. For example, one of the grid computing open-source software packages referenced in many books about VREs called Globus Toolkit was abandoned by its developers around 2018 in favor of a software-as-a-service business model. The community of users of the open-source software then forked it into the Grid Community Toolkit at <https://github.com/gridcf/gct/>. So, a lot of the technologies referenced in Allan's and similar books about VREs may no longer exist and it would require some research to find newer technologies and solutions that accomplish the same functions.

In this dynamic landscape, alternative technologies like cloud computing and Web 2.0 platforms vie for attention with grid technology. Cloud computing mirrors the grid's functionality but operates within a single company's domain, necessitating payment for usage. Web 2.0 technologies, on the other hand, encompass diverse application software accessible through browsers, akin to online platforms like Google Apps.

Peter Kacsuk (2014) says that navigating this complex cyberinfrastructure poses a challenge for many scientists. To simplify the process, Science Gateways have emerged as pivotal solutions. These gateways act as intermediaries, enabling scientists to access remote instruments, computational grids, online software applications, and global resources effortlessly (Allan, 2009). Functionally akin to VREs, Science Gateways streamline the user experience, shielding researchers from the complexities of underlying infrastructure.

A notable application facilitated by Science Gateways and grids is the concept of scientific workflows. Scientific workflows encapsulate processes designed to achieve scientific objectives, encompassing tasks, dependencies, and computational steps. These workflows, essential for scientific simulations and data analyses, are organized and orchestrated, ensuring seamless dataflow and task execution (Ludäscher et al., 2018). Although tools like Taverna (see <https://github.com/taverna/> for the archived code) were once prominent, their retirement necessitates exploration of alternatives, with potential options including Jupyter notebooks. Further research into opensource tools capable of enhancing data analysis reproducibility and supporting replication studies in distance education research is warranted.

However, sustainability emerges as a pressing concern within this evolving landscape. Grids, with their global reach and the ever-expanding enormity of big data, grapple with the challenge of maintaining infrastructure amidst limited funding. Research grants, predominantly earmarked for innovation, often overlook the essential needs of maintaining existing technology (Haythornthwaite et al., 2006). Grid systems, like any other, face practical limitations, including hardware lifespan, power consumption, and software obsolescence. Acknowledging these constraints, research communities must explore avenues to optimize existing resources, especially in resource-poor environments.

As grid technology matures, attention has shifted from grids and cyberinfrastructure to the study of e-Science and e-Research (Koschtial, 2021). Consequently, it is imperative to delve deeper into the conceptualization of collaborative distributed research from these perspectives, which we will discuss in the subsequent sections of this discourse.

Enhanced Research

e-Research signifies a pivotal evolution in contemporary research, harnessing the transformative power of advanced information and communications technology (ICT). Unlike its electronic counterpart, the “e” in e-Research conveys enhancement rather than mere electronic implementation (Borgman, 2007), aligning it with technology-enhanced research (TER) and encompassing a wide array of TER methodologies across disciplines, from e-Science to Digital Humanities (Dutton & Meyer, 2009; Meyer & Schroeder, 2009; Schroeder, 2007).

Nevertheless, the definitions of e-Research are varied, with various scholarly definitions ranging from conceptualizing it as research infrastructure (Borgman, 2007; Deepwell & King, 2009) or laboratories (Anandarajan & Anandarajan, 2010) to emphasizing its role in facilitating distributed and collaborative online research (Meyer & Schroeder, 2009). Some perspectives focus on the utilization of ICT tools in research rather than the research process itself (Dutton & Meyer, 2009; Schroeder, 2007; Wolski & Richardson, 2010).

In this chapter, we align our understanding of e-Research with nuanced definitions proposed by scholars such as Robert Allan, Nicholas Jankowski, and Angel Juan and others. Allan (2009) defines e-Research as research activities utilizing advanced ICT capabilities, while Jankowski (2009b) emphasizes it as a form of scholarship conducted in a network environment, involving global collaboration among scholars, and utilizing Internet-based tools. Juan et al. (2012) extend this definition to encompass any collaborative research activity across academic disciplines facilitated by Internet-based environments.

Our conceptualization defines e-Research as the systematic investigation of phenomena under specific conditions:

- distance—physical or geographical separation between researchers, research locations, and research subjects or participants
- ICT utilization—the use of ICT to bridge these distances, mediating communication, sharing digital objects (such as data and software), collecting or generating data remotely, analyzing data, and publishing research results.

Technological enhancements, as outlined by Allan (2009), include new data providers, computational resources, grid brokers, specialized analysis applications, and the delivery of these technologies through VREs. Jankowski (2009a) complements this perspective by highlighting the increasing computerization of the research process, reliance on network-based virtual organizational structures, development of Internet-based tools, experimentation with innovative data visualization techniques, and the publication, distribution, and preservation of scholarly work via the internet.

Jankowski's (2009b) model presents e-Research as interrelated clusters of scholarly tasks under research organization, research process, and scholarly

communication within the context of a networked environment.

In essence, our chapter adopts a holistic view of e-Research, emphasizing not just the enhancement but the essence of research itself, redefined and amplified through the transformative potential of ICT.

e-Science

e-Science, the pioneering field of e-Research or of distributed collaborative research environments, has transformed the landscape of scientific inquiry. An earlier term for e-Science is collaborative laboratories (collaboratories) and cyberscience (Nentwich, 2003). John Taylor's (National e-Science Centre, n.d.) insightful definition encapsulates its essence: "e-Science is about global collaboration in key areas of science, and the next generation of infrastructure that will enable it" (p. 1809). Historically, e-Science found its early applications in high-energy physics and bioinformatics, generating big datasets that surpassed the capacity of single computers or even local clusters.

At its core, e-Science revolves around global collaboration facilitated by cutting-edge information technologies. Formal VOs epitomize this collaborative spirit, where entities harmonize their computing power, databases, storage facilities, and scientific instruments (Chiang et al., 2011). This collaboration extends across geographical boundaries, enabling researchers to collaborate on an unprecedented global scale.

Central to e-Science are science gateways, gatekeepers to the intricate back-end technologies of grid and cloud computing. While SGs primarily serve as portals to distributed computing resources, they do not inherently emphasize collaboration facilities. Instead, their primary function lies in granting access to the expansive computing power residing in grid and cloud infrastructure.

Doing science is enhanced by leveraging distributed and collaborative technologies to grapple with datasets of staggering magnitude, a task impossible for individual computers or localized clusters. Moreover, the collaborative nature of e-Science allows researchers to remotely work together with peers worldwide, fostering a truly global scientific community. Some scholars are saying that even more important is the fact that research tools generated by e-Science create opportunities for doing research that previously was not possible and that these tools feed into producing more tools (Wouters, 2006).

e-Science implemented via grid computing has been adapted in the Philippines in bioinformatics, earth sciences, biodiversity mapping, and disaster mitigation like an Asian regionwide early warning system for tsunamis (Grey, 2010; Grey & Lin, 2011). There were also plans to develop a Philippine Cancer Grid starting with breast cancer research (Coronel & Saldana, 2010). I do not know what happened to these plans, so it may be a good idea for the university to revisit these projects and learn from the participants' experiences.

Yet, the implementation of e-Science is not without its challenges. Building cyberinfrastructure did not guarantee success of the research project. And it is unclear what made some projects succeed while others failed. These lessons were learned as early as when collaboratories were prominent (Olson et al., 2008). One key issue lies in the ethical dimensions of data collection and sharing, particularly concerning human subjects, notably evident in medical research projects like the UK e-Science Diagnostic Mammography National Database (eDiaMoND) (Brady et al., 2003; David & Spence, 2010). Additionally, disparities in policies related to health, information technology services, and data ownership across political boundaries pose significant hurdles. Addressing these challenges is crucial, especially for projects contemplating commercialization, as ownership rights and copyright permissions come into play.

Open Science, a parallel concept, aligns closely with e-Science principles. Both emphasize the validation and refinement of research findings, building on historical observations, avoiding redundant research, maximizing existing data to address novel questions, and exploring interdisciplinary or international inquiries (Borgman, 2007). Open Science practices, exemplified by initiatives like the UP Pandemic Response Team, further exemplify the collaborative ethos, showcasing the power of Web 2.0 technologies in fostering transparent and accessible scientific exchanges. It would be a good idea for the university to invite members of the team to share their Open Science practices during the COVID-19 pandemic. In fact, Open Science practices during the pandemic were global, as Miedema (2022) states:

...the international scientific organization of the open exchange of data on the molecular biology, receptor use, sequence of the viral RNA of the virus and specimens and research material and data on the course of the pandemic—prevalence, hospitalization, ICU needs,

mortality and morbidity—was a true example of a near global open science practice. (p. 212)

In retrospect, the promises of e-Science have reshaped the scientific landscape, transcended geographical boundaries, and connected researchers globally. However, the journey toward a successful e-Science implementation demands careful navigation of legal, ethical, and technical challenges. Embracing these lessons, the scientific community can forge ahead, leveraging the collaborative spirit of e-Science and Open Science to drive innovation and discovery.

e-Social Science or Digital Social Research

e-Social Science emerged initially as an application of e-Science, focusing primarily on grid computing and the development of related infrastructure. However, as the field progressed, social science researchers recognized the need for a critical examination of e-Science, leading to the incorporation of a social study perspective into e-Research projects. Unlike the traditional e-Science paradigm, e-Social Science diverged in its implementation of VREs (Trudeau, 2016). Scholars like Wouters and Beaulieu (2006) pointed out that social science research did not necessarily require grid computing technology, emphasizing the importance of customizing technology to suit specific research needs rather than adopting prescribed solutions.

This approach to research technology aligns with the concept of social shaping of technology (SST), a perspective that challenges technological determinism by emphasizing the mutual shaping of technology and society. According to SST, technology is both socially constructed and society-shaping, rejecting the notion that technological change occurs independently of social influences (Woolgar, 2006; Misa, 1988).

Social scientists have explored e-Science critically from various angles. Ethnographic studies, such as Knorr-Cetina's (1999) analysis of epistemic cultures in high-energy physics and molecular biology laboratories, provided micro-level insights, challenging macro-level technological determinism (Misa, 1988).

How does technology enhance e-Social Science? Borgman (2016) provides us with an ideal scenario illustrating how social science research is enhanced by technology:

Social scientists will design their research studies to optimize innovation in data sources, theories, and methods. Research methods will be adaptable to context and conditions, while maintaining professional standards for reliability, validity, and protection of human subjects. Obtrusive methods, such as interviews, surveys, and ethnographies, will be used where appropriate. Similarly, unobtrusive methods such as gathering records of human behavior, past or present, in any medium in which recorded, will be used where appropriate. Researchers will acquire digital traces of human activity from whatever sensors or other devices collect them. Data will be aggregated and integrated from disparate sources. Novel instruments, protocols, and software tools will be employed to address new research questions. Researchers will hold intellectual property rights in their data and in their personalized methods. They will release data to peer reviewers or to individual requestors, but no sooner than at the time papers are submitted for publication. Licensing and human subjects' protection procedures will apply. Potential reusers of data will be responsible for acquiring software and other tools necessary to use the data, and for all interpretations thereof. (Social science researcher's ideal scenario section, para. 1)

And Salganik (2018) gives us this personal impression of online research, illustrating how social scientists perceive the impact of the technology on their research:

I'm going to tell you about something that's not in my dissertation or in any of my papers. And it's something that fundamentally changed how I think about research. One morning, when I came into my basement office, I discovered that overnight about 100 people from Brazil had participated in my experiment. This simple experience had a profound effect on me. At that time, I had friends who were running traditional lab experiments, and I knew how hard they had to work to recruit, supervise, and pay people to participate in these experiments; if they could run 10 people in a single day, that was good progress. However, with my online experiment, 100 people participated while I was sleeping. Doing your research while you are sleeping might sound too good to be true, but it isn't. Changes in technology—specifically the transition from the analog age to the digital age—mean that we can now collect and analyze social data in new ways. (Preface section, para. 1)

However, it is noteworthy that these enhancements primarily pertain to handling data, without the exclusive reliance on grid computing or distributed computing. Social scientists have long been accustomed to working with large datasets, even predating the e-Science movement. Presently, the focus has shifted toward digital social research, defined as the analysis of behavioral data patterns (Marres, 2017).

While some e-Social Science projects, like the UK Collaboratory for Quantitative e-Social Science (CQeSS), utilized grid computing and reduced computation time significantly, there have been challenges. The example of the UK's National Centre for e-Social Science (NCeSS) highlighted the complexities of managing cyberinfrastructure projects, including technical issues and sustainability concerns. Notably, ethical considerations related to data collection and sharing persist in e-Social Science, mirroring the challenges faced by e-sciences.

The NCeSS managed the development of cyberinfrastructure and reuse of the existing grid for e-science built a year earlier. The NCeSS is a UK government-funded cyberinfrastructure project for e-Social Science that ran from 2004 to 2012, with around £14 million budget (Halfpenny & Procter, 2010).

The NCeSS had the following two general purposes called strands:

1. application strand—is aimed at stimulating the uptake and use by social scientists of new and emerging Grid computing and data infrastructure in order to make advances in both quantitative and qualitative economic and social research; and
2. social shaping strand—examines the social and economic influences on the development of e-Science and, conversely, the socio-economic impact of Grid technologies (Procter, n.d.)

It had around 11 nodes, i.e., a node in the grid dedicated to one programmatic line of social-science research. And it funds pilot demonstrator projects primarily on the development of VREs and research technologies. Until 2009, “the nodes were coordinated by a ‘hub’ team, based at the University of Manchester” (Halfpenny & Procter, 2010, pp. 142-143). This hub, according to Halfpenny, was “responsible for designing and managing the research program and a parallel dissemination program, creating and exploiting synergies across the components of the programs, and strategically

planning future developments.” The NCeSS portal of this hub is based on Sakai. According to Andy Turner (n.d.), it:

existed in part in a server room at the University of Manchester. Following a fire and a lack of resources, coordination, and will, the entire platform died and along with it a huge investment in configuring workflows to access, integrate, and process potentially sensitive data for applied social science research purposes on the UK National Grid Service. The e-Infrastructure stopped working in 2011 following a fire in a server room at the University of Manchester and was not re-established due to a lack of resources and coordination. (Introduction section, para. 1)

This experience highlights the problem of sustainability of cyberinfrastructure and the e-research sub-culture within social sciences.

Understanding these complexities and learning from past projects, especially those in the Philippines, is crucial. Comprehensive research into the successes and failures of e-social science initiatives will provide valuable insights, informing future endeavors by the lessons of the past and guided by ethical principles and technological adaptability.

Digital Humanities Research

Digital Humanities (DH) stands as a powerful force, epitomized by Enrica Salvatori’s (as cited in Terras et al., 2013, p. 286) vivid portrayal: “The great opportunity to burn down academic walls.” This sentiment finds poignant expression in initiatives like the Philippine Performance Archive on Cultural Performances, a project born out of the ashes of a fire at the University of the Philippines in Diliman, which tragically consumed precious cultural heritage (Tiatco et al., 2019). This project is an example of digital preservation, a prominent theme within DH. These projects demand a unique set of research technologies, a legacy rooted in the early days of humanities computing.

Indeed, the history of computational work in the humanities trace back to the groundbreaking efforts of scholars such as Roberto Busa in 1949, who undertook the creation of an automated approach to his *Index Thomisticus*, a computer-generated concordance to the writings of Thomas Aquinas (Burdick et al., 2012). These foundational endeavors paved the way for subsequent milestones like the development of the Text Encoding Initiative (TEI)

in the 1980s, a pivotal standardization effort for tagging digital texts. Data encoding standards are important in the construction of databases and the collection and sharing of data. However, these applications of computer technology did not involve distributed and collaborative research yet and the term DH was not used yet. This trajectory, from humanities computing to DH, symbolizes a shift driven by the belief in the transformative power of computational tools for humanistic inquiry (Burdick et al., 2012).

The very nomenclature of DH emerged from the convergence of the Association for Computers and the Humanities (ACH) and the Association for Literary and Linguistic Computing (ALLC), culminating in the formation of the Alliance of Digital Humanities Organizations (ADHO; see <https://adho.org/>) in 2007 (Kirschenbaum, 2012). This era also witnessed the rise of influential DH publications like “Digital Humanities Quarterly” (see <http://www.digitalhumanities.org/dhq/>) that carried on the work of the older journal called “Computers and Humanities (CHum)” in shaping the discourse and providing a platform for scholarly exchange.

Since we are only interested in the research practice of DH rather than the entire field, we ask what is DH research in comparison with e-science and e-social science research? In this chapter, we differentiate DH research that aims to investigate, inquire, and create knowledge in the humanities from artistic creation, i.e., the act of writing literature, painting, performing, etc. There had been recent controversies in other countries over the term “research” in relation to “art creation.” What is research in the visual arts? What is research in music? There are those who believe that research supports creation and those who claim that creation itself is a form of research (Chapman & Sawchuk, 2012). (I am not going to go deep into the negation of artistic creation itself by those who believe that artists can only mimetically reconstruct/deconstruct what is already available in the world.) Dubois (2022) views “creation in and of itself is in no way research. For an endeavor to be called research, it needs to pursue a research question (which attempts to better practice, or which triggers answers which are more philosophical in nature).” That is of course not to disparage artistic creation but only in so far as to classify it as a separate activity that deserve patronage without appealing to qualifications of research.

Is the research in the language studies closer to what we consider research in the e-sciences and e-social sciences? The earliest application of computers in humanities were in this field. How about in history? Historical

studies are an odd child. Sometimes, it resides with the social sciences, but argues that its method is not scientific but *sui generis*. We know at least that modern historical research builds repositories of primary sources and uses computers for manuscript study. Sometimes it resides with humanities, but it does not want to be associated with fiction. How about in philosophy? Would research in philosophy find grid computing useful? Can it be done collaboratively? I do not know; these questions need further study.

I would focus more on the arts in the discussion of issues with research and creation in the following discussion. There are some contested terms regarding research in the arts such as artistic research, art-based research, studio-based inquiry, performative research, practice-led research, practice-based research, research through practice, creative research and research-creation. The last is a term coined in Canada and is interesting as it is tied to research funding much like most of e-research we have talked about so far. The Canadian Social Sciences and Humanities Research Council (SSHRC) (2021) defined *research-creation* as:

An approach to research that combines creative and academic research practices and supports the development of knowledge and innovation through artistic expression, scholarly investigation, and experimentation. The creation process is situated within the research activity and produces critically informed work in a variety of media (art forms). Research-creation cannot be limited to the interpretation or analysis of a creator's work, conventional works of technological development, or work that focuses on the creation of curricula. The research-creation process and the resulting artistic work are judged according to SSHRC's established merit review criteria.

Fields that may involve research-creation may include, but are not limited to architecture, design, creative writing, visual arts (e.g., painting, drawing, sculpture, ceramics, textiles), performing arts (e.g., dance, music, theater), film, video, performance art, interdisciplinary arts, media and electronic arts, and new artistic practices. (Research-Creation section, para. 1-2)

Another definition is that it is "an approach applied to an individual or multiple-agent project combining research methods and creative practices within a dynamic frame of causal interaction (that is, each having a direct influence on the other), and leading to both scholarly and artefactual

productions (be they artistic or otherwise)” (Stévanice & Lacasse, 2018). Dubois (2022) states that this concept:

... leaves no doubt as to what comes first, research or creation. The term starts with the word research, thereby foregrounding that any endeavor of this type is driven by a research question—or what is behind it: an open and investigative curiosity. In other words, a project might well be creation-led, i.e., the knowledge generated through the making of a designed work might be dominant (over that of academic literature and theory) or the research question might have been initiated in practice. But to fall within the boundaries of research-creation, the project needs to be initiated and defined within the limits of a research mindset. (para. 9)

Chapman and Sawchuk (2012) identified four types of research-creation:

- a. Research-for-creation—preliminary activities in preparation for creation that may include literature review, studying precedents, and trying out different prototypes, among others. In other words, this is the pre-production research phase.
- b. Research-from-creation—the idea here is that the creation may generate hypotheses, data, tools for further research. Creation or performances that include collecting human information would then be subject to ethical review. It would then share the same issues that e-science and e-social science have to deal with.
- c. Creative presentations of research—this refers to the presentation of traditional academic research in a creative fashion.
- d. Creation-as-research—this idea admittedly, goes against the belief that creation is not research, and thus have artistic freedom that should not be regulated. According to Chapman and Sawchuk (2012), it:

...involves the elaboration of projects where creation is required in order for research to emerge. It is about investigating the relationship between technology, gathering, and revealing through creation ... while also seeking to extract knowledge from the process. Research is more or less the end goal in this instance, although the “results” produced also include the creative production that is entailed, as both a tracing-out and culminating expression of the research process. It

is about understanding the technologies/media/practices that we discuss as communication scholars (for instance) by actually deploying these phenomena and pushing them into creative directions. It is a form of directed exploration through creative processes that includes experimentation, but also analysis, critique, and a profound engagement with theory and questions of method” (p. 19).

Research-creation’s privileging of research over creation has been criticized to result in bad research and bad art (Lowry, 2015). It goes against the commonly held belief that art is for art’s sake and not subject to criteria of research established by a bureaucracy. It is perceived as using assessment of artistic merit and scholarship from the perspective of the sciences rather than respecting the assessment practices by curation, exhibition, and critique in the arts. Hovland (2022) states that the “practices of aesthetic thought cannot be made into algorithms or programs.” But this belief is currently being disrupted by artificial intelligence transformers and diffusion models in software that generate images, clone voices, and write fiction from text prompts.

With that said, we now look at DH research that adopted computing technology. Berry and Fagerjord (2017, p. 18) presents a diagram showing the “range of activities, practices, skills, technologies and structures that could be said to make up the digital humanities, with the aim of providing a high-level map.” They dubbed this diagram the digital humanities stack.

Figure 2

Digital Humanities Stack

Interface	Critical/cultural critique	Tools and apps	Publications	Projects
Systems	Platforms			
Shared infrastructure	Methods libraries	Application programming interfaces (APIs)		Linked data
Code/data	Digital methods	Digital archives	Metadata	
Institutions	Research infrastructure (Centers, labs, clouds, spaces, streams)			

Encoding & education	Computational thinking (algorithms, abstraction, decomposition, critical, technical practice, programming)	Knowledge representation (OCR/scans, databases, encoding, HTML, XML/TEI, ontologies, design patterns)
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The diagram clearly shows the centrality of technology in research and research infrastructure in DH. Some of the research activities of DH (Burdick et al., 2012) include, among other things,

- a. repository building (like the Philippine Performance Archive);
- b. statistical processing (e.g., computational linguistics);
- c. linking (e.g., hypertext and semantic networks);
- d. modeling (architectural and visual displays); and
- e. creation of structured data (XML).

In general, the digital activities of DH can be divided into (Heyer & Böhlke, 2021):

- a. creation, dissemination, and use of digital repositories; and
- b. computer-based analysis of digital repositories using advanced computational and algorithmic methods.

The digital infrastructure is composed of standards (e.g., TEI), software, digital content, and the expertise that supports scholarly research (Waters, 2023). Waters presented a simplified but illustrative research workflow for Classical Studies and the example counterpart standards and software that enhance each step. Note that the enhancement is end-to-end, i.e., from collection of content to publication of the research.

Figure 3

A Digitized Humanities Research Workflow

Collect	Catalogue	Transcribe/ translate	Identify	Analyze/ interpret	Publish
Digitization/ Resolution/ color balance	FRBR/ canonical text service	TEI XML/ EpiDoc/ OCR	EAC/ SNAC	IIIF/ W3C Web annotation/ NLP	EPUB

Tropy/ Omeka/ Perseus/ EAGLE	papyri.info/ Perseus Catalog	OCROPUS/ Son of Suda Online	DPPR/ Pelagios/ GODOT	Mirador/ Virtual Worlds/ Treebanks	STOA/ Perseids/ Digital Latin Library
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Perhaps, this interesting approach can also be used to analyze the enhancement of workflows in e-research in other fields and disciplines. So far, the discussion on technological enhancements of research gives me a general idea of the structure of the research environment network that we have been trying to visualize. The network may have multiple layers of VREs each catering to different sizes of virtual communities. And at the very bottom of this layer will be the research or creative project as a basic unit of the e-research environment.

We have discussed some of the controversies over digital humanities research, albeit at the surface level only. Kirschenbaum (2012) asks:

Whatever else it might be, then, the digital humanities today are about a scholarship (and a pedagogy) that is publicly visible in ways to which we are generally unaccustomed, a scholarship and pedagogy that are bound up with infrastructure in ways that are deeper and more explicit than we are generally accustomed to, a scholarship and pedagogy that are collaborative and depend on networks of people and that live an active, 24-7 life online. Isn't that something you want in your English department? (p. 6)

In essence, the evolution of DH mirrors a paradigm shift, dismantling conventional academic barriers and embracing a collaborative, technology-driven future. As the DH landscape continues to expand, it challenges us to reconsider not only how we conduct research but also how we define the very essence of scholarly inquiry and creative expression.

Lack of Exemplars in Educational Research

We have looked at the technology enhancements of science, social science, and humanities, but I have failed to find exemplars of the use of VREs, distributed computing technology, or any large-scale collaborative distributed research projects in educational research. Educational research has technology driven movements like Educational Data Mining and Learning Analytics, but they seem more institution-based rather than

community-based, emphasizing technology and research methods over the socio-cultural reorganization of the research environment. We need further research on how collaborative and distributed technologies may enhance the research workflow in educational inquiry.

The Socio-Cultural Perspective on Collaborative Research

We have so far discussed the meaning of e-research from the perspectives of different disciplines with a focus on technology-enhancement and their VREs. The following section now turns to the social aspect of the research environment particularly distributed collaboration.

What is distributed collaboration? And in what virtual community of researchers can distributed collaboration thrive? Distributed collaboration is collaboration or, in the case of DH, co-creation that is mediated by ICT. Participants in the collaborative project are distributed across a geographic area and form a virtual community of researchers. For the collaborative project to succeed or achieve its goals, we expect the virtual community to have formed a sub-culture fostering e-research practices that include sharing tools and resources, multidisciplinary, and adoption of open standards.

Multidisciplinary Collaboration among Experts

Collaborative e-research presents a myriad of advantages:

- a. Cost efficiency and resource optimization—collaborative efforts significantly reduce costs by sharing the financial burden of bespoke research software and advanced technology. Pooling resources optimizes expenditures and fosters cost-effective solutions.
- b. Amplified funding opportunities—large-scale, multidisciplinary projects are more appealing to funding agencies. Collaborative initiatives attract substantial funding, empowering researchers to explore ambitious ideas and ventures.
- c. Extensive data acquisition—collaborations involving diverse researchers enable the collection of extensive datasets. The synergy of varied perspectives enhances the depth and richness of the data, enabling nuanced analyses.
- d. Synergistic expertise—multidisciplinary collaboration bridges knowledge gaps, especially in technology-centric research. It amalgamates diverse expertise, enriching theoretical perspectives

- and problem-solving approaches.
- e. Reintegration of specialized knowledge—collaboration dismantles silos, reintegrating specialized knowledge fragmented by overspecialization. It encourages a holistic approach, fostering exploration of interdisciplinary connections.
 - f. Quality enhancement through peer review—continuous peer review within collaborative teams elevates research quality. Iterative feedback loops ensure rigorous scrutiny and refinement, resulting in high-quality research contributions.

Collaboration also has disadvantages, in particular, the overhead cost of managing and maintaining communication between member/partner researchers or research institutions. The research may also take longer if there is a delay in outputs that are required for other members to complete their own contributions. Establishing trust between new collaborators is extremely difficult. And there is the very messy issue of having different research ethics policies in different countries and home institutions. There are also cultural differences in how research is supposed to be done. In some institutions, research is formulaic, almost following a cookbook approach to finding solutions instead of how to do something new. Some emphasize problem-solving skills rather than problem discovery. Thus, some researchers are ill-prepared for the “fuzzy goals and unstructured work environment” in research institutions that expect the student to figure out by her/himself what the problem is and what the research questions are (Sonderegger, 2009). An indicator of this cultural problem is when some of our graduate students fail to craft a relevant research problem within the bounds of the field, they are supposed to be specializing in. Frustrations lead to students begging for “research topics” and “research questions” from the advisors, that result in a lower estimation of the research skills of the students. Admittedly, cases like these are attributed to lack of skills, intelligence, or imagination of the student. And the student in turn blames the advisor for lack of supervision skills. As a side note, we should also look at the problem from a systemic and cultural problem. Problems of mentor-mentee collaboration will be discussed in the next section. This section assumes collaboration between peers of experts.

The point here is that collaborative research is not applicable to all research projects. The project needs to be large enough for tasks to be distributed, preferably in parallel, and the benefit should be large enough to justify the extra effort of maintaining a VRE.

Naturally, in order to collaborate, one needs to find people to collaborate with. This is not as easy as it sounds, especially if the academic unit is too small. One also needs to find people whom you can work with, and this is not just a question of expertise but also of subjective questions of the personality of the researcher, methodological preferences, and commitment to the project. Supposedly, a VRE is meant to help a researcher find potential collaborators, check each other's previous works and curriculum vitae (CV), communicate with them in a trusted messaging system, assist in writing up research proposals, etc. It is pretty much a social networking site for researchers, and if a reputation and recommender system is in place, it makes it easier to determine the viability of research partnership. One could also think not just in terms of individuals but of VRE-to-VRE linkages where the representation is by research institutions like laboratories, research groups, or academic units.

Once potential partners are found, we ask what possible forms of researcher association may be organized to constitute virtual research group or even larger as a community? The term virtual organization (VO) is commonly found in VRE project literature. Foster et al. (2001) called it a "set of individuals and/or institutions defined by such sharing rules form" (p. 201). Allan (2009, pp. 82-83) defined it as "a web-based online collaboration space where a group of collaborators can share files and data and access common tools without the encumbrance of institutional firewalls and compatibility problems." But this is too general, Köhler et al. (2021) distinguished four virtualized organizational forms—the virtual team, virtual project, virtual organization, and meta network. They differentiated these in terms of involvement, size of membership, goal, duration of membership, information technology, and examples from education.

Of special note from this classification is the difference between the virtual team and the temporary VO. On the one hand, the virtual team is characterized as the "simplest form of a virtual organization is a virtual team, which is a local team utilizing technology in order to ensure better connectivity, shared knowledge and lower costs" (Okkonen, 2002, p. 270). On the other hand, the temporary VO involves a "large network of people, based on voluntary membership, and aiming to perform specific tasks" (Okkonen, 2002, p. 270). In education, the online learner team represents a virtual team while the research and development project represent a temporary VO. An even larger virtualized organizational form is the meta network with vague membership (that is difficult to classify because its membership comes

from all disciplines and persuasions) that links networks. Their example of a meta network is ResearchGate (see <https://www.researchgate.net/>), a generic all-purpose VRE whose core is a publication repository and what may be considered an online directory of researchers from its user base. This is a model of the VRE that harks back to the MyNetResearch days.

Another classification of virtualized organizational forms that is based on scale and scope of linkages is that of Lecoure & Carroll (2009). They contrasted the Virtual Academic Research Team (VART) from the Academic International Research Team (AIRT). VARTs are “both formally and informally established teams that work in separate geographic locations and communicate with team members using information communication technologies” (p. 395). Referring to Lipnack and Stamps’ (1999) description of virtual teams, a VARTs would be composed of a small group of academics who conduct research independently with a shared purpose across space, time and organization boundaries using technology. They identified four types of team formations for VARTs: mentor, expert, common interest, and collegial.

AIRTs “are normally formally established and work on research initiatives which involve several countries and cultures” (Lecoure & Carroll, 2009, p. 395).

Note that not everyone can join an AIRT. Typically, the more prestigious senior researchers have access to an international network. For resource-poor research systems, such networks are developed personally and informally rather than provided by the institutional linkages’ infrastructure (that may even be non-existent) (Kwiek, 2020). How then can we organize and encourage junior researchers who have fallen into the “lonely scholar” syndrome (sometimes a habit picked up from the need for sole authorship during the tenure process) to collaborate? How do we link a VART with an AIRT? What steps should we take to develop a sub-culture of collaborative research in an environment mediated by distributed technology from small-scale research to large-scale? How do we federate many VARTs into a larger virtual research community?

Pothen (2007, p. 22) defined a virtual research community as “a group of researchers, possibly widely dispersed, working together and facilitated by a set of online tools, systems and processes interoperating to support collaborative research within or across institutional boundaries ... or VRE”.

A related term is virtual community of practices (VCoPs) that is defined as communities of practices (CoPs) where “organization members and individuals interact supported by collaborative ICT in order to bridge time and/or geographical distances. They are a type of social networks where knowledge sharing and exchange processes occur across organizational, cultural and international boundaries” (Gonzalez-Aranda et al., 2010, p. 170). Unfortunately, we still do not know how to successfully form VCoPs (Dubé et al., 2005). Following Ettiene Wenger’s CoP concept, it supposedly develops out of a sense of joint enterprise, that is, through the research project and that the CoP requires a shared repertoire of key concepts, artifacts, and stories to communicate effectively (Deepwell & King, 2009). These seem to be what VREs offer to members. However, there are some personal characteristics of leaders and members that are not mentioned here: the charisma and sincerity of leaders, the commitment of members, their ability to communicate and work with others, etc. I think we should expect a lot of failed attempts to form VCoPs, VRCs, and VARTs before we hit on a relatively successful approach.

We can also ask if there are other types of joint action other than collaboration among members of a virtual community of researchers? If, for instance, in the early phase of organizing the VART or VCoP, potential members are less committed and not so convinced of the value of collaboration, how do we work with these members long enough for the sub-culture to grow on them?

Before we proceed any further, we should point out that what we consider research collaboration in this paper is intentional collaboration based on common goals and relevant expertise needs. We do not include in this discussion the so-called collaborations of convenience, i.e., “collaborations formed simply because fellow researchers are in the same laboratory or facility” (Duffy, 2010, p. 229).

Two forms of working together, aside from collaboration, are cooperation and coordination. In common language, cooperation and collaboration are considered synonymous. But some literature on the theory of collaboration differentiates these two. Mattessich and Monsey (1992) differentiate collaboration, cooperation, and coordination based on the following:

- a. Vision and relationships—include relationships, missions and goals, and interaction;
- b. Structure, responsibilities and communication—include roles,

- planning, and communication;
- c. Authority and accountability—include authority, leadership, and risk; and
- d. Resources and rewards.

In contrast to the above criteria, Rogers and Whetten (1982, as cited in Harley & Blismas, 2010) use five criteria to distinguish cooperation from coordination:

- a. Rules and formality
- b. Goals and activities
- c. Implications for vertical or horizontal linkages
- d. Personnel resources
- e. Threat to autonomy

Mattessich and Monsey (1992) defined the three forms of working together as follows:

Cooperation is characterized by informal relationships that exist without any commonly defined mission, structure or planning effort. Information is shared as needed, and authority is retained by each organization, so there is virtually no risk. Resources are separate as are rewards.

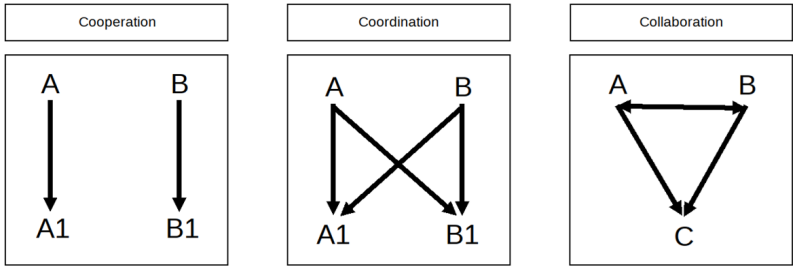
Coordination is characterized by more formal relationships and understanding of compatible missions. Some planning and division of roles are required, and communication channels are established. Authority still rests with the individual organizations, but there is some increased risk to all participants. Resources are available to participants and rewards are mutually acknowledged.

Collaboration connotes a more durable and pervasive relationship. Collaborations bring previously separated organizations into a new structure with full commitment to a common mission. Such relationships require comprehensive planning and well-defined communication channels operating on many levels. Authority is determined by the collaborative structure. Risk is much greater because each member of the collaboration contributes its own resources and reputation. Resources are pooled or jointly secured, and the products are shared. (p. 42)

Harley and Blismas (2010) illustrate the difference and relation between cooperation, coordination, and collaboration in the following diagram.

Figure 4

Comparison of outcomes in cooperation, coordination, and collaboration



The diagram can be read as a progression of complexity of relation between two individuals or units from left (cooperation) to right (collaboration). My interpretation is that the letters represent initial goals (A & B) and outcomes after research (A1, B1, and C). The arrows represent the way the researchers relate one another's goals. In cooperation, although it is assumed that the research groups would talk of some general common aim, they would establish different goals leading toward different outcomes and do their research independently of each other. It is like the jigsaw puzzle approach to group discussion. The output may refer to the common aim and how each other's outcome contributes to the common aim, but the outcomes only satisfy the local goals.

In coordination, the researchers proceed as in cooperation, but they would check on one another and perhaps share resources and cross-fertilize each other's outcomes.

In collaboration, my reading of the diagram is that a common outcome is achieved from the different goals of the partners. There is a going back and forth between partners throughout the research process. In this case, there is but one research instead of multiple research projects.

All three can be used by VARTs, VOs, and VCoPs in pursuing a programmatic line of research. For instance, one can envision a research project designed to converge into a meta-analytic study, wherein initially a pilot demonstrator project is done that serves as template, and enhanced replications can

follow if done by other research groups. Each group can do their own meta-analysis of the replications, or they can collaborate to produce one report.

Note that these inter-researcher activities are done across time and space and mediated by distributed technology. However, it is recommended to start with face-to-face meetings or synchronous video conferencing to build rapport and trust among members. It would also help if there were “translators” in the teams who will bridge the different disciplinary jargon and perspectives. These intermediaries can interpret what each other wants and how to go about it between experts. This is particularly important when interpreting between subject-matter experts and technology experts (Kertcher, 2010).

Tips like these for building a collaborative research environment are interesting, but we would need a systematic study of the theory of research collaboration. Perhaps, the literature on computer-supported cooperative work (CSCW) can assist us in that study.

We now turn to a specific form of collaboration that has a bearing on the Panda et al. proposed VRE for Asian DE researchers that we are trying to elaborate on for application in our university. This is the mentor-mentee collaboration between research advisor and advisee and that between expert senior researchers and novice junior researchers.

Collaboration between Experts and Novices

We discuss this form of working together on a research project separately from collaboration between peer experts due to its training component in the VRE. Although the emphasis of this section is on research supervision at the graduate or post-graduate level, we can extend the discussion to mentoring teams between colleagues. These mentoring teams are considered as a “continuance of the natural and traditional relationship of the thesis advisor and student beyond graduation. This relationship, when it continues, tends to be rather robust and long-lasting” (Lecoure & Carroll, 2009, p. 393).

It is said that “research requires not only scientific and technical expertise, but also the social and management skills needed to work as part of a team. These cannot be readily taught in the classroom—they are best learned ‘on the job’ by engaging graduate students or young postdoctoral researchers in collaborative activities” (Katz & Martin, 1997, pp. 14-15). And that the “...

learning formal courses are traditionally designed to provide students with only structured theoretical knowledge but no real practices” (Mohamed & Köhler, 2021, p. 31).

If the courses are not enough to mentor students in doing research, then what this section proposes is to leverage e-research at the program level. In order to do that, we need to develop a sub-culture of research and a VRE in the program. Within this VRE, the faculty can collaborate with students in “open-kitchen research.” Mohamed and Köhler (2021) state that this term “refers to sharing research activities not only as a finished product, but also as processes” (p. 31).

But what kind of sub-culture of research collaboration do we want to practice in this research environment? For this, research supervisors/advisors must first adopt a perspective of research as a form of teaching and supporting learning. In the case of distance education, this appears to me to look at research supervision/advising as guided independent study. Thus, the supervisor brings the conceptual tools of andragogy to the sub-culture, and the students bring the conceptual tools of heutagogy.

There are some who believed that “if one can do research, then one presumably can supervise it” (Rudd, 1985, as cited in Taylor, 2018), but this view appears to be wanting. In order to mitigate the high attrition of research students, it may be necessary to do further studies on the nature of the relationship and collaboration between the supervisor and the candidate researcher. One perspective is that of Kiley (2009) who views doctoral dissertation and training as a form of rite of passage. She identified threshold concepts that the student must cross in order to become a “researcher” in name and spirit. From this view, our problem is how the research environment, including the supervisor, can assist the student to cross those threshold concepts.

What are these threshold concepts? Kiley (2009) said that “threshold concepts are concepts that are so critical to an understanding of the discipline that advanced disciplinary learning is not possible without having crossed the threshold of understanding for that concept” (p. 297). She identified the following examples of threshold concepts:

- concept of an argument/thesis
- concept of a theory

- concept of framework
- concept of knowledge creation
- concept of analysis
- concept of research paradigm

In my experience, some candidate researchers get stuck even in the early phase of defining the research problem. In educational technology research, for instance, they would identify some interesting technology solutions but do not know what the problem that solution is supposed to fix. There is neither causal nor correlational argument. Some, after taking courses on the theory of DE, could not apply them in building the theoretical-conceptual framework. They would just drop the name of the theory or the theoretician and forget about it in the rest of the proposal, proceeding in an atheoretical manner. Some would list so many concepts but cannot relate the concepts to each other in a hypothesis or an informed guess. Some cannot seem to locate their topic within the specialization of the DE field. And some have difficulty differentiating the methodology, in the language of research paradigm with the research method.

How do supervisors and the institution support students' attempt to cross these threshold concepts? How can we help research candidates get unstuck? There appears to be a need for the candidates to be aware of their predicament and to get them to "discuss it" with others. But talking about it may not be enough as even when these concepts are explained to them in detail and model research papers provided, some do not get it. Perhaps, demonstrating how to cross these thresholds together through collaborative research would be fruitful. But again, collaborative research at a distance would require the socio-technological environment for the collaborators to thrive.

What would the content of the VRE for graduate students then be? An example project is described by Barbara Allan (2016) in the following manner:

The Graduate Virtual Research Environment (GVRE) was developed at Hull University as a means of providing additional support to research students. Focus groups with research students and early career researchers showed that they wanted to learn about the research journey from other students and academics, rather than from academic journals and research textbooks. Consequently, doctoral research students were recruited as resource developers.

This process was led by a project manager who organized the recruitment and management of students, who were paid for this work, and he also managed the quality control of the resources. The GVRE involved students as co-creators as well as users of the learning resources and produced more than 250 video clips plus other resources. They illustrate all stages of research and students and staff at all stages of their research journeys. (pp. 58-59)

The videos were meant to “capture the realities of the research process and research students’ experiences” (Costello et al., 2012, p. 173).

Judging from this description and that of Costello et al. (2012), it seems that there are more components to this GVRE than just a video repository. With Web 2.0 technologies, we can probably improve upon this with more interactive facilities for the participants that is closer to our description of a VRE for peer experts.

And learning research from reading academic journals is important. Reviewing peer’s papers is a common task of academics sitting in review boards or thesis panels. The only problem with current practice is that students are not taught “how” to review a paper. They do not know what to look for and what constitutes a good paper. Our VRE should have clear criteria for good research in education, similar to Audrey Trainor et al.’s “Reviewing Qualitative Research in the Social Sciences (2013)” and Gregory Hancock et al.’s “The Reviewer’s Guide to Quantitative Methods in the Social Sciences (2019)”, in addition to the standard information on research paradigms and methods.

Kiley’s (2009) respondents also recommend dissertation camps and writing retreats. Here we need to find some way to replicate such activities online. And one respondent encourages candidate researchers to join journal clubs. “Journal clubs are formally organized reading groups that discuss an article found in the recent research journals” (Golde, 2007, p. 345).

The VRE should also share tools on research writing and data processing. Current research tools are being powered by artificial intelligence such as the SciSpace’s Copilot (see <https://typeset.io/>), a chatbot specialized in assisting the reading of journal articles. We need to test these new tools to recommend to our students.

And of course, this VRE should have spaces for collaborative research projects between faculty, students, research assistants, even external researchers. Having an open access student journal would also be advantageous as some research like enhanced replications may not be acceptable to existing professional journals of the field.

Another useful perspective on research supervision is Anne Lee's (2020) "Framework of Approaches to Research Supervision". The approaches in this typology highlight the differences in preferences to supervision by supervisors and the student's reaction to those preferences. The types are not mutually exclusive but serve as a guide for self-reflection and diagnosis of potential problems with supervisor-candidate relationship. The types are:

- Functional
- Enculturation
- Critical thinking
- Emancipation
- Relationship development

I will leave it to the reader to consult Lee's "Successful Research Supervision" (2020) book for a deeper understanding of these types. What I am particularly interested in with respect to collaborative research is the enculturation approach. Lee said that the "enculturation approach will focus on encouraging the research student to become a member of a research community, to understand and apply the methods of good practice in the discipline" (p. 33).

The supervisor who prefers the enculturation approach performs gatekeeping and introducing the candidate to people and exemplars of high-quality work. Her/his supervision knowledge and skills include diagnosis of deficiencies and coaching. And the possible student reaction to this approach is one of role modeling and apprenticeship (Lee, 2020).

The approach has also been mapped to different functional phases of managing research as follows (Lee, 2020):

- a. Framing—looking at other examples in the discipline;
- b. Negotiating—asking who else in the department or discipline is doing similar work (what opportunities for collaboration might there be? what contacts might be approached?);

- c. Generating—by reviewing the research methods most commonly used in the discipline (looking for opportunities for joint fieldwork);
- d. Creating—through team discussions, by analyzing data, and looking for advances in the field;
- e. Disseminating—through departmental seminars and conferences; and
- f. Reflecting—on epistemological progress (on how the team supported and were involved in the research process).

Clearly, these are things that need to be supported by a VRE with modification for collaboration at a distance. Although we have online seminars and conferences, we are no longer limited to that. Open access provides dissemination to preprint archives without jeopardizing the paper's acceptance in a journal.

In the preceding two sections, we discussed the implications of distributed collaboration for developing a VRE. It is not enough to build the cyberinfrastructure for research; there is also a need to develop the sub-culture, the community of practice for research. If it takes a village to raise a researcher, we have to ask ourselves: if in an open university research program filled with part-time students, does the village exist at all or are all that we have are visitors? Is the faculty too small and too specialized that they prefer to collaborate with their professional communities rather than do interdisciplinary research with their colleagues in the institution? Are the faculty open to collaborating with students on an actual publishable research paper? We need to encourage some form of commitment outside the modules/courses for use to create a sub-culture in order for the enculturation approach to succeed and for the students to cross the threshold concepts.

In the next section, we will look at the concept of openness that is said to be inherent in e-research, although this is not always articulated.

Openness in Research

At the heart of UPOU lies an unwavering commitment to openness, exemplified through its endorsement of Open Distance e-Learning (ODeL). The concept implies unrestricted access and use, being free of charge, and using non-exclusionary standards, as underscored by Schroeder (2007). This ethos finds its expression in communities of practice, facilitated by

breaking down participation barriers and democratizing content production, as Duffy (2010) suggests. Openness, according to Duffy, involves “opening up content production to all users and exposing data for re-use and combination in mashups” (p. 221), where disparate data sources merge seamlessly, as exemplified in the global response to the COVID-19 pandemic. Organizations like the University of the Philippines (UP) Pandemic Response Team harnessed this approach, practicing open science by overlaying data onto maps and generating insightful graphs, showcasing the collaborative power of openness (Cayton & the UP Pandemic Response Team, n.d.).

In the context of e-research, “openness” is a multifaceted concept, encompassing various expressions that significantly influence the research landscape. Opensource software, for instance, served as the foundation for constructing the cyberinfrastructure of e-research. Examples are abundant, from the Globus Toolkit facilitating grid middleware to Sakai enabling VREs. Additionally, open standards, such as TEI XML for textual information, EpiDoc for epigraphy, WaterML by the Open Geospatial Consortium for water observation data, and the UK’s System Interoperability Framework (SIF) for school data, foster data sharing and database interoperability.

In the subsequent sections of this chapter, the focus will shift to explore other pivotal ‘open’ concepts, namely Open Science and Open Data. We hope to understand how these concepts are enmeshed in the morphing of the future of research in the university.

Open Science

e-Research (including e-Science of course) has been linked to open science through its emphasis on improving access to information. According to Borgman (2007), “those associated with e-Science and cyberinfrastructure tend to reiterate the principles of open science, such as:

- a. verifying and refining research findings;
- b. building on historical observations;
- c. avoiding the duplication of research;
- d. leveraging research investments by addressing new questions from extant data; and
- e. addressing questions that require data from multiple disciplines or countries” (pp. 192-193)

According to O'Carroll et al. (2017), open science “represents an approach to research that is collaborative, transparent, and accessible.” It is an umbrella term that includes the following:

- open access publishing
- open data
- open peer review
- open research
- citizen science

The last term allows non-specialist to contribute to the research like the game Foldit (see https://dev.fold.it/about_foldit) wherein anyone can help design new proteins with the objective of helping solve problems like viruses, breaking down plastic, and self-assembling materials. Or when the International Virtual Observatory opened up participation to amateur astronomers by allowing them to contribute to open data repositories (see <https://www.ivoa.net/>). Schroeder said that this openness to contributions or openness as participation is different from openness for dissemination, like the openness of open access publishing (Schroeder, 2007).

One notable innovation in open science is pre-registration, where researchers publicly register their research proposals before data collection. This approach encourages transparency, allowing others to replicate and enhance research ideas, even if they do not lead to formal publications (Bowman et al., 2020; Center for Open Science, 2023). Pre-registration is particularly valuable for graduate students, providing a platform to assert their ideas and protect against accusations of unoriginality.

Additionally, the rise of preprint archives has revolutionized the peer review process. Unlike traditional open access publications, preprint archives act as platforms for preliminary sharing, akin to presenting conference papers for expert feedback before journal submission. This approach enhances the quality of research by incorporating diverse perspectives and accelerating the review process. Even education research has its own preprint archive called EdArxiv (see <https://edarxiv.org/>). And we should take note that open access journals have exempted articles published in preprint archives from the rule on non-publication of a submitted article, thus widening the space for dissemination of research even from its earliest stage.

In spite of these advancements, embracing open science necessitates a

paradigm shift among researchers. It invites public scrutiny, requiring researchers to adopt a more transparent and inclusive approach. The International Science Council (2020) aptly defines open science as an inclusive practice, accessible to all, transcending geographical, gender, ethnic, and financial boundaries. Open science not only democratizes access to knowledge but also invites collaboration with diverse stakeholders, fostering the common pursuit of knowledge and supporting humanity in achieving a sustainable and equitable existence on earth.

Linked Open Data

Throughout this chapter, we have referred to big data as a major justification for creating the cyberinfrastructure for e-research. Collecting, formatting, sharing, and storing big data are major technical and sociological concerns in current research. The bigness of data is not just about the size of the dataset file (e.g., volume of the data in petabytes and larger) but also about the “variety of data types” (e.g., text, audio, images, video, spatial data, etc.) and the “velocity at which data must be processed” (Kelleher & Tierney, 2018, p. 9).

Data is quite valuable now. It has become a commodity that is traded, sold, and sometimes stolen by hackers for ransom. For researchers, datasets can be used to barter with other datasets from other research centers, and in some AI-related model development, there are datasets that have become a benchmark for training. Of course, not all data is valuable. The quality of data is important in carrying out research, and having a systematic way of collecting, storing, and sharing that data impacts its usability in research. Unfortunately, universities may not yet recognize the value of the data that they collect beyond enrollment data. Learning-related data may be treated as something that is only temporarily stored and thrown away after grades are calculated, thus leading to loss of knowledge and the frequent reinvention of the wheel when the people who had the expertise to generate such data leaves the institution.

We already know that research in the sciences and social sciences can generate big data to justify the building of distributed databases and grid-computing infrastructure. Is this also the case with educational research? Perhaps yes. According to Fischer et al. (2020), there are three levels of big data use in educational contexts that also illustrate the potential sources of big data for educational research.

1. **Microlevel big data**—fine-grained interaction data between students/teachers and the interactive content. Usually, the data is collected in the form of log files of clicks on the content displayed in a browser or application. In DE, this is collected automatically, 24 hours a day, seven days a week, in platforms like LMS, intelligent tutoring systems (ITS), massive online open courses (MOOCs), remote and virtual laboratories, simulations, and game-based learning environments. Perhaps in the future, immersive environments that incorporate virtual reality, augmented reality, and haptics may be included in that list.

Unfortunately, this data is also the one thrown out by schools that do not know how to mine information on them or do not see any value or use for them. This is particularly true with DE providers with low-resource servers running in cloud computing services because the log files grow big quickly and consume storage, which in turn affects the performance of the site or crash it altogether.

2. **Mesolevel big data**—includes most of the digital content contributed by teachers and students from term papers as digital documents to text posts in discussion forums. Fischer et al. (2020) said that this data “affords opportunities to naturally capture raw data on learners’ progressions in cognitive and social abilities, as well as affective states” (p. 132).
3. **Macrolevel big data**—is data collected at the institution level. In DE systems, this is usually collected in student information systems or student portals holding enrollment data. This may also include educational management data from the institutions’ management information system. This data is less frequently updated than the other two.

I have noticed though that these categories focus on the teaching-learning subsystem of an educational institution. I do not know where one could categorize data related to research in a university such as repositories of research, dissertations, and publications; and repositories of learning objects such as the video collection of UPOU Networks or even an open data repository. Would those fall under meso or macro? If a university has already created a VRE, then that will also generate data separate from the teaching-learning platforms.

I would like to note as well that even the Philippine Department of Education has already digitalized its collection of student grades in what they call as the Learner Information System (LIS; see <https://lis.deped.gov.ph>) in 2012. The LIS appears to hold macro level data. This is a welcome development as I still remember the days when teachers would spend a lot of time manually writing up reports of grade in paper spreadsheets.

Analysis of big data is the focus of the new fields of Educational Data Mining (EDM) and Learning Analytics (LA). EDM has been described as a “process that reveals patterns, sometimes imperceptible and unexpected, in large educational datasets using statistical techniques, machine learning and data mining” (Murchan & Siddiz, 2021, p. 5). Although there is an overlap with EDM, LA tried to differentiate itself as a research community by focusing primarily on learning rather than educational management. LA is defined as “the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs” (Society for Learning Analytics Research, 2023, para. 1).

At UPOU, even though we are well aware of these fields and have studied their methods, there is no large-scale systematic application of it yet. The statistical, other advanced mathematical, and computational prerequisites for these quantitative approaches to studying big data may be a barrier to some faculty members. This would require some attention from the institution as to how we can assemble a team capable of exploiting these approaches to further understand how students learn at a distance and mediated by distance learning technology.

We have mentioned before that not only is e-research about big data, but it is also about open data. The following are definitions of open data:

- a. “Open data are data which are made accessible and available in a standardized machine-readable format and under a license that allows it to be re-used and re-shared” (Yao & Park, 2020, p. 1)
- b. “Open data and content can be freely used, modified, and shared by anyone for any purpose” (Open Knowledge Foundation, n.d., para. 4)
- c. “It is information, of all types and not just digital, available free of charge on the Internet and allowing any user to download, copy, analyze, reprocess, transmit without financial, legal, or technical obstacles other than that concerning access to the Internet itself”

(Rentier, 2019, p. 80)

If you checked the statistics on the COVID-19 during the pandemic, then you are a witness to the results of open data practices. At the height of the pandemic in the Philippines, the UP COVID-19 Pandemic Response Team (2020) made this emphatic call for open data:

Nowhere is the need for Open Data as clearly manifested than in the current COVID-19 crisis. In preparing for, responding to, and recovering from the impacts of health hazards or any natural hazard for that matter, data must be used to generate knowledge. If we keep our information in silos, our collective efforts and perspective of the situation narrows and so do our chances to maintain and preserve public health and security. Ultimately, because the battles ahead will no longer be just about health, this call for more open data sharing is a call to other sectors as well. We need to resolve our data issues post-haste to secure public trust in the plans, decisions, and pronouncements of the government and its private partners. (Call for Open Data and Scientific Cooperation section, para. 5)

I imagine such a call to be applicable as well to an education crisis. Interestingly, UP Diliman already has an Open Data Policy as early as 2014 (University of the Philippines Diliman, 2014), wherein it states that:

The social benefits of sharing publicly-funded research data include the development of new research or innovative products based on the data, maximization of returns to investment in creating or collecting the data, avoiding the need for others to unnecessarily recreate the data, and the formulation of relevant and informed public policy and the advancement of public services based on the data. (Policy section, para. 3)

We need to study the experiences of the experts who developed open data systems if we plan to adopt this in our VRE. Admittedly, opening data of students to the public is going to be a messy policy development process, probably much more so than the development of the UPOU repository with its copyright issues.

It is strongly recommended that we study data governance, data management, and data warehousing practices in relation to open data. Data governance

is defined as “a systemic and multidimensional approach to setting policies and regulations, establishing leadership for institutional coordination and national strategy, nurturing an enabling data ecosystem, and streamlining data management” (Yao & Park, 2020, p. 2).

We should really carefully design the data collection and what data we collect as early as possible in relation to our programmatic lines of research and quality assurance research. This would increase the value of the data in the long run instead of realizing later that the data is unusable due to missing information, erroneously aggregated information that should have been separate, duplicate records, and just generally bad database design.

So now we got big data and open data, we still need to consider one more idea on data in e-research—that is, linked data or linked open data. In the third definition of open data that we previously cited, it said that open data are “made accessible and available in a standardized machine-readable format.” One of the standards is Resource Description Framework (RDF) that is based on Extensible Markup Language (XML). It has XML tags that tell a computer the “meaning” of a word in an RDF web page (similar to an HTML page) in the triple format. The triple has a subject, predicate, and object tag. For example, if your RDF web page refers to a pet named Fluffy, the subject tag is Fluffy, the predicate is a verb like “is a”, and the object is cat. Or one could relate two people, let’s say Juan and Maria. Juan (subject) is a son of (predicate) Maria (object). How does the machine know what is a “cat”? Aside from the RDF triple, there would be a declaration of the vocabulary (e.g., in Web Ontology Language or OWL) that list the tags like “cat” and “is a”. Then each tag is linked to a resource in the semantic web via a Unified Resource Indicator (URI), which is a generalized form of the Uniform Resource Locator (URL) that is commonly referred to as the web address starting with the term https. In the DBpedia ontology, for instance (see <https://www.dbpedia.org/resources/ontology/>), the term “cat” would point to <https://en.wikipedia.org/wiki/Cat>. I have noticed that this tagging sounds similar to supervised tagging in training an AI model, but I still do not know how the two are related or if building AI models can take advantage of semantic webs.

The triples are stored in a database called an RDF store, which has a different structure than a relational database management system like MySQL. In addition, we have to consider developing ontologies for our programmatic lines of research to enhance the datasets we will generate and provide

those datasets a context. Currently, learning objects in distance education are described through metadata. The metadata facilitates some form of machine processing for data analysis. But, metadata describes the whole learning object and is constrained by the predefined metadata elements of the metadata model. However, many learning objects are complex, like whole course learning objects. It would be difficult to identify which parts of these learning objects contribute to learning at a distance with metadata alone. For example, if a learning object is a collection of multiple-choice questions, how would the machine know which question measures which concept in a learning objective? Perhaps we can use RDF technology to tag individual questions in a quiz, individual concepts in a reading, individual sections of a video, and so on. Thus, these parts of a learning object are linked to ontologies, learning objectives, and the students' clicks on them in the clickstream data.

This may also be useful in some automation projects like automated feedback so that the machine providing the feedback would be in the same semantic space as what the student is talking about. We have to consider these kinds of requirements if we are to build the cyberinfrastructure for a semantic web that includes our research data.

We cannot go any deeper in the details of the semantic web technology in the section, and I am trying my best to describe it in a simple non-technical language. Linked data is a core concept in the semantic web. The semantic web is also known as a web of data. "Linked data is a set of design principles for sharing machine-readable interlinked data on the Web" (Land Portal Foundation, n.d., What is Linked Data? section, para. 1). According to d'Aquin (2016), "implementing open data through Linked Data technologies can be summarized as using the web both as a channel to access data (through URIs supporting the delivery of structured information) and as a platform for the representation and integration of data (through creating a graph of links between these data URIs)" (p. 1)—that is, data can be federated and data can be mashed up with these technologies. Anyone who tried merging datasets from two different platforms with different database structures knows the pain of doing so. I presume from literature that linked data makes such mergers and intersections of data much easier. Linked Data can be used in EDM and Learning Analytics.

As you probably guess by now, Linked Open Data (LOD) is linked data that is open data. According to Tim Berners-Lee (n.d.) "Linked Open Data is Linked

Data, which is released under an open license, which does not impede its reuse for free” (as cited in Land Portal Foundation, n.d., What is Linked Open Data? section, para. 1). The implication for us here is that we have to consider what open licenses will be appropriate for the datasets that we will make open in the same manner that we considered what Creative Commons licenses we use for our Open Educational Resources.

Some of the advantages of Linked Open Data are efficient use of resources, increased information quality, creation of added value, and identification of gaps in information (Land Portal Foundation, n.d.). However, there are concerns about the type of data we are collecting and the repurposing of such data in research.

Veltri (2020) differentiated organic data from designed data. He stated that:

“Digital data are considered ‘organic’, they are created by different actors in the context not of research, but of producing or delivering goods or services. This is in contrast to ‘designed’ data, those that are collected when we design experiments, questionnaires, focus groups, etc. and that do not exist until they are collected.” (00:13:14)

Veltri further said that there are validity issues with the repurposing of organic data, especially if we do not know the context of the data when it was originally collected. We have no space in this chapter to delve into this issue any deeper, but I think we need to study this thoroughly first if we are to commit to a cyberinfrastructure for collecting “organic data.” This is also why I think we should design our data collection processes with respect to longitudinal programmatic lines of research and carefully document the context of the datasets that we generate.

Ethical Quandaries in e-Research and the Need for Policy Reforms

As the digital age propels us into an era of vast data and open information, the ethical dimensions of e-research have become increasingly complex. The challenges posed by big data and open data initiatives extend beyond mere threats to research validity; they delve deep into issues of privacy, consent, and institutional oversight. In this context, existing ethics review practices are struggling to keep pace, particularly in the realm of e-research. This section critically examines these challenges, focusing on the nuances of data privacy, consent protocols, and the limitations of current review systems.

Data Privacy and Anonymization Revisited

Data privacy stands atop the list of ethical concerns in e-research, raising fundamental questions about anonymization and the protection of participant identities. There is ongoing debate over the anonymization of data and whether the de-identification of data elements is enough to protect privacy. Some claim that, even with anonymized data sets, one can reidentify individual participants (Klose et al., 2020). However, the claimants seem to gloss over the fact that they already have access to another dataset with identifiable data to compare with. For instance, in the evaluation of teachers and courses in DE, student respondents are supposedly anonymous in the surveys. But if the class size is small, a teacher may identify the student simply from the way the responses were constructed. The longer the text response, the higher the probability for the teacher to reidentify the student from the idiosyncratic patterns in the sentences in comparison to their submitted requirements and discussion forum posts in the LMS module sites. With large classes, one might even employ machine learning pattern-matching algorithms to reidentify the student. However, how can a teacher from another program who had never taught any of the students reidentify those students without access to their module data? This complexity suggests that not all datasets can be made entirely public, necessitating nuanced policies and even non-disclosure agreements for certain types of data.

Broad Consent and the “Right to Be Forgotten”

The ethical principle of the “right to be forgotten”, essential in e-research, challenges the notion of organic data collection. While organic data, such as student enrollment records, pose little challenges to adhering to this principle, other organic data reused and designed data for longitudinal studies require innovative solutions. Do we need to repeat the collection of informed consent every time the data is used in new research? Can the concept of “broad consent” address this issue? In the United States of America, regulations on the protection of human subjects (United States Department of Health and Human Services: Office of Human Research Protections, 2018b) state that broad consent is permissible only for “secondary research,” i.e., “research using identifiable private information collected for either research studies other than the proposed research or non-research purposes” (United States Department of Health and Human Services: Office of Human Research Protections, 2018a; see <https://www.>

youtube.com/watch?v=jpqH2sHmOF4 for further explanation) that appears to be similar to how we define organic data.

In addition, I would assume that if broad consent or the regular informed consent was given, and the dataset is later de-identified of personal information, then if the participant later revokes his/her consent, his/her de-identified data can no longer be purged from the anonymized dataset. Thus, it follows that an anonymized dataset (that could have passed some tests and criteria) can be openly distributed. These scenarios need to be explicitly discussed and documented if we are to build an open data repository.

Perhaps Davis and Patterson's book on the Ethics of Big Data (2012) can be a starting point for studying how to construct a framework for big data ethics. They proposed the following elements to define such a framework:

- a. Identity — What is the relationship between our offline identity and our online identity?
- b. Privacy — Who should control access to data?
- c. Ownership — Who owns data, can rights to it be transferred, and what are the obligations of people who generate and use that data?
- d. Reputation — How can we determine what data is trustworthy? Whether about ourselves, others, or anything else, big data exponentially increases the amount of information and ways we can interact with it. This phenomenon increases the complexity of managing how we are perceived and judged.

Challenges in Research Ethics Review Boards

The expansion of research ethics review boards beyond their initial scope has led to frustration among researchers, particularly in the social sciences. Mission creep, coupled with a lack of understanding of diverse research methodologies, has resulted in bureaucratic hurdles. The disparities between universal ethical standards and the relativistic perspectives of social scientists further complicate the review process.

Some perceived these review boards as becoming too powerful by being able to “stop, delay, or change the character of research” (Bledsoe et al., 2007, p. 594). Initially designed as an oversight to medical research, some social scientists are complaining that its “encroachment” into their field is neither necessary nor appropriate. Some review boards appear to adopt

a universal ethics, while social scientists may take the perspective of the relativity of ethics with respect to the culture of the society and the historical times, thus, thinking of it as a problematic process that needs negotiation while board members see it as a bureaucratic legalistic process. In addition, it takes away the attention and limited resources of the review board to fulfill its original function. Why waste time monitoring low-risk interviews and surveys when close monitoring is needed for studies testing new drugs? Some are declaring that all “research,” including classroom research and quality assurance research, should go through review boards when it is clear that the small number of reviewers and staff of the board cannot even process all theses and dissertations of the university in the prescribed time for the candidate researcher to be graduated.

Reviewers appear to even go beyond reviewing the elements of respect for persons, beneficence and justice of the research proposal and intrude on the role of the research grant panels and thesis/dissertation panels. They may even try to change the study scope, comment on its feasibility, validity and reliability of the methods, and even micromanage the choice of every word in the instruments. There are even some institutions abroad that insist that a proponent has no right to determine the ethical worth of their paper and only the review board can do so. If the researcher cannot make judgment on the ethics of her/his own paper, then how is she/he able to operationalize the ethical requirements during research? And in the Philippines, the university ethics boards do not offer more than a comment on the proposal, there is no support for resolving the weaknesses that were supposedly uncovered.

Review boards have been accused of disrupting student careers, setting back tenure schedules, and blunting “the essence of many intellectual traditions” (Bledsoe et al., 2007, p. 594). Carr (2015, p. 18) further states that “mission creep has manifested itself in several ways.” Perhaps most notably is that institutional review boards (IRBs) increasingly serve to protect institutions rather than human subjects, more concerned about meeting legal regulations than actual participant harm. In the case of educational research in the Philippines, how sure are we that imposing stricter than normal ethical rules will protect the institution from litigation when there are no laws directly regulating educational research? As far as I know, only research in medicine and research involving animals have existing laws.

Policy Gaps and International Comparisons

Comparative analysis of international policies, such as the US Code of Federal Regulations, highlights the inadequacies in existing local frameworks. The explicit exemptions for educational research and specific conditions for secondary research underscore the need for clarity and specificity in policy formulation. The lack of detailed policy statements in the local context, particularly regarding the balance between risks and benefits, exacerbates the challenges faced by researchers in e-research.

One of my main complaints with our research ethics review policies in the Philippines is that there is a lack of explicit policy statements on what benefits outweigh the risks. It seems to me that whenever research is reviewed, the focus is only on the risk and never the benefits. The risk always outweighs the social benefits.

The other complaint is that there are no explicit policy statements about what research are exempt from full review or expedited review. It seems to me that this is left solely to the arbitrary preferences of the reviewer. In relation, my belief that research method is a factor in exempting a research proposal from full review and submission of documents that run counter to the methodology is dismissed without discussion. In fact, even the documentary requirements of the ethics review process have a clear bias towards experimental and survey research in that it forces some social science research proponents to literally go against their own methodology.

It has been claimed that “the diversity of methods employed by social scientists is often not reflected in the specialties and training of IRB members and reviewers, who are often prone to oppose methodologies with which they are unfamiliar, not due to ethical reasons but because of a lack of understanding” (Carr, 2015, p. 19).

While Philippine research ethics policy leaves it to the research ethics committee chair to “determine the proposal’s exemption from review or the kind of review required” (Philippine Health Research Ethics Board, 2017, p. 38), the US Code of Federal Regulations for the Protection of Human Subjects (45 CFR 46; United States Department of Health and Human Services: Office of Human Research Protections, 2018b) contains explicit statements on what research gets exemption based on discipline and research methods. In fact, under certain conditions (excluding those

involving minors), educational research is exempted from ethics review as shown below:

... the following categories of human subjects research are exempt from this policy:

Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison. (US Department of Health and Human Services: Office of Human Research Protections, 2018b, 00:06:07)

Relevant to research involving pre-collected big data, there are also conditions wherein secondary research is exempted from ethics review:

Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

(i) The identifiable private information or identifiable biospecimens are publicly available; (ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects... (US Department of Health and Human Services: Office of Human Research Protections, 2018a, 00:31:18).

Admittedly, my reading of these US laws is not that of an expert in international law, but I think this merits study by our own lawyers with respect to the viability of big data research and adoption of open data policies. We need to be as explicit in our policies as these documents show.

Ethics issues are extremely complex, and frankly I have no specific solution to the issues and complaints. All I know is that ethical processes should make e-research possible. Ethics processes should support research with

big open linked data rather than frustrating it. Bad actors have used big data analysis to threaten democratic processes. I fear that, if universities abstain from the opportunity to empower society with similar tools from big data research, it will have significant detrimental effects on freedom and general welfare.

The ethical challenges in e-research necessitate urgent policy reforms and a paradigm shift in ethics review practices. Addressing the intricacies of data privacy, consent, and the diverse methodologies employed by researchers requires a nuanced, adaptable, and inclusive framework. Learning from international models can provide valuable insights, guiding the formulation of explicit policies that balance ethical considerations with the opportunities offered by e-research.

Alternative Rewards/Incentive System in Open Collaborative e-Research

What might be the incentives for researchers to engage collaboratively at a distance? What incentives can be provided for researchers to adopt the perspective of openness in their research? Can institutions encourage e-research activities other than one that leads to a publication like repository building or research tool development?

In the case of open science, there are guidelines for an alternative incentive system. An example is the Open Science Career Assessment Matrix (OS-CAM) that:

provides a framework that can be used to develop evaluation systems that can be applied in various contexts: at individual level for the purpose of recruitment and promotion, at individual or group level in the evaluation of grant and fellowship applications or adapted to develop institutional funding allocation models or incentives focused on building open science capacity. (O'Carroll et al., 2017, p. 17)

Some of the evaluation criteria include the following (O'Carroll et al., 2017):

- a. pushing forward the boundaries of open science as a research topic;
- b. publishing in open access journals;
- c. self-archiving in open access repositories;
- d. using the FAIR (findable, accessible, interoperable, and reusable) data principles;

- e. adopting quality standards in open data management and open datasets;
- f. making use of open data from other researchers;
- g. using open-source software and other open tools;
- h. developing new software and tools that are open to other users; and
- i. securing funding for open science activities;

We can see from this list that not only is publication rewarded but also activities that help develop a sub-culture of open e-research and the development of the research infrastructure for that sub-culture to thrive in.

Opportunities and Challenges for UPOU

In conclusion, the trajectory of the last 25 years, as examined in this chapter, unequivocally points to a future characterized by multidisciplinary distributed collaborative e-research in universities. The challenges ahead are undeniably daunting. How do we foster a sub-culture of collaborative e-research when researchers often find themselves isolated in their scholarly pursuits? How can we establish and sustain a robust cyberinfrastructure? What policies must be crafted to facilitate open and big data research within a robust ethical framework? Moreover, how can we reform the existing incentive structures to encourage active participation from researchers, staff, and students in shaping this future?

These challenges, while formidable, are not insurmountable. There are unique opportunities, particularly within our institution, the UPOU, where the spirit of openness is ingrained in its ethos. What is needed is a systematic application of the same innovative thinking that allowed us to fortify our teaching and learning systems during the COVID-19 pandemic. The elements required to realize the vision of the university of the future exist within our faculties, although they are not yet systematically integrated.

The Faculty of Management and Development Studies, with its expertise in research management and developmental practices, can provide invaluable insights, as can the health experts who have pioneered open science and open data initiatives. The Faculty of Information and Communication Studies, experts in cyberinfrastructure and data management, holds the key to building the technical backbone of our vision. The Faculty of Education, with its proficiency in e-sciences, e-social sciences, and digital humanities, can contribute significantly to reshaping our educational paradigms.

Collaboration between these faculties, leveraging their diverse expertise, could result in a transformative approach to research and education.

While UPOU already boasts an online repository for research publications and educational resources, there is still much ground to cover. Establishing a linked open data repository, creating preprint archives, and fostering a sustained community of researchers engaged in collaborative distributed e-research remain vital objectives. The time is ripe for interdisciplinary efforts to reimagine our data collection practices, enhancing the value of our datasets.

Yet, the pivotal question remains: what future do we envision for research in universities? Is it one where we surrender the reins of leadership to commercial institutions in exchange for funding, or do we chart our course towards a future where academia thrives independently? Can we perhaps find a middle ground, combining collaboration with external entities while retaining our academic integrity and autonomy?

This chapter issues a clarion call to envision a future defined by multidisciplinary distributed and collaborative e-research. It implores grassroots stakeholders—students, faculty, and staff—to initiate bottom-up e-research projects, nurturing a sub-culture of open e-research. Simultaneously, it urges top management to spearhead policies, reward systems, and cyberinfrastructure projects conducive to the growth of this sub-culture. In the convergence of these efforts lies the vision of the University of the Future—an institution where knowledge knows no boundaries and innovation knows no limits.

References

- Albion, P. R. (2012). Benchmarking citation measures among the Australian education professoriate. *The Australian Educational Researcher*, 39(2), 221–235.
- Allan, B. (2016). *Emerging strategies for supporting student learning*. Facet.
- Allan, R. (2009). *Virtual research environments: From portals to science gateways*. Chandos.
- Anandarajan, A., & Anandarajan, M. (2010). An overview of e-research collaboration. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. ...).

3–13). Springer.

- Berry, D. M., & Fagerjord, A. (2017). *Digital humanities: Knowledge and critique in a digital age*. Polity.
- Biagioli, M., & Lippman, A. (2020). *Gaming the metrics: Misconduct and manipulation in academic research*. MIT.
- Bledsoe, C. H., Sherin, B., Galinsky, A. G., Headley, N. M., Heimer, C. A., Kjeldgaard, E., Lindgren, J., Miller, J. D., Roloff, M. E., & Uttal, D. H. (2007). Regulating creativity: Research and survival in the IRB iron cage. *Northwestern University Law Review*, 101(2), 593–641.
- Borda, A., Careless, J., Dimitrova, M., Fraser, M., Frey, J., Hubbard, P., Goldstein, S., Pung, C., Shoebridge, M., Wiseman, N., & e-Infrastructure Steering Group, Office of Science and Technology. (2006). *Report of the Working Group on Virtual Research Communities for the OST e-Infrastructure Steering Group*. <https://eprints.soton.ac.uk/42074/>
- Borgman, C. L. (2007). *Scholarship in the digital age: Information, infrastructure, and the internet*. MIT.
- Borgman, C. L. (2016, July 23). *Not fade away: Social science research in the digital era*. <https://items.ssrc.org/parameters/not-fade-away-social-science-research-in-the-digital-era/>
- Bornmann, L., & Daniel, H.D. (2008). What do citation counts measure? A review of studies on citing behavior. *Journal of Documentation*, 64(1), 45–80. <https://doi.org/https://doi.org/10.1108/00220410810844150>
- Bowman, S., DeHaven, A. C., Errington, T. M., Hardwicke, T. E., Mellor, D. T., Nosek, B. A., & Soderberg, C. K. (2020, January 22). *OSF prereg template*. <https://osf.io/preprints/metaarxiv/epgjd>
- Brady, M., Gavaghan, D., Simpson, A., Parada, M. M., & Highnam, R. (2003). eDiamond: A grid-enabled federated database of annotated mammograms. In F. Berman, G. Fox, & T. Hey (Eds.), *Grid computing: Making the global infrastructure a reality* (pp. 924–943). Wiley.
- Brunvand, S., & Duran, M. (2010). A taxonomy of e-research collaboration tools: Using Web 2.0 to connect, collaborate and create with research partners. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. 105–116). Springer.
- Burdick, A., Drucker, J., Lunenfeld, P., Presner, T., & Schnapp, J. (2012). *Digital humanities*. MIT.
- Candela, L., Castelli, D., Manzi, A., & Pagano, P. (2014). *Realising*

- virtual research environments by hybrid data infrastructures: The D4Science experience. *Proceedings of Science PoS(ISGC2014)022*. International Symposium on Grids and Clouds (ISGC), Academia Sinica.
- Carr, C. T. (2015). Spotlight on ethics: Institutional review boards as systemic bullies. *Journal of Higher Education Policy and Management*, 37(1), 14–29. <http://dx.doi.org/10.1080/1360080X.2014.991530>
- Carusi, A., & Reimer, T. (2010). *Virtual research environment collaborative landscape study* [Research Report]. Joint Information Systems Committee (JISC).
- Cayton, P. J., & the UP Pandemic Response Team. (n.d.). *Open science practices of the UP Pandemic Response Team*. https://psa.gov.ph/sites/default/files/kmcd/Open%20Science%20Practices%20of%20the%20UP%20Pandemic%20Response%20Team%20%281%29_0.pdf
- Center for Open Science. (2023). *Welcome to registrations*. <https://www.cos.io/initiatives/prereg>
- Chapman, O., & Sawchuk, K. (2012). Research-creation: Intervention, analysis and family resemblances. *Canadian Journal of Communication*, 37(1), 5–26. <http://dx.doi.org/10.22230/cjc.2012v37n1a2489>
- Chiang, G.-T., Dove, M. T., Bovolo, C. I., & Ewen, J. (2011). Implementing a grid/cloud e-science infrastructure for hydrological sciences. In X. Yang, L. Wang, & W. Jie (Eds.), *Guide to e-Science: Next generation scientific research and discovery* (pp. 3–28). Springer.
- Conaco, M. C. G. (2016). Research cycle. In P. F. Almoro, C. B. Dimalanta, & A. R. T. Morta (Eds.), *Towards excellence in science research: A UP research guidebook* (pp. 13–18). University of the Philippines.
- Coronel, A. D., & Saldana, R. P. (2010). Developing a Philippine cancer grid. Part 1: Building a prototype for a data retrieval system for breast cancer research using medical ontologies. In S. C. Lin & E. Yen (Eds.), *Managed grids and cloud systems in the Asia-Pacific research community* (pp. 131–144). Springer.
- Costello, R., Shaw, N., Mundy, D., & Allan, B. (2012). Tailoring e-learning 2.0 to facilitate EU/international postgraduate student needs within the (GVRE) Graduate Virtual Research Environment. *International Journal for E-Learning Security*, 2(2), 173–180.
- Cruz, F. A., Gabatin, R. G., Abao, E. B. Jr., & Comendador, P. L. (2008). *UPLB research manual: Guidelines and procedures governing research*

and its related activities. University of the Philippines Los Baños.

- David, P. A., & Spence, M. (2010). Institutional infrastructures for global research networks in the public sector. In W. Dutton & P. w. Jeffreys (Eds.), *Worldwide research: Reshaping the sciences and humanities* (pp. 191–221). MIT.
- Davis, K., & Patterson, D. (2012). *Ethics of big data*. O'Reilly.
- Deepwell, F., & King, V. (2009). E-research collaboration, conflict and compromise. In J. Salmons & L. Wilson (Eds.), *Handbook of research on electronic collaboration and organizational synergy* (Vol. 1, pp. 1–15). Information Science Reference.
- Department of Science and Technology-Advance Science and Technology Institute (n.d.). *COARE: Computing and Archiving Research Environment*. <https://asti.dost.gov.ph/projects/coare>
- Dubé, L., Bourhis, A., & Jacob, R. (2005). The impact of structuring characteristics on the launching of virtual communities of practice. *Journal of Organizational Change Management*, 18(2), 145–166.
- Dubois, F. D. (2022). An overview of research-creation in and with interactive media. *The International Journal of Creative Media Research*. <https://www.creativemediaresearch.org/post/an-overview-of-research-creation-in-and-with-interactive-media>
- Duffy, A. (2010). Shifting the research grant collaboration paradigm with research 2.0. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. 219–232). Springer.
- Dutton, W. H., & Meyer, E. T. (2009). Experience with new tools and infrastructures of research: An exploratory study of distance from, and attitudes toward, e-research. *Prometheus*, 27(3), 223–238.
- d'Aquin, M. (2016). On the use of linked open data in education: Current and future practices. In D. Mouromtsev & M. d'Aquin (Eds.), *Open data for education: Linked, shared, and reusable data for teaching and learning*. Springer.
- Fischer, C., Pardos, Z., Baker, R., Williams, J. J., Smyth, P., Yu, S. Renzheand Slater, Baker, R., & Warschauer, M. (2020). Mining big data in education: Affordances and challenges. *Review of Research in Education*, 44, 130–160.
- Foster, I., Kesselman, C., & Tuecke, S. (2001). The anatomy of the grid: Enabling scalable virtual organizations. *The International Journal of High Performance Computing Applications*, 15(3, Fall), 200–222.
- Fraser, M. (2005). Virtual research environments: Overview and activity. *Ariadne*. <http://www.ariadne.ac.uk/issue/44/fraser/>

- Golde, C. M. (2007). Signature pedagogies in doctoral education: Are they adaptable for the preparation of education researchers. *Educational Researcher*, 36(6), 344–351. <https://doi.org/10.3102/0013189X07308301>
- Gonzalez-Aranda, J. M., Rodriguez-Clemente, R., & Lozano, S. (2010). E-research in international cooperation networks in science and technology research. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. 167–199). Springer.
- Goodyear, R. K., Brewer, D. J., Gallagher, K. S., Tracey, T. J., Claiborn, C. D., Lichtenberg, J. W., & Wampold, B. E. (2009). The intellectual foundations of education: Core journals and their impact on scholarship and practice. *Educational Researcher*, 38(9), 700–706.
- Grey, F. (2010). Asia federation report on international symposium on grid computing 2009 (ISGC 2009). In S. C. Lin & E. Yen (Eds.), *Managed grids and cloud systems in the Asia-Pacific research community*. Springer.
- Grey, F., & Lin, S. C. (2011). Asia federation report on International Symposium on Grid Computing (ISGC) 2010. In S. C. Lin & E. Yen (Eds.), *Data driven e-science: Use cases and successful applications of distributed computing infrastructures (ISGC 2010)* (pp. 3–36). Springer.
- Halfpenny, P., & Procter, R. (2010). The e-social science research agenda. *Philosophical Transactions of the Royal Society*, 368, 3761–3778.
- Hancock, G. R., Stapleton, L. M., & Mueller, R. O. (2019). *The reviewer's guide to quantitative methods in the social sciences*. Routledge.
- Harley, J., & Blismas, N. (2010). An anatomy of collaboration within the online environment. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. 15–34). Springer.
- Haythornthwaite, C., Lunsford, K. J., & Bowker, G. C. (2006). Challenges for research and practice in distributed interdisciplinary collaboration. In C. Hine (Ed.), *New infrastructure for knowledge production: Understanding e-science* (pp. 143–166). Information Science.
- Heyer, G., & Böhlke, V. (2021). CLARIN-D: An IT-based research infrastructure for the humanities and social sciences. In C. Koschtial, T. Köhler, & C. Felden (Eds.), *e-Science: Open, social and virtual technology for research collaboration* (pp. 99–110). Springer.

- Hovland, E. (2022). Artistic research and the need for a paradigmatic shift in art research. *Journal for Artistic Research*. <https://doi.org/https://doi.org/10.22501/jarnet.0060>
- International Science Council. (2020). *Open science for the 21st century*. https://council.science/wp-content/uploads/2020/06/International-Science-Council_Open-Science-for-the-21st-Century_Working-Paper-2020_compressed.pdf
- Jankowski, N. W. (2009a). *e-Research: Transformation in scholarly practice*. Routledge.
- Jankowski, N. W. (2009b). The contours and challenges of e-research. In N. W. Jankowski (Ed.), *e-Research: Transformation in scholarly practice* (pp. 3–31). Routledge.
- Jarwal, S. D., Brion, A. M., & King, M. L. (2009). Measuring research quality using the journal impact factor, citations and 'ranked journals': Blunt instruments or inspired metrics? *Journal of Higher Education Policy and Management*, 31(4), 289–300.
- Joint Information Systems Committee (JISC). (2016). *Implementing a virtual research environment (VRE): Understanding the tools and technologies needed by researchers*. <https://web.archive.org/web/20220120184426/https://www.jisc.ac.uk/full-guide/implementing-a-virtual-research-environment-vre>
- Juan, A. A., Daradoumis, T., Roca, M., Grasman, S. E., & Faulin, J. (2012). *Collaborative and distributed e-research: Innovations in technologies, strategies and applications*. Information Science Reference.
- Kacsuk, P. (2014). *Science gateways for distributed computing infrastructures: Development framework and exploitation by scientific user communities*. Springer.
- Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, 26(1), 1–18.
- Kelleher, J. D., & Tierney, B. (2018). *Data science*. MIT.
- Kertcher, Z. (2010). Gaps and bridges in interdisciplinary knowledge integration. In M. Anandarajan & A. Anandarajan (Eds.), *e-Research collaboration: Theory, techniques and challenges* (pp. 49–64). Springer.
- Kiley, M. (2009). Identifying threshold concepts and proposing strategies to support doctoral candidates. *Innovations in Education and Teaching International*, 46(3), 293–204. <https://doi.org/10.1080/14703290903069001>
- Kirschenbaum, M. (2012). What is digital humanities and what's it doing

- in English departments? In M. K. Gold (Ed.), *Debates in the digital humanities*. University of Minnesota.
- Klose, M., Desai, V., Song, Y., & Gehringer, E. (2020). EDM and privacy: Ethics and legalities of data collection, usage and storage. In A. N. Rafferty, J. Whitehill, V. Cavalli-Sforza, & C. Romero (Eds.), *Proceedings of The 13th International Conference on Educational Data Mining (EDM 2020)* (pp. 451–459).
- Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University.
- Köhler, T., Lattemann, C., & Numann, J. (2021). Organising academia online. In C. Koschtial, T. Köhler, & C. Felden (Eds.), *e-Science: Open, social and virtual technology for research collaboration* (pp. 11–28). Springer.
- Koschtial, C. (2021). Understanding e-science-What is it about? In C. Koschtial, T. Köhler, & C. Felden (Eds.), *e-Science: Open, social and virtual technology for research collaboration* (pp. 1–10). Springer.
- Kwiek, M. (2020). Internationalists and locals: International research collaboration in a resource-poor system. *Scientometrics*, 124, 57–105.
- Land Portal Foundation. (n.d.). What is linked open data? <https://landportal.org/pt/developers/what-is-linked-open-data>
- Laterza, V., Carmichael, P., & Procter, R. (2007). The doubtful guest? A Virtual Research Environment for education. *Technology, Pedagogy and Education*, 16(3), 249–267.
- Lecoure, J. S., & Carroll, W.R. (2009). ICT processes for virtual academic research teams (VART) in academia. In A. Cartelli & M. Palma (Eds.), *Encyclopedia of information communication technology*. Information Science Reference.
- Lee, A. (2020). *Successful research supervision: Advising students doing research* (2nd ed.). Routledge.
- Lin, S. C., & Yen, E. (2011). *Data driven e-science: Use cases and successful applications of distributed computing infrastructures (ISGC 2010)*. Springer.
- Lipnack, J. & Stamps, J. (1999). Virtual teams: The new way to work. *Strategy & Leadership*, 27(1), pp.14-19. <https://doi.org/10.1108/eb054625>.
- Lowry, G. (2015). Props to bad artists: On research-creation and a cultural politics of university-based art. *RACAR: Revue D'art Canadienne / Canadian Art Review*. <https://doi.org/https://doi>.

org/10.7202/1032751ar

- Ludäscher, B., Bowers, S., & McPhillips, T. (2018). Scientific workflows. In L. Liu & M. T. Özsu (Eds.), *Encyclopedia of database systems* (pp. 3320–3324).
- Marres, N. (2017). *Digital sociology: The reinvention of social research*. Polity.
- Mattessich, P. W., & Monsey, B. R. (1992). *Collaboration: What makes it work; a review of research literature on factors influencing successful collaboration*. Amherst H. Wilder Foundation.
- Merga, M. K., Roni, S. M., & Mason, S. (2020). Should Google Scholar be used for benchmarking against the professoriate in education? *Scientometrics*, 125, 2505–2522. <https://doi.org/https://doi.org/10.1007/s11192-020-03691-3>
- Meyer, E. T., & Schroeder, R. (2009). The World Wide Web of research and access to knowledge. *Knowledge Management Research & Practice*, 7(3), 218–233.
- Miedema, F. (2022). *Open science: The very idea*. Springer.
- Mintrom, M. (2008). Managing the research function of the university: Pressures and dilemmas. *Journal of Higher Education Policy and Management*, 30(3), 231–244.
- Misa, T. J. (1988). How machines make history, and how historians (and others) help them to do so. *Science, Technology, & Human Values*, 13(3–4), 308–331.
- Mohamed, B., & Köhler, T. (2021). The Fish Model: When do researchers collaborate online? In C. Koschtial, T. Köhler, & C. Felden (Eds.), *e-Science: Open, social and virtual technology for research collaboration* (pp. 29–48). Springer.
- Murchan, D., & Siddiz, F. (2021). A call to action: A systematic review of ethical and regulatory issues in using process data in educational assessment. *Large-Scale Assessments in Education*, 9(25).
- National e-Science Centre. (n.d.). *Defining e-science*. <https://web.archive.org/web/20170219160359/http://www.nesc.ac.uk/nesc/define.html>
- National Science Foundation. (2005). *NSF workshop on cyberinfrastructure for the social sciences*. <https://web.archive.org/web/20060105171914/http://vis.sdsc.edu/sbe>
- Nentwich, M. (2003). *Cyberscience: Research in the age of the internet*. Austrian Academy of Sciences. https://www.academia.edu/62982455/Cyberscience_Research_in_the_Age_of_the_Internet

- O'Callaghan, C. (2023, June 30). QS world university rankings methodology: Using rankings to start your university search. <https://www.topuniversities.com/qs-world-university-rankings/methodology>
- O'Carroll, C., Rentier, B., Valdes, C. C., Esposito, F., Kaunismaa, E., Maas, K., Metcalfe, J., McAllister, D., & Vandavelde, K. (2017). *Evaluation of research careers fully acknowledging Open Science practices: Rewards, incentives and/or recognition for researchers practicing Open Science*. European Commission.
- Okkonen, J. (2002). Performance in virtual organisations. *Frontiers of E-Business Research*, 1, 267–279.
- Olson, G. M., Zimmerman, A., & Bos, N. (2008). *Scientific collaboration on the internet*. MIT.
- Open Knowledge Foundation. (n.d.). *The open definition*. <http://opendefinition.org/>
- Panda, S., Libroero, F., & Bhatpurev, B. (2005). *A platform for virtual research and research training for Asia*. Paper presented at the 19th AAOU Annual Conference, Jakarta. http://www.pandora-asia.org/downloads/05-AAOU_PanLibBat.pdf
- Philippine Health Research Ethics Board. (2017). *National ethics guidelines for health and health-related research: 2017*. Department of Science and Technology-Philippine Council for Health Research and Development.
- Pothen, P. (2007). *Developing the UK's e- infrastructure for science and innovation* [Report]. OSI e-Infrastructure Working Group.
- Procter, R. (n.d.). *e-Infrastructure for the social sciences*. *UK Research and Innovation*. <https://gtr.ukri.org/projects?ref=RES-149-25-1063>.
- QS Quacquarelli Symonds Limited. (2021). *Understanding the methodology: QS world university rankings*. <https://www.topuniversities.com/university-rankings-articles/world-university-rankings/understanding-methodology-qs-world-university-rankings>
- Rentier, B. (2019). *Open science, the challenge of transparency*. Académie Royale de Belgique.
- Research Councils UK. (n.d.). *e-Science*. <https://web.archive.org/web/20101205140852/https://www.rcuk.ac.uk/escience/default.htm>
- Salganik, M. J. (2018). *Bit by bit: Social research in the digital age*. Princeton University.
- Schroeder, R. (2007). E-research infrastructures and open science: Towards a new system of knowledge production? *Prometheus*:

Critical Studies in Innovation, 25(1), 1–17.

- Social Sciences and Humanities Research Council-Canada. (2021). *Definition of terms*. <https://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/definitions-eng.aspx>
- Society for Learning Analytics Research. (2023). *What is Learning Analytics?* <https://www.solaresearch.org/about/what-is-learning-analytics/>
- Sonderegger, P. (2009). Creating shared understanding across distance: Distance collaboration across cultures in R&D. In N. W. Jankowski (Ed.), *e-Research: Transformation in scholarly practice* (pp. 129–146). Routledge.
- Stévanec, S., & Lacasse, S. (2018). *Research-creation in music and the arts: Towards a collaborative interdiscipline*. Routledge.
- Stokes, D. E. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Brookings Institution.
- Tahamtan, I., & Bornmann, L. (2019). What do citation counts measure? An updated review of studies on citations in scientific documents published between 2006 and 2018. *Scientometrics*. <https://doi.org/https://doi.org/10.1007/s11192-019-03243-4>
- Taylor, S. (2018). Thinking of research supervision as a form of teaching. In S. Taylor (Ed.), *Enhancing practice in research supervision*. Research Supervisors Network, UK Council for Graduate Education.
- Tecson-Mendoza, E. M. (2015). Scientific and academic journals in the Philippines: Status and challenges. *Science Editing*, 2(2), 73–78.
- Terras, M., Nyhan, J., & Vanhoutte, E. (2013). *Defining digital humanities: A reader*. Ashgate.
- Tiatco, S. A. P., Viray, B. L., & Javier, J. R. (2019). The Philippine performance archive on cultural performances: Archive as performative cultural memory and pedagogy. In A. W.-b. Tso (Ed.), *Digital humanities and new ways of teaching* (pp. 33–52). Springer.
- Trainor, A. A., & Graue, E. (2013). *Reviewing qualitative research in the social sciences*. Routledge.
- Trudeau, A. B. (2016). *Tracing the evolution of collaborative virtual research environments: A critical events-based perspective* [Master's thesis]. University of North Texas.
- Turner, A. (n.d.). *Andy Turner's NCeSS e-Infrastructure for the Social Sciences Project Web Page*. <https://www.geog.leeds.ac.uk/people/a.turner/projects/eInfrastructure/>
- United States Department of Health and Human Services: Office of Human Research Protections (2018a). *45 CFR 46 (Common Rule): 2018*

- Requirements (2018 Common Rule). <https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/revised-common-rule-regulatory-text/index.html>
- United States Department of Health and Human Services: Office of Human Research Protections (2018b). *45 CFR 46 (Common Rule): Exemptions (2018 requirements)*. <https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/common-rule-subpart-a-46104/index.html>
- University of the Philippines COVID-19 Pandemic Response Team (2020). Prevailing data issues in the time of COVID-19 and the need for open data. <https://up.edu.ph/prevailing-data-issues-in-the-time-of-covid-19-and-the-need-for-open-data/>
- University of the Philippines Diliman (2014). *University of the Philippines Diliman: Open Data Policy*. <https://opendata.upd.edu.ph/doku.php>
- Veltri, G. A. (2020, November 2). OxDEG: *Do we need a canonised digital social research?* <https://www.oii.ox.ac.uk/news-events/events/oxdeg-do-we-need-a-canonised-digital-social-research/>
- Vidican, G. (2009). The role of universities in innovation and sustainable development. In C. Brebbia, M. Neophytou, E. Beriatos, I. Ioannou, & A. Kungolos (Eds.), *Sustainable development and planning IV* (Vol. 1). WIT.
- Waters, D. J. (2023). The emerging digital infrastructure for research in the humanities. *International Journal on Digital Libraries*, 24, 87–102. <https://doi.org/https://doi.org/10.1007/s00799-022-00332-3>
- Wolski, M., & Richardson, J. (2010). *Moving researchers across the e-research chasm*. Ariadne.
- Woolgar, S. (2006). Virtual witnessing in a virtual age: A prospectus for social studies of e-science. In C. Hine (Ed.), *New infrastructure for knowledge production: Understanding e-science* (pp. 1–25). Information Science.
- Wouters, P. (2006). *What is the matter with e-science?—thinking aloud about informatisation in knowledge creation*. <http://pantaneto.co.uk/what-is-the-matter-with-e-science-thinking-aloud-about-informatisation-in-knowledge-creation-paul-wouters/>
- Wouters, P., & Beaulieu, A. (2006). Imagining e-science beyond computation. In C. Hine (Ed.), *New infrastructure for knowledge production: Understanding e-science* (pp. 48–70). Information Science. Information Science.
- Wulf, W. A. (1993). *The collaborative opportunity*. *Science*, 261, 854–855.
- Yao, K., & Park, M. K. (2020). *Strengthening data governance for effective*

Sustainability and the University of the Future

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ABSTRACT

In recent years, sustainability and sustainable development have become buzzwords. In spite of advances in technology and economic growth, the world has continued to suffer from extreme poverty, pandemics, war, climate change, desertification, gender inequality, biodiversity loss, overexploitation of resources, and other complex problems that have a high degree of urgency, posing a threat to the future of humanity. More than ever, the global call for a sustainable future has become louder and highlights the importance of having individuals who are able to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability. It was clear from the start that the University of the Philippines Open University (UPOU), as part of the national university, needs to contribute to addressing these challenges by developing professionals who can advance research-based and holistic solutions that encompass both natural resource and human well-being aspects of sustainability problems and that are grounded on local and regional problems. A Task Force Committee (TFC) composed of faculty members and researchers primarily from the Faculty of Management and Development Studies (FMDS) was formed to work on the development of a doctoral program in this emerging field. After a series of activities, which will be presented later, a program called Doctor of Sustainability was drafted. In 2020, members of the TFC shared their reflections on the process of crafting the proposed program at a virtual round table discussion on Sustainability and the University of the Future held on 10 December 2020. The following is an effort to put into text the oral narration and discussions that took place in that forum.

Why is Sustainability Important in the Future?

Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs. Many of us in the academe and in the development studies field would know about this classic definition and that when we talk about needs, we talk about natural, social, and economic resources.

Where does the term sustainability come from? While the concept of sustainability is relatively new, the movement has roots in social justice, conservationism, internationalism, and other past movements with rich histories. By the end of the 20th century, many of these ideas had come together in the call for “sustainable development” (SD). In 1983, the United Nations (UN) tapped former Norwegian Prime Minister Gro Harlem Brundtland to run the New World Commission on Environment and Development. There was a growing concern among countries that, after decades of effort to raise living standards through industrialization, many countries were still dealing with extreme poverty. It seemed that economic development at the cost of ecological health and social equity did not lead to long-lasting prosperity. It was clear that the world needed to find a way to harmonize ecology with prosperity.

This actually led to the development of sustainable development. Four years later, in 1987, the Brundtland Commission released its final report titled “Our Common Future.” The report famously defined SD as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987, p. 41). The commission successfully unified environmentalism with social and economic concerns on the world’s development agenda. From 1987 to 2015, various SD conventions, summits, and agreements have transpired. There was the Earth Summit in 1992 that led to the adoption of the Rio Declaration on Environment and Development and Agenda 21. The Summit for Social Development was held in 1995, the Millennium Summit in 2000, which led to the adoption of the Millennium Development Goals (MDGs), and in 2002, the World Summit on SD or the Johannesburg Summit. In 2012, the UN Conference on SD or Rio+20 was held. Three years later, in 2015, the 17 Sustainability Development Goals were adopted by member states of the UN.

When we talk of sustainability, we talk about a holistic, integrative approach

that considers ecological, social, and economic dimensions, recognizing that all three must be considered together to find lasting prosperity. It is in this context that we are adapting this definition of sustainability—a “discipline that points the way toward a sustainable society”—by addressing “problems at three levels (human system, which includes security, lifestyle, values, norms, and health; social system, which includes policies, economy, industry, and technology; and global system, which includes climate, resources, energy, and ecosystem)” (Komiyama & Takeuchi, 2006).

Why is sustainability important in the future? We are all cognizant of the fact that we are confronted with interconnected problems that do not seem to have optimal solutions. We have hunger, environmental degradation, low levels of education, gender inequality, lack of access to water and sanitation, urbanization, biodiversity loss, war and armed conflicts, vulnerable sectors such as persons with disability, indigenous people, women, the elderly, impacts of climate change, legal and social discrimination, extreme and multiple forms of poverty, and now, pandemic and emerging diseases. Experts and scientists are saying that, in the future, we should expect to face more complex and challenging scenarios ranging from more intense and frequent climate-related extreme events such as typhoons, floods, heat waves, and droughts to more pandemics. And all these would point us in the way people operate from a mindset of plenty. We act as if our resources are infinite, which is untrue.

Because of these reasons, our team would like to highlight discourses on sustainability. We only have one planet, and we need to stop operating from this mindset of plenty. We need to educate people that resources are finite and that we need to think of alternative solutions to meet our daily needs and that we should veer away from traditional models of development that have led to unexpected devastating effects. The current global public health crisis should be a lesson for all of us. This crisis cannot be solved with health experts alone; it requires a transboundary, multilevel system, a pluridisciplinary approach that transcends traditional solutions and promotes intersectoral cooperation and collaboration and takes on intergenerational equity perspectives. We seek an approach that cuts across scales, intergenerational, interconnected, and transboundary; deals with complex challenges; anticipates damage potential; and addresses urgent concerns. And while there have been international and national efforts to achieve sustainability, the complexity of such issues and challenges requires a field that could integrate generated use-inspired knowledge to a transformational

action under an adaptive and participatory setting (Ellis, 2019).

Making Sense of Sustainability and the UoF through our Reflective Journey

In the forum, we decided to make sense of what sustainability means in the University of the Future (UoF) by sharing our reflections on our journey as members of the Task Force Committee on the Doctor of Sustainability (DS) program. We believe that sustainability is a goal that requires the support of multiple stakeholders and what better way to do this than to provide a venue for people to share their ideas, even apprehensions, about it. This is a story of our reflections, our meta interpretation or meta narrative of our conversations, experiences, realizations, and all of the text we have produced as collaborators working on the DS proposal. Just like everyone else, we are not experts or the sole arbiters of sustainability, we are just initiators of conversations that hopefully shall continue as we journey to a sustainable university contributing to a sustainable future.

An Overview of our Journey

Part of the prospects for a sustainable future is to develop an academic program that will produce graduates who can develop research-based solutions to persistent sustainability challenges. Such an approach is grounded on a thorough understanding of the interrelationship between sustainability world views and practical approaches as well as innovative and collaborative applications of this understanding to manage sustainability transitions in specific contexts while recognizing relationships across system scales and their implications on intergenerational equity.

The proposed DS program will address the demands of prospective students who are interested in non-academic career paths, including leadership in international organizations, national and local government agencies, and nongovernment organizations involved in addressing sustainability issues, sustainable development, and other development projects. This demand is propelled by the increasing need for interventions at the individual, community, national, regional, and global levels, with a heightened realization that sustainability as a reality is constituted in a highly interconnected and complex world that is made up of many distinct but related systems—environmental, social, economic, technical, political, cultural, and so on.

This program proposal is actually part of our sustainability journey. It started in 2012 when the task for the development of a doctoral program in Environmental and Natural Resource Management (ENRM) was initiated and a task force was created to develop or study further how we can develop a Doctor of Philosophy (PhD) in ENRM. A series of stakeholder consultations was done and from these, we found one common denominator across our programs and in those of other faculty offices: sustainability. We organized a sustainability conference (the International Forum on Sustainability Science) that was held in New Clark City, Philippines. A group of experts talked about sustainability and related areas and disciplines and, in 2015, we started inviting visiting professors. We have partnered with universities abroad such as Kanazawa University (KU) in Japan. We then initiated a round table discussion (RTD) with professors from the United Nations University (UNU) and from KU. In 2016, based on such consultations, the program was renamed PhD in Sustainability Science, reflecting the shift in focus from ENRM to sustainability science. Another series of consultations began, involving a number of visiting professors. In 2017, we held an RTD on Sustainability Perspectives and we invited a professor from UNU, Dr. Osamu Saito, our very own Dr. Alexander Flor from the Faculty of Information and Communication Studies (FICS), and Dr. Richard Bawden from Western Sydney University. Our partnership expanded with another constituent university that is also starting its Master of Sustainability Science and we also held a series of RTD with University of the Philippines Visayas (UPV). The year 2018 saw more visiting professors being invited and in 2019, the senior author started an extensive training program at UNU. In 2020, the DS proposal was further developed, and the final output is presented in this chapter.

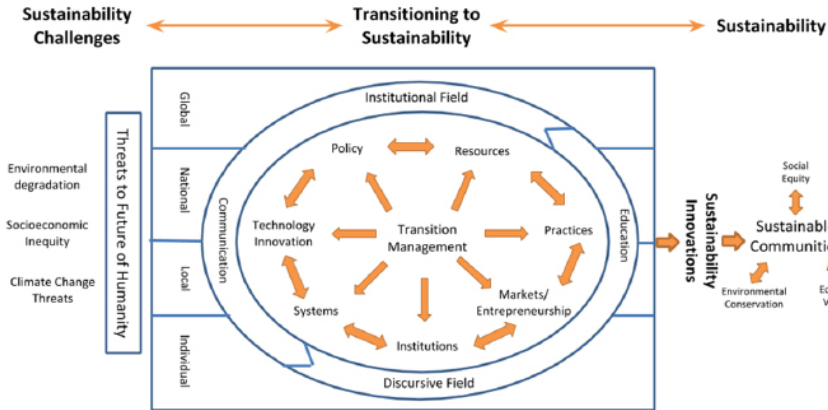
The Doctor of Sustainability Program

Program Framework

As previously mentioned, there is a call for an immediate and holistic response to sustainability challenges such as environmental degradation, socioeconomic inequity, and climate change that threaten the future of humanity. University-wise, these challenges also have implications on how the university performs in its trifold functions of teaching, research, and public service. Given the complexity of these challenges, transitioning to sustainability at the individual, local, national, and global levels is required.

Figure 1

Doctor of Sustainability Framework



In line with the university’s goal of developing people in society through its graduates who can contribute significantly to addressing societal problems, transitioning to sustainability is expected to strengthen the programs that the university would like to offer. Specifically, the university, through its content and curriculum, can provide students with wide perspectives on sustainability. Moreover, this transition in education could catalyze the development of sustainability as a field, especially in the local context, through knowledge sharing and creation among academics and learners, thereby advancing the agenda to meet sustainability challenges.

The target outcome is to support the creation of sustainable communities through sustainability innovations. This outcome requires transition management, which involves an interplay of technology innovation, policy, resources, practices, markets or entrepreneurship, institutions, and systems. Through communicative activities, a discursive field that allows for the articulation and advocacy of sustainability concepts, issues, and practices can be created. Mainstreaming sustainability as a concept and practice through education allows for the development of an institutional field where multiple change agents, actors, and institutions interact for sustainable development.

The role of the UoF is therefore crucial in honing society by creating a sustainability-driven mindset and forming a perspective among learners that could lead to behavioral changes toward sustainability. By the time they

graduate, students are envisioned to be part of a sustainable community and to influence the system where they belong.

To achieve sustainability, the application of theories to practice is critical. Students must be able to understand sustainability issues and challenges and see the interconnection of various problems in society. The way to train the students is to let them see and realize the interaction and interconnection of their discipline with all other fields through pluridisciplinarity and systems input. With the proposed program, the university would provide the necessary information to help students make sense of the framework of sustainability and develop them into sustainability experts.

Moreover, through a mentoring system, the necessary skills and values can be imparted by the UoF. Students will be mentored while they are in the university with the presumption that, upon graduation, they would also mentor somebody else in their community to achieve sustainability. Application of knowledge may be through sustainability innovations in which graduates are able to integrate and properly apply their knowledge in real-life scenarios.

The proposed DS program is anchored on the open and distance e-learning or ODeL framework of the University of the Philippines Open University (UPOU), which envisions social transformation. OdeL as a worldview draws from the features and affordances provided by three related modalities, i.e., open learning, distance education, and e-learning, in providing flexible, equitable, accessible, learning- and learner-centered, and highly connected quality education (Alfonso, 2014). Grounded on this framework, the program could contribute to the thrust of UPOU as a research university and a public university where creation of new knowledge, discovery of innovative ways, and application of various sustainable development initiatives will address the sustainability challenges of society. Through this proposed program, UPOU can directly contribute to sustainability— i.e., toward building sustainable communities where there is social equity, economic viability, and environmental conservation.

Program Goals

In the RTD, we also shared the envisioned goal of the program, which is to produce graduates who can create and implement transformative design, strategies, and solutions that address sustainability of human-driven

systems by applying pluridisciplinary (interdisciplinary, multidisciplinary, and transdisciplinary) approaches. It aims to develop graduates who can

- draw on a variety of theoretical and practical knowledge resources to develop a broad understanding of sustainability issues of various society-nature interactions, including unintended consequences of intergenerational equity;
- synergize the perspectives of various disciplines in analyzing and addressing the social, economic, and environmental dimensions of sustainability challenges;
- communicate and educate individuals, groups, and communities on sustainability issues, solutions, and future initiatives;
- negotiate sustainability goals, values, and targets across various positions, perspectives, and cultures, social groups, and communities;
- promote interactions and collaborations between local actions and wider or even global initiatives to expand the impacts of local practices; and
- lead others in the development of research-based solutions to persistent sustainability problems in specific sectors.

Alignment between DS Program Goals, Wiek’s Sustainability Competencies, and 21st Century Skills

Our experience shows a parallelism between the program’s goals that we developed at that time, the sustainability competencies as identified by Wiek et al. (2011) and the 21st century skills for lifelong learning (Table 1). The table illustrates that teaching students about sustainability does not only help them develop competencies that are useful in examining and addressing sustainability challenges but also contributes to developing 21st century skills that can serve students the rest of their lives.

Table 1

Parallelism between DS Program Goals, Sustainability Competencies, and 21st Century Skills

DS program goal	Sustainability competencies (Wiek et al., 2011)	21st century skills
Draw on a variety of theoretical and practical knowledge resources to develop a broad understanding of sustainability issues of various society-nature interactions, including unintended consequences of inter-generational equity	<ul style="list-style-type: none"> • Systems-thinking competence • Strategic competence 	<ul style="list-style-type: none"> • Critical thinking and problem solving • Learning to learn/ self-awareness and self-direction
Synergize the perspectives of various disciplines in analyzing and addressing the social, economic, and environmental dimensions of sustainability challenges	<ul style="list-style-type: none"> • Systems-thinking competence • Strategic competence 	<ul style="list-style-type: none"> • Critical thinking and problem solving • Innovation, creativity, and entrepreneurship • Learning to learn/ self-awareness and self-direction
Communicate and educate individuals, groups, and communities on sustainability issues, solutions, and future initiatives	<ul style="list-style-type: none"> • Interpersonal competence • Anticipatory competence 	<ul style="list-style-type: none"> • Learning to learn/ self-awareness and self-direction • Communication
Negotiate sustainability goals, values and targets across various positions, perspectives, and cultures, social groups, and communities	<ul style="list-style-type: none"> • Interpersonal competence • Normative competence 	<ul style="list-style-type: none"> • Innovation, creativity, and entrepreneurship • Collaboration • Communication • Global citizenship and sustainability
Promote interactions and collaborations between local actions and wider or even global initiatives to expand the impacts of local practices	<ul style="list-style-type: none"> • Anticipatory competence 	<ul style="list-style-type: none"> • Collaboration • Communication • Global citizenship and sustainability

Lead others in the development of research-based solutions to persistent sustainability problems in specific sectors	<ul style="list-style-type: none"> • Strategic competence • Anticipatory competence 	<ul style="list-style-type: none"> • Collaboration • Global citizenship and sustainability
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Lessons Learned from our Experience

Current development efforts are disjointed and do not take intergenerational equity into consideration (hence the need for sustainability perspectives in educational curricula)

In spite of recent efforts to make development initiatives more inclusive and participatory, development policies have focused mostly on economic growth. While millions in the developing world have been lifted out of poverty in the last 70 years, millions remain poor without or with very little access to basic necessities. Rapid economic growth has also been accompanied by the degradation of the environment and the non-equitable distribution of economic benefits. More importantly, the needs of the future generation are not considered, and decisions are thus made as if environmental wastes can just be dumped into a “future” without people. In view of this, there is a need to incorporate sustainability perspectives in educational curricula, including the aforementioned competencies. For one, there is also a need to include futures literacy as a skill to be developed among our learners. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines futures literacy as a:

“skill that allows people to better understand the role of the future in what they see and do. Being futures literate empowers the imagination, enhances our ability to prepare, recover and invent as changes occur. People can become more skilled at ‘using-the-future’, more ‘futures literate’, because of two facts. One is that the future does not yet exist, it can only be imagined. Two is that humans have the ability to imagine. As a result, humans are able to learn to imagine the future for different reasons and in different ways. Thereby becoming more ‘futures literate’.” (UN office in Jakarta, U-Inspire Alliance, UN Office for Disaster Risk Reduction, and UNDD Accelerator Lab Indonesia, 2022, p. 10)

Sustainability issues are interconnected and transect different sectors and disciplines (hence the need for systems thinking and pluridisciplinary and collaborative approaches)

Sustainability problems are complex and quite interrelated. Our environmental problems are connected to our human consumption patterns, which are connected to our economic structure, our culture, and so forth. Hence, sustainability challenges cannot be addressed by one disciplinary approach or by different sets of disciplines working separately. Sustainability problems must be understood from different angles and perspectives. Pluridisciplinary approaches (preferably interdisciplinary and transdisciplinary) are needed to understand and address these challenges systematically. While disciplinary lens is still useful to studying sustainability issues, they should also be aligned with the overall research framework used by the collaborative research team.

Sustainability has become a politically charged discourse because science cannot be separated from its political dynamics (hence, the need for recognizing diverse perspectives.)

Sustainability has traditionally been more of a concern in the field of environmental science. A survey of existing programs on sustainable development would show an environmental science bias. As previously mentioned, sustainability must go beyond environmental concerns to include economic and social goals as well. We also understand that even environmental systems are complex, and it needs to be understood beyond the biophysical. In addition, sustainability cuts across sectors with varying needs, values, and resources. As such, sustainability is always subject to contestation and remains political. And even as science works under the principles of evidence-based inquiry, it is not immune to political developments and scientific results can be used by various parties for their political ends. Given its normative nature, sustainability studies will have to make decisions that may lead to varying benefits and costs for different groups. To be able to understand sustainability challenges, we need to look at the science of it within its broader sociopolitical contexts. Hence, learners of sustainability need to learn about political dynamics and the art of negotiation among diverse perspectives.

This brings in another point—if sustainability's science cannot be separated from its political context, then the study of sustainability should embrace all

forms of knowledge that permeate and shape people's culture and behavior: arts, the humanities, indigenous knowledge, etc. People's behavior toward each other and the planet is influenced by these nonscientific knowledge or practices by as much or even more than the "scientific" factors.

Sustainability is addressed at different scales (hence the need for greater awareness of the dynamics involved)

Sustainability challenges exist at different scales—at the individual, community, national, and global levels. These levels are interconnected in such a way that what happens in one affect or is shaped by what happens in the other. Learners and researchers of sustainability should be aware of such dynamics.

Sustainability issues and solutions are context-specific (hence the need for considering local cultural contexts)

The issues of sustainability vary across biophysical environments, societies, cultures, and legal-political contexts. For real impact to occur, international bodies have tried to make international sustainable development targets. How such targets are met varies across countries and even across regions within countries. Sustainable development initiatives in one community may not apply in the next. Hence, communities and students of sustainability benefit most if sustainability problems and solutions are analyzed and crafted with these specific contexts in mind, while still recognizing that these specific contexts are also shaped by larger contexts or supra systems at the national or international levels.

Current solutions to sustainability challenges are no longer working (hence the need for encouraging creativity and innovation)

The problems of sustainability are complex, exist at various scales, and cut across different sectors and geopolitical boundaries. Traditional solutions in the past have not been enough to address these challenges. It is therefore imperative that we promote innovation in creativity in addressing such solutions without shutting the opportunity for future generations to scale back, add on, or dismantle the solutions our generation has implemented.

Transitioning to sustainability needs a citizenry that supports it (hence the need for sustainability education and communication)

Given its political context, sustainability is also a social movement. It needs the support of the citizenry who will elect governments that will, in turn, support it. It needs socially conscious citizens who will be willing to make adaptations to bolster it. It needs to have a society that is willing to recalibrate its priorities. As in any social movement, a broader discourse on it is essential. Communication, in all its forms, and education, at all its levels, should contribute to creating awareness about its importance and to building the skills needed to ensure people participation in sustainability endeavors at the level they choose to do so.

Implications and Recommendations

After the presentation of the committee members, an online workshop took place. Participating faculty members, staff, and students from FMDS and the rest of UPOU were divided into small groups to answer this question: “How do you propose to incorporate sustainability in teaching and learning, research, public service, and university and program governance in the context of the UoF?”

The presentations and ensuing discussions centered around two major themes.

- a. Incorporating sustainability in program or course content, which includes the following:
 - Incorporating futures literacy in relevant courses;
 - Inculcating sustainability values among students (flexibility, resilience, diversity, harmony, preservation, and forecasting);
 - Expanding knowledge to include the indigenous;
 - Working with technology and not for technology;
 - Adoption of community-based learning activities; and
 - Conducting pluridisciplinary research on sustainability.

- b. Managing the university sustainably through the following:
 - Incorporating SDGs in the quality assurance framework; and
 - Reviewing and/or formulating policies to guide sustainable operations in the university.

References

- Alfonso, G. J. (2014). Creating spaces and possibilities through open and distance e-learning (ODEL): A worldview. In G. J. Alfonso, & P. G. Garcia (Eds.), *Open and Distance eLearning: Shaping the Future of Teaching and Learning* (pp. 3-14). UP Open University and Philippine Society for Distance Learning. <https://networks.upou.edu.ph/3184/odel/>
- Komiyama, H., & Takeuchi, K. (2006). Sustainability science: Building a new discipline. *Sustainability Science*, 1, 1–6. <https://doi.org/10.1007/s11625-006-0007-4>
- Ellis, M. (2019). Critical global semiotics: Developing sustainable transformational citizenship. *Critical Global Semiotics: Understanding Sustainable Transformational Citizenship*. <https://doi.org/10.4324/9780429022159>
- UNESCO Office in Jakarta, U-INSPIRE Alliance, United Nations Office for Disaster Risk Reduction, & UNDP Accelerator Lab Indonesia. (2022). Futures literacy for DRR [Programme and meeting document]. <https://unesdoc.unesco.org/ark:/48223/pf0000384038>
- WCED. (1987). Our common future. United Nations. <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
- Wiek, A., Withycombe, L. & Redman, C.L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science*, 6, 203–218. <https://doi.org/10.1007/s11625-011-0132-6>

Sustainability Office: An Important Element of the University of the Future's Organizational Structure

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ABSTRACT

There is an increasing trend in the number of universities participating in international assessments (e.g., THE Impact Ranking) for the institutional implementation of the United Nations Sustainable Development Goals (UNSDGs), indicating a growing interest among universities to achieve such goals. Future university operations seem to consider sustainability as an essential foundation. For universities to become efficient, they are expected to create a sustainability office or center to oversee their adherence to the principle of sustainable development. The paper discusses the rationale for establishing a sustainability office and elucidates on the reasons that this will encapsulate the characteristics of the university of the future.



Sustainability Challenges and the Academic Institutions

Globally, sustainability has become part of the operations of various academic institutions, as indicated by the increasing number of universities worldwide that participated in the Times Higher Education (THE) Impact Ranking. The number of participating universities globally has swelled from 450 in 2019 to 1,406 in 2022, a more than 300% increase in just 3 years (THE, n.d.). The impact rankings “are global performance tables that assess universities against the United Nations’ Sustainable Development Goals (SDGs)” (THE, n.d., para. 1).

Meanwhile, academic institutions are faced with sustainability challenges as they remain vulnerable to various forms of disruption. Although institutional vulnerability is an important consideration in every academic institution, this is the least explored dimension of vulnerability (Papathoma-Köhle & Thaler, 2018). The exposure of basic, higher, and nonformal educational institutions to disruptions—e.g., environmental, technological, health, financial, and the like—must be seriously weighed as they may negatively affect their operations. For instance, Mateo (2022) reported that more than 400 schools in the Philippines were closed because of the COVID-19 pandemic. Globally, schools for more than 168 million students have been completely closed between 2020 and 2021 (United Nations Children’s Fund [UNICEF], 2021). In higher education institutions (HEIs), although they were able to transition from the conventional face-to-face learning modality to remote teaching and learning, the pandemic has affected the mental health of students, teachers, and other staff of the universities. According to Sahu (2020), the pandemic has “caused a tremendous level of stress among the university fraternity, inclusive of students” (para. 9). Such a stress level had unfavorable effects, primarily on students’ psychological health and learning (Kafka, 2020).

In addition, many schools and universities worldwide struggled to survive from the impacts of global sustainability crises such as climate change. They face extreme weather events such as droughts, heavy rains, and typhoons accompanied by strong winds, landslides, and flash floods with short- and long-term consequences (United Nations Development Programme [UNDP], 2017). Academic institutions located near coastal areas face inundations as a result of rising sea levels. Trisos et al. (2020) predicts that, with the continuing excessive resource use, the impacts of this global socio-ecological sustainability crisis will intensify in the coming years. Thus, academic

institutions in basic and higher education must implement far-reaching measures (e.g., social, economic, technological, and/or institutional) to effectively respond to these global crises' complexity and scale of impacts.

Aside from facing the impacts of climate change, several universities are also struggling against the impacts of diminished government support for their operations. DeAngelis (2020), for instance, reported that budget cuts for universities and colleges directly stifle their operations and reduce students' academic achievement and graduation rates. The decreasing financial resources of the university can slash its access to updated educational technology, learning materials, laboratory facilities, and the like. In the absence of these resources, students' learning experiences will suffer. Lastly, technological disruptions are critical in their operations, especially for online learning institutions. As they are highly dependent on the internet and power supply services, any service interruptions of these facilities can directly or indirectly affect the teaching-learning process and content delivery. As such, they need to scale up student support, which may be costly for some institutions.

These challenges highlight the need to make sustainability an important thrust of the university of the future. This is crucial as education is key to the global attainment of SDGs. As Kumar and Mohapatra (2018) emphasized, education "is an important area which can pave the way to achieve the desired goals of sustainable development" (p.1), which means that educational institutions must sustainably provide good quality education for all to produce significant outcomes for sustainable development. Hence, sustainability must be at the core of their operations.

This paper aims to provide a rationale for establishing a sustainability office and elucidates why this will encapsulate the characteristics of the university of the future. Toward the end, it will narrow its discussion and focus on the University of the Philippines Open University (UPOU) on how a sustainability office can be established as part of its organizational structure as a University of the Future (UoF).

The Concept of a Sustainability Office

A sustainability office is a node within a university that coordinates all sustainability-related initiatives of such a university (Filho et al., 2019). It is a special structure that assists higher education in coordinating their efforts

and initiatives for achieving the SDGs. As Filho et al. (2019) indicated, the setup for this office effectively enhances staff and students' awareness of matters related to sustainability and implements sustainability initiatives within the university.

However, creating a sustainability office should go beyond the SDGs, although this is the primary factor for its addition to the university's organizational structure, especially in the future where everything is volatile, uncertain, complex, and ambiguous. Primarily, sustainability offices are established to create sustainable universities, albeit such a transformation cannot be forced upon universities under the premise of academic freedom (Filho et al., 2019). Nevertheless, Hoover and Harder (2015) argued that transformation of universities is essential, further suggesting that such a transformation must be a whole-institution approach. This approach may indicate that universities should attempt to make sustainability an integral part of their instructional, research, public service, and administrative operations, which, in turn, must be accompanied by effective leadership, transformative environments, and organizational learning practices for sustainability (Mader et al., 2013) and the crucial participation of students and staff in the promotion of sustainable operations (Filho et al., 2019). According to Mader et al. (2013), the whole university transformation "requires leadership in an environment of co-creation in which the university's stakeholders—executives, employees, students, and partners—can interact." (p. 6). They proposed framing this transformative environment around a shared understanding of the vision, mission, and goals of the university; trust that is mirrored through exchanging and innovative social networks; shared leadership and responsibilities in processes; organizational learning that supports a system of adequate understanding of the university's vision, mission, and goals; and transdisciplinary research that leads toward applied innovations. Moreover, Filho et al. (2019) indicated that organizational learning practices, effective leadership for sustainable strategies, and organizational learning practices are relevant in the creation of such transformative environments and processes. The creation of the sustainability office could then be construed as an essential step toward such creation of a transformative environment.

Thus, sustainability offices are expected to take leadership in providing strategic development and implementation and monitoring and evaluating the university's programs and activities leading toward sustainability. They are also expected to guide and support the university's commitment to sustainable operations by catalyzing its community around a shared vision

for a sustainable world (Appalachian State University, n.d.). In some cases, they “facilitate the institutionalization of best practices in sustainability across academic and research units, auxiliary units, and student groups” (University of Michigan, n.d., para. 2). They also create crucial partnerships among various sectors of the university (executives, faculty, staff, and students) to create and collate knowledge, expertise, and resources for the creation of connections that can advance the university’s commitment to a sustainable working environment.

Typically, sustainability offices are led by a sustainability coordinator (SC), although they can also function through establishing a sustainability team (ST) or committee. The SC or ST’s tasks include planning and executing sustainable development-related projects and supporting technical working groups in policymaking and project implementation. The ST specifically provides strong university-wide leadership in establishing a strategic and policy framework for the sustainability initiatives of a university (Filho et al., 2019). Appleton (2017) reported that for sustainability offices to work effectively, universities must allocate a clear mandate, working budget, and office space. These are important so that sustainability offices can function properly, especially in recommending policies and projects related to SDGs and coordinating various actors, monitoring them, and reporting their progress.

The Creation of Sustainability Office in Universities

The intensification of the impacts of climate change on education and the increasing number of agencies rating the environmental friendliness of universities will create the impetus for the adoption of the concept of sustainability offices in the UoF. Seeing their important role in achieving a sustainable world, universities will integrate the concept of sustainability into their operations, i.e., in their education, administration and governance, research, and public service. Likewise, being highly conscious and protective of their global ranking and reputation in terms of environmental friendliness and contribution to achieving SDGs, more and more universities will add to their structure a unit that will coordinate the whole university’s initiatives for sustainability. Sugiarto et al. (2022) reported that several global universities are now implementing the idea of a sustainable campus where environmental science concepts are integrated into its policies, operations, and research. This development will continue, especially when non-implementing universities witness the benefits of adopting the concept. For

instance, Tiyyarattanachai and Hollmann (2016) reported that stakeholders in universities where such an idea had been implemented are significantly satisfied and have a better perceived life quality than their counterparts in non-implementing universities. Filho et al. (2019) also indicated that universities with sustainable campuses have improved energy and resource efficiency, thus gaining visible cost savings for the institutions. Though these universities might incur investment costs, they can be amortized over time, especially when “the cost saving elements of the facilities start to be calculated” (Filho et al., 2019, p. 1394). These and other benefits can attract more non-implementing universities to start creating sustainable offices to support their strategic initiatives to achieve sustainability and increase their local and global ranking.

The role of education in achieving a sustainable world is three-pronged: developing and providing expertise for the achievement of SDGs (El-Jardali et al., 2018), creating knowledge and providing evidence-based solutions and innovations that can address the barriers to SDGs (Tonegawa, 2023), and promoting sustainability within their sphere of influence (Rosen, 2019).

Education is known to be a powerful tool that can lead everyone toward achieving the SDGs. The role of universities in training and shaping minds is important in creating future leaders of sustainable development (El-Jardali et al., 2018). Universities can integrate the principles of sustainability into their curricula and develop their students’ leadership knowledge and skills that are important in addressing sustainability issues (SDSN Australia, 2017). El-Jardali et al. (2018) maintained that they can also establish various academic programs emphasizing interdisciplinary learning with systems thinking as their framework to train students to find solutions to increasingly complex societal challenges in the future.

Moreover, universities are sources of knowledge and evidence-based solutions to sustainability challenges. Especially with the globalization of educational processes, including research and creative work, universities are important multi-perspective knowledge sources that can lead to establishing programs addressing specific SDGs. Ashida (2023) indicated that “a wide range of research-related activities is essential for addressing the challenges of the SDGs, which at the same time is seen as a means for the implementation of the goals” (p. 75). As part of its core functions, universities are expected to play this role vis-à-vis the SDGs. By creating knowledge through research, universities are expected to provide evidence-

based solutions and innovations that can facilitate the realization of the SDGs. In addition, by disseminating this knowledge to society through educational activities (Tonegawa, 2023), universities can enhance national economic growth and development and societal well-being. As Rosen (2019) has indicated, disseminating this knowledge can promote awareness among their various stakeholders about their role in achieving the SDGs and increase their participation as they acquire the necessary skills, attitudes, and values to contribute to addressing sustainability challenges.

These expected contributions of universities to achieving sustainable development must be coordinated to implement them efficiently and effectively. Creating a sustainability office or Sustainability Office or Committee or Team (SC/T) can be the most rational step a university can take, making it an important element in the university's future organizational structure. This office can be tasked to collaborate with internal and external stakeholders in identifying "key issues and concerns or matters important to stakeholders, and to manage sustainability strategy, coordination of how to execute plans, the progress of the initiatives, and sustainability reports" (Yu, 2022, para. 6). It can "create strategic partnerships between students, faculty, and staff that combine knowledge, expertise, and resources across the university" (Appalachian State University, n.d., para. 2) while the academic units of the university are concerned about the creation, management, and implementation of their curricula. These partnerships can be implemented to advance all stakeholders' understanding of and commitment to sustainability, thus enriching the university's experience.

In addition, the office can develop guidelines and policies that promote ecological or environmental sustainability, economic or financial sustainability, and social equity within and outside the university. These guidelines and policies are essential to enable the university to respond sustainably to various forms of disruption as well as to steer society toward a sustainable future.

The creation of a sustainability office has become a global phenomenon in higher education and has become a significant process for ensuring the integration of sustainability into the university's policies, programs, and activities. In the United States, major universities such as Harvard University, the University of California, Stanford University, and the like have established their Office of Sustainability to reduce the university's environmental impacts, conserve resources, and lead sustainability by example. Similar trends are

observed in European universities such as Cambridge University, Stanford University, etc.), and Canadian universities (University of British Columbia, McGill University, University of Toronto). In the Philippines, centers or institutes of sustainability are established at De La Salle University and the University of Batangas. These offices or centers work toward more sustainable and eco-friendly operations and promote education and research for sustainable development.

UP Open University and the Sustainability Office

The UPOU is a leading online learning academic institution in the Philippines that is “committed to open education as a means of enabling Filipinos everywhere to achieve a bright future for themselves, their communities, and the Filipino nation” (UPOU, n.d., para. 1). As an HEI, it is committed to teaching and learning, research and innovation, public service, and governance and administration that are underpinned by the principles of scholarship and academic excellence, inclusivity and equity, responsiveness and social relevance, collaboration and community, and sustainable development for all. As a public institution and part of the national university, UPOU is often considered to be a role model where more sustainable practices of, for instance, operation and procurement, can be tried out (Filho et al., 2019). Being an open and distance e-learning (ODEL) institution, it occupies a strategic position in the educational landscape in the country and the region for promoting transformed consumption patterns and behavior and attaining sustainable development goals.

However, by the nature of its operations, the University is highly vulnerable to various factors that can disrupt its operations. Thus, it must intensify its efforts to become a sustainable HEI. Systematizing and coordinating all its initiatives may address this concern and ensure that sustainability’s ecological, socio-cultural, and financial dimensions will be tackled. As Sonetti et al. (2016) emphasized, creating a sustainable institution must involve a broader, more holistic, systematic, and well-coordinated approach to ensure that all sustainability dimensions are integrated into its policies, programs, and activities. Integrating these various dimensions into the University’s operations can be facilitated by creating an office, i.e., the sustainability office. According to Filho et al. (2019), a sustainability office can act as a node “from where all sustainability related activities are coordinated. They involve not only administrative operations, but also research and teaching on matters related to sustainable development.” (p. 1396). A sustainability

office in the University can connect UPOU's constituents, including the students, to act on sustainability.

With the evidence shown by various institutions, the creation and establishment of a sustainability office in the University can likewise support its efforts to become a sustainable university and its initiatives to contribute to the attainment of the UN's SDGs. It will likewise strengthen its commitment to sustainable development that underpins its operation.

University's Sustainability Office: Mandate and Functions

The Sustainability Office can support UPOU's mission to promote ecological, financial, and socio-cultural sustainability in the institution and its environment. Its creation can be focused on nurturing a culture of sustainability, enhancing its constituents' (inclusive of students) competency around sustainability matters, implementing programs targeted to reduce the university's overall environmental impact, and communicating sustainability initiatives to internal and external audiences.

As a unit mandated to ensure that the University achieves its sustainability thrusts and goals, the Office can propose or recommend policies and programs that will support the University's efforts to attain ecological, economic, and socio-cultural sustainability. As a coordinating unit, it can create an avenue for the University's constituents, including the students, to work collaboratively on sustainability matters and challenges. It can also engage in collaborative sustainability-related research studies and development where outputs can be translated into strategic development outreach and engagement programs using its ODeL framework to reach broader participation. They can also be translated into strategies to raise awareness and improve performance around sustainable practices and behaviors, the creation of students' internships for sustainability, and other capacity-building for internal and external stakeholders.

Organizational Structure

The Sustainability Office can be under the Office of the Chancellor, headed by a director, and function through the assistance of sustainability committees that will be responsible for the attainment of ecological, financial, and socio-cultural sustainability in the University. The Ecological Sustainability Committee may be responsible for creating climate action

and ecological sustainability plans, coordinating the various UPOU units for their ecological sustainability initiatives, consultation of the campus green building and certification programs, and leadership on energy and water-saving campaigns. Meanwhile, the Financial Sustainability Committee will be tasked to create the institutional financial sustainability plans, given the vulnerability and uncertainty of fund support from the government and other funding institutions. It can also function to explore revenue-generating circular opportunities and other fund-raising drives for local sustainability causes, including the University's thrust for open educational resources and open education through the offering of massive open online courses (MOOCs). This Committee can also recommend practices that ensure wise spending of the University's financial resources.

The Socio-cultural Sustainability Committee can create plans and programs that support a more inclusive, highly participative and consultative environment in the University. It can be tasked to enhance respect for diversity of beliefs, perspectives, and practices inside and outside the University. The Committee can initiate programs that enhance social well-being and social equity among all the University constituents, including the students. To increase awareness and improve participation of the University's stakeholders in any sustainability-related activities, the Committee can develop a regular eco-education program and a reward system for top eco-performers at work.

Concluding Remarks

Changing society's mindset—i.e., from the current consumerism attitude toward a circular economy—requires universities to play an important role in achieving sustainability. An important starting point would be the creation of a Sustainability Office that can steer society away from the consumerism attitude toward a more sustainable circular economy. With the establishment of such an Office, universities can shift their focus from merely collecting data and monitoring SDG progress to actively shaping better policies and actions that support the creation of a sustainable future society. As El-Jardali et al. (2018) emphasized, “universities need to embrace their changing roles and their unique position of influence” (para. 16). They should be able to provide evidence-based solutions to current and future societal sustainability-related challenges.

Should UPOU move toward becoming a sustainable UoF, it must harness

its potential to integrate different evidence ecosystems and disciplines (El-Jardali et al., 2018) to implement its sustainability-related initiatives and programs successfully. It must establish a unit that can assist in changing the mindsets and culture of its stakeholders or society in general and translate its research outputs into knowledge products, capacity-building programs for sustainability and resource-saving measures. Being an ODeL-providing HEI, the University has a strategic position to take the lead in steering society toward a more sustainable future.

References

- Appalachian State University. (n.d.). *Office of University Sustainability*. <https://newfaculty.appstate.edu/virtual-educational-mall/office-university-sustainability>
- Appleton, E. (2017). *Next generation sustainability strategy and structure. Gloucestershire: Environmental Association of Universities and Colleges*. www.eauc.org.uk/next_generation_sustainability_strategy_and_str.
- Ashida, A. (2023). The role of higher education in achieving the sustainable development goals. In S. Urata, K. Kuroda, & Y. Tonegawa. *Sustainable Development Disciplines for Humanity: Breaking Down the 5Ps—People, Planet, Prosperity, Peace, and Partnerships*. (p. 75). Springer, Singapore. https://doi.org/10.1007/978-981-19-4859-6_5
- DeAngelis, C. A. (2020). *Reviewing the impact of budget cuts on student outcomes*. Reason Foundation. <https://reason.org/commentary/examining-the-impact-of-budget-cuts-on-student-outcomes/>
- El-Jardali, F., Ataya, N., & Fadlallah, R. (2018). Changing roles of universities in the era of SDGs: Rising up to the global challenge through institutionalizing partnerships with governments and communities. *Health Research Policy and Systems*, 16, 38. <https://doi.org/10.1186/s12961-018-0318-9>
- Filho, W.L., Will, M., Salvia, A.L., Adombent, M., Grahl, A., & Spira, F. (2019). The role of green and sustainability offices in fostering sustainability efforts at higher education institutions. *Journal of Cleaner Production*, 232, 1394–1401. https://www.haw-hamburg.de/fileadmin/LS/FTZ-NK/PDF/Publications/The_role_of_green_and_Sustainability_Offices_in_fostering_sustainability.pdf
- Hoover, E., & Harder, M.K. (2015). What lies beneath the surface? The hidden complexities of organizational change for sustainability in

higher education. *Journal of Cleaner Production*, 106, 175e188. <https://www.sciencedirect.com/science/article/abs/pii/S0959652614001073>

Kafka, A.C. (2020). *Shock, fear, and fatalism: As coronavirus prompts colleges to close, students grapple with uncertainty*. The Chronicle of Higher Education. <https://www.chronicle.com/article/Shock-FearFatalism-As/248240>.

Kumar, G., & Mohapatra, S. (2018). *Role of education for sustainable development*. https://www.researchgate.net/publication/350886560_Role_of_Education_for_Sustainable_Development

Mader, C., Scott, G., Dzulkifli, A.R. (2013). Effective change management, governance, and policy for sustainability transformation in higher education. *Sustainability*, 4(3), 264e284. https://haqaa2.obsglob.org/wp-content/uploads/2020/11/2013_Mader_Effective-change-management.pdf

Mateo, J. (2022). 425 private schools closed since 2020. *Philippine Star Global*. Online newspaper. <https://www.philstar.com/nation/2022/08/20/2203802/425-private-schools-closed-2020>

Papathoma-Köhle, M., & Thaler, T. (2018). Institutional vulnerability. In S. Fuchs, & T. Thaler (eds.), *Vulnerability and Resilience to Natural Hazards* (pp. 98-123). Cambridge: Cambridge University Press.

Rosen, M.A. (2019). Do universities contribute to sustainable development? *European Journal of Sustainable Development Research*, 4, em0112. <https://www.ejosdr.com/download/do-universities-contribute-to-sustainable-development-6429.pdf>

Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. *Cureus*, 12(4), e7541. <https://doi.org/10.7759/cureus.7541>

SDSN Australia/Pacific. (2017). *Getting started with the SDGs in universities. A guide for universities, higher education institutions, and the academic sector*. Australia, New Zealand and Pacific Edition. Melbourne: Sustainable Development Solutions Network – Australia/Pacific.

Sonetti, G., Lombardi, P., & Chelleri, L. (2016). True green and sustainable university campuses? Toward a clusters approach. *Sustainability*, 8, 83. <https://doi.org/10.3390/su801008>, 2016

Sugiarto, A., Lee, C. W., & Huruta, A. D. (2022). A systematic review of the sustainable campus concept. *Behavioral Sciences (Basel,*

- Switzerland), 12(5), 130. <https://doi.org/10.3390/bs12050130>
- Times Higher Education [THE]. (n.d.). *Impact rankings 2022*. <https://www.timeshighereducation.com/impactrankings>
- Tiyarattanachai, R., & Hollmann, N.M. (2016). Green campus initiative and its impacts on quality of life of stakeholders in green and non-green campus universities. *Springer Plus*, 5(84). <https://doi.org/10.1186/s40064-016-1697-4>.
- Tonegawa, Y. (2023). Education in SDGs: What is inclusive and equitable quality education? In S. Urata, K. Kuroda, & Y. Tonegawa. *Sustainable Development Disciplines for Humanity: Breaking Down the 5Ps—People, Planet, Prosperity, Peace, and Partnerships*. Springer, Singapore. https://doi.org/10.1007/978-981-19-4859-6_5
- Trisos, C. H., Merow, C., & Pigot, A. L. (2020). The projected timing of abrupt ecological disruption from climate change. *Nature*, 580, 7804. <https://doi.org/10.1038/s,41586-020-2189-9>
- United Nations International Children Emergency Fund [UNICEF]. (2021). *COVID-19: Schools for more than 168 million children globally have been completely closed for almost a full year, says UNICEF*. <https://www.unicef.org/philippines/press-releases/covid-19-schools-more-168-million-children-globally-have-been-completely-closed>
- United Nations Development Programme [UNDP]. (2017). *Zimbabwe human development report: Human development towards building a climate-resilient nation*. Climate Change and Education. https://www.undp.org/sites/g/files/zskgke326/files/migration/zw/UNDP_ZW_2017ZHDR_Briefs—Climate-Change-and-Education.pdf
- University of Michigan. (n.d.). *The Office of Campus Sustainability*. <https://ocs.umich.edu/about/about-us/>
- UP Open University [UPOU]. (n.d.). *Flagship Program*. <https://www.upou.edu.ph/about/flagship-program/>
- Yu, A. (2022). *The evolving role of chief sustainability officers*. Convene. ESG. <https://www.azeusconvene.com/esg/articles/the-evolving-role-of-chief-sustainability-officers>

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Sustaining Lifelong Learning through Continuing Education in the University of the Future

Primo G. Garcia, Luisa A. Gelisan, and Larry N. Cruz

ABSTRACT

This article presents the initiatives of the University of the Philippines Open University (UPOU) to provide continuing education opportunities to Filipinos aside from its degree program offerings. The initiatives included the offering of nonformal courses, the development of open educational resources (OER), the offering of massive open online courses (MOOCs), the development and production of webinars on various topics, and most recently the proposed development of microcredentials. The development of micro-credentials included the plan to unbundle existing courses, MOOCs, and OERs, and the creation of flexible pathways between micro-and macro-credentials. The article also pointed out that the provision of more flexible pathways shall further promote lifelong learning that will benefit people to keep up with the changing work environment as they will be acquiring new knowledge and skills in a more flexible and inclusive way. It further emphasized that to be able to sustain continuing education in the context of open and distance e-learning, universities, like UPOU, need to ensure that new learning opportunities do not become ends by themselves but avenues for further learning while promoting quality, inclusion, and diversity.



Introduction

The University of the Philippines Open University (UPOU) was established in 1995 to make quality education more accessible to more learners. From the start, UPOU has adopted distance education to enable Filipinos to study at the University of the Philippines (UP) despite their location, age, financial status, work or family commitments. In addition, UPOU has also strived to provide lifelong opportunities not only to various types of learners but also at various stages in the learners' lives. UPOU has always been committed to providing lifelong learning opportunities to Filipinos.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Lifelong Learning (2020) states that:

...learning is lifelong and life-wide, from birth to death (any time) and exists in and out of the education system (anywhere). Learning is undertaken by people of all ages (anyone), takes place through a range of modalities, including face-to-face, at distance, and increasingly, online, and concerns all domains of knowledge (anything). (p. 21)

Lifelong learning can be achieved through the following flexible pathways as presented by the UNESCO International Institute for Educational Planning (2021):

- Pathways for getting into higher education: alternative admission policies and practices (e.g., preparatory programs, open access policies, recognition of prior learning);
- Pathways for getting through higher education: study transfer, credit accumulation and transfer, flexible delivery modes (e.g., open and distance learning, flexibility in the pace of study, flexibility in the curriculum); and
- Pathways for getting out of higher education: completion and transition to the labor market (e.g., combining work and study, flexible degree structures, continuous learning).

For UPOU, lifelong learning means providing flexible pathways through a number of ways. First, it has adopted open and distance e-learning as a means to make its programs accessible and flexible. Second, the university has provided alternative admission policies for certain academic programs

(i.e., using multiple sets of criteria as opposed to admission tests). Some of the programs have multiple entrances, exits, and ladderized structures. This curricular structure enables learners to choose a level of qualification that fits their needs or level of preparation and also brings these course credits towards a higher degree at some future time. It also allows some learners who may no longer wish to finish a higher degree to graduate with a lower level of qualification. Third, it also offers a range of programs addressing different knowledge and skills set as well as qualifications, from non-formal courses, massive open online courses (MOOCs), associate, bachelor's, graduate certificate, diploma, master's, and doctoral programs. It also disseminates open educational resources that address different learning needs of the general public.

UPOU has always recognized that not all learners are interested in getting a formal degree from the university. Since its establishment, it has offered non-formal, fee-based courses to those who would like to upgrade their skills in a certain problem domain or occupation. In the past decade, UPOU also offered free courses in the form of MOOC, thus widening its reach to other learners. In 2022, UPOU also committed itself to further widening access to learning through the offering of microcredentials and in response to recent changes in the educational and professional landscapes. The rise of the 4th industrial revolution, which is characterized by a “fusion of technologies that is blurring the lines between the physical, digital, and biological spheres,” (World Economic Forum, 2016, para. 2) has changed and will continue to alter the labor market as more jobs are automated and previously unheard-of jobs are created. As a result, the demand for skills needed for new occupations has continuously increased. The pandemic has also increased the need for reskilling and upskilling of employees. The offering of credentials that can be credited by industry and professional sectors is one way to further equip Filipinos for an increasingly digitized world.

Right now, UPOU offers the following categories of academic and/or course offerings: formal degree programs; non-formal courses, and MOOCs. In addition, it also produces stand-alone open educational resources in the form of learning video lectures, instructional videos, and e-publications. In the future, it aims to add microcredentials in its portfolio of academic offerings.

If UPOU is to sustain its continuing education program, we argue that it is not enough that these types of academic offerings or courses are offered and

made available to learners. First, for it to be impactful, these different types of programs have to be connected through flexible pathways between them. Second, UPOU can also be made more sustainable by tapping on its current resources as it pursues new grounds such as microcredentials. Third, the university has to provide the necessary academic support to ensure the quality of these offerings.

Formal Academic Degree Programs

Before we discuss the non-degree program and course offerings of the university, we shall first provide you a background on the formal degree programs as it has implications on our discussion of flexible pathways between levels of qualification.

UPOU currently offers seven undergraduate programs, 14 post-baccalaureate certificate and diploma programs, 13 master's programs, and three doctoral programs. These programs are offered by the Faculty of Education (FEEd), the Faculty of Information and Communication Studies (FICS), and the Faculty of Management and Development Studies (FMDS) (Appendix 1). While the programs have different sets of admission requirements, there has been a move towards opening some of the requirements to lessen barriers to access.

Continuing Education in UPOU

For purposes of our discussion, we refer to continuing education as those academic courses offered by the university that are narrower in focus in terms of topic, learning outcomes, and duration.

Non-formal Courses

The UPOU-FMDS has offered continuing education non-formal courses that are delivered online for worldwide accessibility. These non-formal, non-credit courses were developed and delivered by experts from the academe and practitioners from the industry and managed by the UPOU, an open and distance e-learning (ODeL) higher education institution. The non-formal courses under the UPOU's Continuing Education Program (CEP) are fee-based, 12 to 16-week teacher-facilitated courses.

The offering is in line with one of the stated objectives in the resolution

establishing the UPOU: to provide opportunities for alternative access to quality higher education by offering baccalaureate and post-baccalaureate degree programs as well as non-formal courses by distance education (Cruz & Perez, 2020). The development and delivery of non-formal courses in UPOU aim to institutionalize a system of continuing education to sustain professional growth and promote lifelong learning, especially for those who cannot leave their jobs or homes for full-time studies.

The UPOU began managing the course development and delivery of its non-formal courses immediately after its establishment in 1995. In the early years, the UPOU, in general, took care of the promotion of the courses; the Office of the University Registrar (OUR) was in charge of the admission and registration of enrollees; and the former campus-based Schools for Distance Education (SDEs) took care of the development and delivery of these courses.

In 1999, the newly organized discipline-based Faculties of Studies assumed a more proactive role as it coordinated the admission and registration up to the completion of learners, with appropriate support from relevant UPOU offices/units.

Currently, the UPOU, specifically the FMDS, has 11 non-formal courses, grouped into three clusters under its CEP, that are up and running:

- a. Human and Social Development Cluster
 - Caring for the Child with Special Needs (CCSN)
 - Impact Assessment and Poverty Alleviation (IAPA)
- b. Environmental Cluster
 - Integrating Climate Change Adaptation and Disaster Risk Management Policies, Plans and Investments toward Inclusive and Sustainable Agricultural and Rural Development (CCA & DRM)
 - Organic Agriculture (OA)
 - Permaculture Systems Design Thinking (PSDT)
 - Responding to Climate Risks in Agriculture and Natural Resources Management (RCRANRM)
- c. Entrepreneurship Cluster
 - Digital Marketing for Entrepreneurs (DMfE)
 - Introduction to Electronic Commerce (eCom)
 - New Enterprise Planning (NEP)
 - Personal Entrepreneurial Development (PED)

- Simplified Accounting for Entrepreneurs (SAfE)

The development and delivery of non-formal courses have evolved through the years. To date, it has generated a total of 4,185 course enrollees and 2,444 course completers.

In recognition of the contribution of non-formal courses to lifelong learners, in particular, and the university, in general (as an extension and/or public service initiative), and with the Certificate of Accreditation awarded to UPOU-FMDS in 2017 for having completed the requirements for Continuing Professional Development (CPD) as CPD Provider in accordance with the “Implementing Rules and Regulations of Republic Act No. 10912, otherwise known as the CPD Act of 2016” set forth by the Professional Regulation Commission in Resolution No. 1032, Series of 2017, the CEP of FMDS continuously develops and improves the non-formal courses, with the aim of sustaining its relevance and ensuring its development and delivery.

Open Educational Resources

The UNESCO defines open educational resources (OER) in its 2019 Recommendation as

learning, teaching, and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation, and redistribution by other. (UNESCO, 2022, p. 5)

The development and rise of the OER movement can be traced back to three events—the creation of the Multimedia Educational Resources for Learning and Teaching Online (MERLOT), Open Access, and the Budapest Open Access Initiative (Bliss & Smith, 2017).

MERLOT, a collection of curated open online teaching, learning, and faculty development services that are accessible for free, was created in 1997 by the California State University (Bliss & Smith, 2017). The platform served as a way for teachers to share educational materials on teaching and learning. Data showed that, since its inception, there is a consistent increase in its use and has remained highly robust and responsive to new technological practices (Okewole & Knokh, 2016).

The Open Access movement led to the publication of the Public Library of Science (PLOS) in 2001 (Ratan, 2013). PLOS is an open access, non-profit publisher that aims to “make science immediately and publicly available online” (PLOS, n.d., para. 5). By doing this, it empowers researchers to help accelerate progress in science and medicine

The Budapest Open Access Initiative (BOAI) came from “a small meeting convened by the Open Society Institute (now Open Society Foundations)” (para. 1) held in Budapest, Hungary in 2001. It aims “to make research free and available to anyone with internet access and promote advances in the sciences, medicine, and health” (BOAI, n.d., para. 2).

Open Educational Resources in UPOU

As early as 2012, the UPOU has crafted its policies on OER as well as the strategies to promote, support, and integrate OER values in the institutional processes and practices. But do take note that in 2010, the UPOU started sharing for free its copyrighted educational material through the UPOU Networks website (<https://network.upou.edu.ph>), initially established in 2009 as a resource-generating website.

With the crafting of the OER policies, the UPOU has also converted the UPOU Networks website as its online repository of OER, where different materials in multiple formats can be accessed and downloaded for free. With this, UPOU further strengthened the university’s mandate to promote lifelong learning and to provide wider access to quality education.

The UPOU Networks’ contents—videos, podcasts, books, research journals, video e-proceedings, study guides and modules—except when otherwise noted, are licensed under Creative Commons Attribution-Non-Commercial-No Derivatives 4.0 International Licenses. As of November 2023, there are 3,547 resources available in the UPOU Networks.

Inclusivity and accessibility of the UPOU-produced materials are major considerations during the planning, production, and sharing of UPOU OERs. The concepts were introduced to UPOU in 2016. Accessibility and inclusivity are among the strategic thrusts of the university under the chancellorship of Dr. Melinda dP. Bandalaria.

To enhance the accessibility and inclusivity of UPOU’s online repository of

learning materials, the UPOU Multimedia Center looked into and adapted guidelines and principles from Web Content Accessibility Guidelines (WCAG), Principles of Universal Design for Learning (UDL), and UNESCO's Guidelines to Ensuring Inclusion and Equity to Education.

In November 2023, UPOU Networks analytics showed that the website has 612,187 users and 4,796,088 page views. The most accessed resources during these periods were video learning materials and webinars, with videos about Filipino language, gender, and teaching as the most accessed learning objects from 2020 to 2023.

The most cited benefit of OER is free access to and distribution of the learning materials. In UPOU, another benefit is that the OER developed are contextualized in the Filipino culture. Contextualization of a learning material "promotes improvement of learning outcomes" (Masangcay, 2022, p. 58).

Developing an OER, specifically multimedia materials, is a challenging task, as quality assurance is incorporated in each stage of development—pre-production, production, and post-production stages. Evaluation and revisions are done in each stage before proceeding to the next, which is seen by faculty members to be tedious and time-consuming, though they acknowledge that such processes are necessary to come up with quality OER. Other challenges include (a) learning and acquiring skills needed such as scriptwriting, recording, animation, and video editing, among others; (b) access to equipment and technical assistance (Gelisan & Mangubat, 2020); and (c) the small staff complement of the multimedia production unit of the university in relation to the number of requests for production and technical assistance received.

To deal with these challenges, the UPOU Multimedia Center (the unit that assists in the development, production, and curation of multimedia learning materials in the university's online repository), now renamed as the Educational Media Production Unit (EMP), expanded its assistance in terms of OER production. On top of the production services, the EMP also conducts capacity-building activities and makes available audio-visual equipment and facilities for use by faculty members who want to develop their own OERs by themselves. The center also outsources production services, which is a challenge in itself, as there are limited production personnel who have the knowledge and skills to develop multimedia materials for teaching and learning.

As mentioned earlier, the OERs are shared with the public through the UPOU Networks website. Continuous information dissemination about in the UPOU Networks is done to make people aware of the various UPOU-produced OERs. This is done through constant postings on the university's social media accounts and the UPOU website.

Massive Open Online Courses

The MOOCs are online courses that can provide anyone an affordable and flexible way of learning new knowledge and acquiring new skills as anyone can enroll in for free (EDX, n.d.) From an OER perspective, as a teaching and learning product, MOOCs are considered OERs (Stracke et al., 2019).

MOOCs have been referred to by many as a type of disruptive technology and it is pushing higher education institutions to carefully plan their approach and strategies toward their implementation of open education and e-learning (Bates, 2014).

The features of MOOCs are as follows (Bates, 2014):

- infinite scalability—can accommodate as many enrollees as possible;
- open accessibility—courses do not have prerequisites before one can enroll in; they also do not require tuition fees;
- courses available online—anyone who has a computer and internet access from any part of the world can participate in a course; and
- contents organized in one whole course.

The first MOOC was created in 2008, with the offering of the course “Connectivism and Connectivity” developed by Stephen Downes and George Siemens (Croslin, 2018). Since then, millions of learners have enrolled in various MOOC offering platforms such as Udacity, Coursera, and edX.

In 2012, the UPOU started to develop MOOCs. The following year, it offered its own MOOC with the course “Introduction to Mobile Applications Using the Android Platform.” Bandalaria (2013), the main proponent of the course, said that UPOU's offering of MOOCs is in line with its role as a public service university and its advocacy for openness. The said course was developed in partnership with SMART, one of the leading mobile service providers in the country. The course was offered through UPOU's first MOOC platform called “@ral.”

Later, @ral was succeeded by UPOU MODeL or the Massive Open Distance eLearning (www.model.upou.edu.ph). UPOU's MOOCs are free. Course duration ranges from 4 to 6 weeks. Course coordinators, as the "teachers" in this MOOC are called, are limited to evaluating learners who qualify for granting of certificates for completion. The distinguishing feature of MODeL is its learner support system, which "plays an important role in making sure that students have ways to communicate with their MOOC facilitators." Interactions are done not only within the MODeL learning management system but also in social media that is more accessible to UPOU MODeL learners (Almodiel et al., 2020).

The UPOU MODeL has offered a total of 79 MOOCs under 20 programs and had 152,944 enrollees since it started in 2013 (Table 1).

Table 1

Programs and Courses Offered by the UPOU MOOCs from 2013 to 2023

MOOC Program	Courses Under Each Program
Introduction to Mobile Application Development Using Android Platform	<ul style="list-style-type: none"> • Introduction to Mobile Application Development Using Android Platform
ASEAN Studies	<ul style="list-style-type: none"> • Art in the ASEAN Region
Child Rights Protection and Promotion	<ul style="list-style-type: none"> • Understanding the Child Better • Legal Instruments for the Protection of Children • Institutional Mechanism Towards Child Rights Protection and Promotion • Planning Programs on Child Rights Protection and Promotion • Implementing and Evaluating Programs for Child Rights • Communicating for Child Rights Protection and Promotion: Theoretical Approach • Traditional and New Media for Child's Rights Protection and Promotion
eFilipiniana	<ul style="list-style-type: none"> • Critical Approaches to Philippine Art and Culture • Kahulugan, Kasaysayan, at Pag-unlad ng Wikang Filipino • Philippine Art as Cultural Text • Understanding Philippine Art and Culture • Wika, Kultura, at Lipunang Filipino sa mga Usaping Lokal at Global • Wikang Filipino sa Pananaliksik at Diskurso

e-Service Management Program	<ul style="list-style-type: none"> • Business Processes Management 101 • Business Processes Management 102 • Service Management Business Communication • Systems Thinking • Service Culture • Blended Teaching and Learning for SMP Teachers
Interlocal Cooperation	<ul style="list-style-type: none"> • Introduction to Inter-Local Cooperation • Legal Ingredients of Inter-Local Cooperation • Institutional Ingredients of Inter-Local Cooperation • Financial Ingredients of Inter-Local Cooperation
ODEL Teacher Accreditation	<ul style="list-style-type: none"> • ODeL 101: Introduction to ODeL • Quality Assurance in ODeL • Assessment of Learning in ODeL • Learner Support in ODeL • Strategic Planning in ODeL • Technology in ODeL • Content Development for ODeL • Designing Learning in ODeL
Sustainable Development	<ul style="list-style-type: none"> • Social Entrepreneurship
Technology for Teaching and Learning	<ul style="list-style-type: none"> • Introduction to Technology for Teaching and Learning • Blended Teaching and Learning Using OERs • Teaching and Learning with Modern ICTs
Gender-Responsive Education (formerly Office of Gender Concerns Training Program)	<ul style="list-style-type: none"> • Gender Sensitivity Training
Educational Media Production (formerly Multimedia Center Online Training Program)	<ul style="list-style-type: none"> • Principles of Graphic Design • Scriptwriting for Educational Video Materials • Creating Educational Materials Using PowToon • Developing and Producing an Interactive Educational Video Material • Video Editing Using an Open-Source Video Editing Software
Crisis Management and Foresight Planning	<ul style="list-style-type: none"> • Crisis Management and Foresight Planning
Disaster Risk Reduction Management and Climate Change Adaptation and Mitigation	<ul style="list-style-type: none"> • Basics of Resilience
MOOC Initiatives	<ul style="list-style-type: none"> • Media and Information Literacy in Today's Digital World • Maging Mapanuring Botante at Mamamayan

MOOCs Offered with Partner Institutions	<ul style="list-style-type: none"> • Foundations of Early Childhood Education and Development • Crash Course on Wikipedia Editing • Introductory Course on Contact Center Services • Online Mothers Class on Newborn Care • Online Learning Skills for Students
Online Bridge Programs	<ul style="list-style-type: none"> • Bridge Mathematics • Bridge Physics • Bridge English
Business Analytics (BA Track)	<ul style="list-style-type: none"> • Business Analytics Concepts and Frameworks • Database Management and Business Analytics Applications • Supervised Learning: Classification Methodologies • The Kimball Lifecycle • Supervised Learning: Regression Methodologies • Data Warehousing and Dimensional Modeling • Introduction to Descriptive Analytics • Unsupervised Learning Methodologies • Data Pre-processing • Data Visualization and Communication • Prescriptive Analytics: Formulating and Solving Linear Programming Models • Prescriptive Analytics: Transportation, Transshipment and Assignment Problems • Prescriptive Analytics: Network Problems
Business Analytics (IT Track)	<ul style="list-style-type: none"> • Introduction to Database Management Systems • Knowledge Discovery in Databases • Introduction to R programming • Introduction to Predictive Analytics and Analytics Modelling & Data Pre-Processing • Techniques with Spreadsheets and Workflow-based Tools • Supervised & Unsupervised Learning • Introduction to Prescriptive Analytics and Operations Research Overview • Risk Analysis & Ethics • Finance and Accounting Analytics
Oral Communication and Conversational Fluency in English	<ul style="list-style-type: none"> • Oral Communication and Conversational Fluency in English (2017-2019)
Distance Education Readiness	<ul style="list-style-type: none"> • Distance Education Readiness module

Source: The UPOU MOOCs Toolkit UPOU Massive Open Online Courses (MOOCs) Policies, Principles and Guidelines (unpublished)

The UPOU MOOCs, generally, do not have very restrictive requirements for admission: anyone who is interested in any of the scheduled course offerings and who has access to the internet can self-register in the MODEL site. When the course ends on the specified date, the enrollee who is able to comply with the requirements of the course shall receive a certificate of completion.

Webinars

A webinar is computer-mediated communication that makes real-time communication or interaction possible. Through the use of a webinar application, computer hardware, microphone, camera, and internet connection, live transmission of audio and video from across geographical locations and synchronous engagement between hundreds to thousands of teachers and learners are made possible.

Webinar has become a buzzword all over the world as it provides significant support to online learning (Wang & Hsu, 2008). During the pandemic, when remote learning became the alternative to face-to-face teaching, educational institutions from K-12, college, and graduate schools adopted its use.

The UPOU has adopted its use as early as 2010 in its continuing education courses due to the various affordances that it offers. Through live streaming or web streaming as it was called then, students in continuing education courses who cannot participate in on-campus tutorial sessions were still able to do so. At the same time, recordings of web-streamed events/webinars are uploaded so that those who missed the live session can catch up and those who wanted to watch the session again can do so. Real-time interaction was still a challenge as the application available then was not as sophisticated as the applications being used now. Starting in 2020, the university's use of webinars peaked as it implemented its various public service programs online. Webinars on online teaching and learning and related topics were conducted to assist educational institutions, teachers, and trainers transition into remote and/or online learning. Several webinars that feature digital literacy, public health and mental health, environmental management and protection, public management, entrepreneurship, gender, and research were also conducted.

The UPOU also produced educational webinars in collaboration with government and/or private organizations.

The most watched webinars were the series of episodes on Gearing UP for the New Normal in Teaching and Learning: A Webinar for Teachers (2020); Digital Literacy Webinar for Students (2021); *Master Class on Tips in Writing the Research Paper* (2022); and *OPEN Talk: Pangangalaga sa Unang 1,000 Araw ng Buhay sa Panahon ng Pandemya* [Caring for the First 1,000 Days of Life during the Pandemic] (2023).

Microcredentials

Recently, as part of the goal of expanding people's access to education, UPOU has decided to get into microcredentials. According to UNESCO (2022), a microcredential

- is a record of focused learning achievement verifying what the learner knows, understands, or can do;
- includes assessment based on clearly defined standards and is awarded by a trusted provider;
- has stand-alone value and may also contribute to or complement other microcredentials or macrocredentials, including through recognition of prior learning; and
- meets the standards required by relevant quality assurance (p. 6).

Credentials are evidence that validates or confirms a person's learning achievements, knowledge, and preparedness for performing tasks (UNESCO, 2022). They can be broadly categorized into "macrocredentials," which refers to formal academic degrees which are offered and regulated by educational institutions, and "microcredentials," which are usually focused on a narrow set of learning outcomes in a specialized field and taken over a shorter period of time (UNESCO, 2022).

A learner may get a microcredential either by taking and passing an assessment for a specific knowledge and skill set or taking a microcredential course and passing the assessment included in the course.

Microcredentials can be taken as a one-off learning experience or can be stacked with each other to form a larger certification or formal qualification. Normally developed with representatives from the industry or a profession, microcredentials are usually designed to address employment skill sets.

Sustaining Continuing Education through Synergy

There are efforts among UPOU's academic units to develop microcredentials as part of the flexible pathways to learning in UPOU. Several programs are planning to work with industry to develop microcredential courses that are aligned with the required competencies of these sectors. We believe that working with the industry or a professional sector is a must for a microcredential to be relevant and recognized for future employment or job promotion.

Institutions like UPOU can also start this initiative by building on their current strengths and resources. As previously mentioned, UPOU already has existing formal, non-formal courses, and MOOCs that have been developed in consultation with different experts in the industry/profession, including the alumni. We can establish synergy between these academic offerings by adapting existing resources as well as establishing flexible pathways between them.

Unbundling Existing Formal Courses into Microcredential Courses

First, UPOU can unbundle some of its existing formal courses to develop microcredentials and MOOCs. The key here is to ensure that the courses to be unbundled have undergone review by qualified representatives from the profession or industry. Microcredential courses that have been unbundled from formal courses not undergoing review by industry representatives or professional association may face difficulty being recognized later on.

Unbundling of MOOCs into Microcredential Courses

UPOU can also unbundle MOOCs it had developed with the industry or reputable agencies into smaller courses and convert them into microcredentials. Examples of which are the MOOCs on Business Process Management (developed with IBPAP) and Caring for the Special Child (developed with and funded by UNESCO).

Developing MOOCs out of Existing OER

It can also develop MOOCs and microcredential courses out of existing OERs, especially those that have been developed in partnership with recognized institutions. An example of this would be the OER series on flexible learning

developed by UPOU with Commission on Higher Education (CHED). A portion of existing non-formal courses can also be unbundled as microcredentials. Some of the webinars can also be curated and adapted for other MOOCs and microcredentials.

Bundling MOOCs to Develop New Formal Programs

Some of the MOOCs developed by UPOU were designed based on a recognized curriculum. Others were developed with partner agencies to provide a defined set of knowledge and skills to target learners. These MOOCs can be bundled together and combined to develop a formal degree qualification. For instance, the MOOCs on business process management and business analytics can be combined into degree certificates in these areas, respectively.

Creating Flexible Pathways between Micro and Macrocredentials

There must be efforts to ensure that these shorter courses become opportunities for further study. As the circumstances of learners change over the course of their personal professional lives, they may choose to continue to upgrade their knowledge and skills, retool themselves, or even get a different qualification for a career change. Establishing a crediting system between the microcredentials and the macrocredentials can make the transition between these lifelong opportunities more easily. To ensure the portability of these credentials and qualifications and degrees, they have to be aligned with the Philippine Qualifications Framework. Non-formal courses can also be designed according to the Technical Education and Skills Development Authority (TESDA) certification system and submitted to the Professional Regulatory Commission for accreditation.

Given this challenge, UPOU needs to find ways of stacking and crediting them into the formal programs, which requires some changes in some academic policies. In other educational institutions in other countries, microcredentials and MOOCs are given credit points that can be credited towards either a course in a formal program. In the case of UPOU, it has to find ways of either adapting the existing academic policies on crediting of non-degree courses or propose a new set of policies specifically designed for this purpose.

Development of Appropriate Instructional Models, Course Development and Delivery Systems

The introduction of more non-formal courses, MOOCs, and microcredentials as well as the establishment of flexible pathways between academic offerings will further open up UPOU to a more diverse set of learners. This requires the university to review its instructional models to suit the competency requirements of these learners. With a more open admission policy, UPOU must address the varying levels of preparation of these learners prior to studying at UPOU. The university also needs to review its course development and delivery systems to support these various types of course offerings.

Ensuring the Quality of Non-formal Courses, MOOCs and Microcredentials

Quality standards and guidelines for continuing education courses and offerings will have to be formulated to ensure relevance and learning effectiveness, wise use of resources, and appropriateness and legitimacy of institutional partners. In the future, universities need to develop quality frameworks that are specific to the outcomes for which these micro-courses have been designed. The quality framework should include criteria to ensure flexible pathways between micro-courses and macro-courses are met.

Conclusion

The move towards greater openness in education is a move towards sustainability. Providing more flexible pathways promotes lifelong learning, which is in line with what continuing education also espouses. Sustainability is about making sure that the benefits of development are shared by the people across the spectrum and ensuring that resources are used wisely along the way. To be able to sustain continuing education in the context of open and distance e-learning, universities, like UPOU, need to ensure that new learning opportunities do not become ends by themselves but as avenues for further learning while promoting quality, inclusion, and diversity.

References

- Almodiel, M.C., Mampusti, K.C.A, & Tanay, S. (2020). Social media as communication and learner support tool in massive open online courses (MOOCs). *International Journal on Open and Distance e-Learning*, 6(1),25–37. <https://ijodel.com/index.php/ijodel/>

article/view/60/105.

- Bandalaria, M. dP. (2013). *MOOC- to MOOC+: Applying the ODeL quality framework to fill the gaps*. Paper presented at the 25th World Conference of the International Council of Distance Education, 15-18 October 2013, Tianjin, China.
- Bates, T. (2014.) *What is a MOOC?* Retrieved on 18 November 2022 from <https://www.tonybates.ca/>.
- Bliss, T.J. and Smith, M. (2017). A brief history of open educational resources. In R. Jhangiani & R. Biswas-Diener (Eds.), *Open: The philosophy and practices that are revolutionizing education and science*. Ubiquity Press, 2017. <https://doi.org/10.5334/bbc.b>.
- BOAI. (n.d.). *Budapest Open Access Initiative*. Retrieved on 18 November 2022 from <https://www.budapestopenaccessinitiative.org/>.
- Crosslin, M. (2018). *Creating online learning experiences*. Retrieved 18 November 2022 from <https://uta.pressbooks.pub/>
- Cruz, L. N., & Perez, G. C. (2020). Quality in continuing education. In M.F. Lumanta & P.G. Garcia (Eds.), *Quality initiatives in an open and distance e-learning institution: Towards excellence and equity* (pp. 119-132). University of the Philippines Open University. <https://networks.upou.edu.ph/32136/quality-initiatives-in-an-open-and-distance-e-learning-institution-towards-excellence-and-equity/>
- EDX. (n.d.). *About MOOCs*. Retrieved on 30 October 2022 from <https://www.mooc.org/>.
- Gelisan, L.A., & Mangubat, L.J. (2020). Producing quality learning resources in multimedia formats. In M.F. Lumanta & P.G. Garcia (Eds.), *Quality initiatives in an open and distance e-learning institution: Towards excellence and equity* (pp. 107-120). University of the Philippines Open University. <https://networks.upou.edu.ph/32136/quality-initiatives-in-an-open-and-distance-e-learning-institution-towards-excellence-and-equity/>
- IIEP-UNESCO. (2022). *International Policy Forum on Flexible Learning Pathways in Higher Education*. <https://www.iiep.unesco.org/en/international-policy-forum-flexible-learning-pathways-higher-education-13759>
- Masangcay, G.G. (2022). Cultural identity: Contextualizing and scaffolding language learning process. *International Journal of Advanced Research and Publication*, 5(4), 58–62. Accessed on 1 December 2022 at <http://www.ijarp.org/online-papers-publishing/apr2022.html>
- Okewole, J.T. and Knokh, I. (2016). *MERLOT: A case study of sustainability*

- in open educational resources (OER)*. <http://oasis.col.org/handle/11599/2403>
- Public Library of Science [PLOS]. (n.d.). About PLOS. <https://plos.org/about/>
- Public Library of Science [PLOS]. (n.d.). *Leading a transformation in Science Communication*. Retrieved 31 October 2022 from <https://plos.org/>.
- Ratan, K. (2013). *PLOS and the surge in global momentum for open access*. <https://www.csescienceeditor.org/article/plos-and-the-surge-in-global-momentum-for-open-access/>
- Stracke, C., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019). Are MOOCs open educational resources? A literature review on history, definitions and typologies of OER and MOOCs. *Open Praxis*, 11. 331. 10.5944/openpraxis.11.4.1010.
- UNESCO. (2022). The 2019 UNESCO recommendation on open educational resources (OER): Supporting universal access to information through quality open learning materials. <https://unesdoc.unesco.org/ark:/48223/pf0000383205>
- United Nations Educational, Scientific, and Cultural Organization [UNESCO] Institute for Lifelong Learning. (2020). *Embracing a culture of lifelong learning: Contribution to the futures of education initiative*. <https://unesdoc.unesco.org/ark:/48223/pf0000374112>
- United Nations Educational, Scientific, and Cultural Organization [UNESCO] Institute for Lifelong Learning. (2022). *Towards a common definition of micro-credentials*. <https://unesdoc.unesco.org/ark:/48223/pf0000381668>
- UP Open University. (n.d.). *Massive Open Online Courses*. Retrieved on 1 December 2022 from <https://helpdesk.upou.edu.ph/support/solutions/articles/48001149046-massive-open-online-courses-moocs>.
- Wang, S.K. & Hsu H.Y. (2008). Use of the webinar tool (Elluminate) to support training: The effects of webinar-learning implementation from student-trainers' perspective. *Journal of Interactive Online Learning*, 7(3), 175–194. <https://www.ncolr.org/jiol/issues/pdf/7.3.2.pdf>
- World Economic Forum. (2016). The fourth industrial revolution: what it means and how to respond. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

Appendix 1*Academic Program Offerings, by Faculty of Study*

Faculty of Study	Degree Level	Degree Program
Faculty of Education	Undergraduate	Associate in Arts
		Associate of Science in Instructional Design and Technology
		Bachelor of Education Studies
	Graduate Certificate	Distance Education
	Diploma	Science Teaching
		Mathematics Teaching
		Language and Literacy Education
		Social Studies Education
	Masters	Distance Education
		Language and Literacy Education
		Social Studies Education
	Doctorate	PhD in Education
	Faculty of Information and Communication Studies	Undergraduate
Associate of Science in Information Technology		
Bachelor of Arts in Multimedia Studies		
Diploma		Computer Studies
Masters		Development Communication
		Information Systems
Doctorate		Doctor of Communication
Faculty of Management and Development Studies	Undergraduate	Associate of Arts in Digital Entrepreneurship
	Graduate Certificate	ASEAN Studies

	Diploma	Environment and Natural Resources Management
		International Health
		Land Use Planning
		Land Valuation and Management
		Research and Development Management
		Social Work
		Women and Development
	Masters	Nursing
		ASEAN Studies
		Environment and Natural Resources Management
		International Health
		Land Valuation and Management
		Research and Development Management
		Public Management
	Social Work	
Doctorate	Doctor in Sustainability	

Achieving Sustainability Through a Future-Ready Quality Assurance Framework

Mari Anjeli L. Crisanto and Michael John C. Gomez

ABSTRACT

Sustainability is at the heart of the University of the Philippines Open University (UPOU) as a university of the future. With UPOU's present and future initiatives aiming to contribute to the 17 Sustainable Development Goals (SDGs), sustainability should also be incorporated into the quality assurance (QA) framework that would be used by UPOU to achieve quality in its programs and processes. SDGs should not be an afterthought but instead be part of a university's core. This chapter details recommendations on how SDGs can be incorporated into a QA framework used to guide an Open and Distance e-Learning (ODEL) institution to achieve quality and sustainability as a university that hopes to make an impact as it shapes the course of educational revolutions in the future.



Sustainable Development Goals in the Context of Universities

The Sustainable Development Goals (SDGs), commonly referred to as the Global Goals, were enacted by all UN member states in 2015 as a global call to action to eradicate poverty, safeguard the environment, and guarantee that everyone lives in peace and prosperity by the year 2030 (Sustainable Development Goals: United Nations Development Programme, n.d.). Higher education institutions (HEIs) are one of the driving factors in promoting the SDGs. They are well-positioned to lead the cross-sectoral implementation of the SDGs, providing a priceless source of expertise in research and education on all sectors of the SDGs (El Jardali et al., 2018). Their engagement creates different opportunities for knowledge sharing, learning, demonstration of support, collaboration, guidance, and impacts that positively affect both sides (Sustainable Development Solutions Network [SDSN] Australia/Pacific, 2017). Universities, in particular, now observe and incorporate sustainability into their programs and efforts. Mawonde and Togo (2019) enumerated all of the university's SDG-aligned programs, including those that promote individual empowerment, off-campus sustainability projects, gender equality in terms of the ratio of women to men employed by University of South Africa, recycling, and collaborations with other organizations that uphold sustainability. A majority of Ukrainian HEIs incorporate SDGs in their strategies as seen in their policy documents; sustainable development events are being held regularly; and the SDG policies being presented are comprehensive and consistent, and although not fully realized, Ukrainian HEIs clearly understand the incorporation of SDGs in formulating their policies (Stukalo & Lytvyn, 2021). The past few years saw the rise in the number of universities declaring their commitment to the SDGs. Xue (2019) found that from 467 universities in 74 countries, there are now 1,406 universities participating in 2022 from 103 countries. It also has seen shifts of focus from SDG 3 (Good Health and Well-Being) in 2019 to SDG 9 (Industry, Innovation, and Infrastructure) in 2022. The study also showed SDG 14 (Life Below Water) and 15 (Life on Land) to receive the least attention among universities.

Heiss (n.d.) enumerated the challenges facing the implementation of sustainable development in higher education:

- Coordinated change at all levels is necessary to put sustainable development commitments into practice—in governance, planning, academic programs, facility management, and financial systems;

- To reform curricula and instructional methods, deeper innovation in staff development and across institutions is required; and
- Preparation of learners to address complex issues is hindered by disciplinary boundaries.

Benefits of Engaging in Sustainable Development Goals

Every year, the education and study abroad consultancy company Quacquarelli Symonds (QS) publishes the QS Rankings, one of the most esteemed international rankings that gauges the reputation and effectiveness of institutions throughout the world (The Times of India, 2022). On the QS website (B2B Marketing, 2019), it has enumerated the benefits universities can acquire from engaging in SDGs. These are:

- *Building impactful and inclusive networks.* The importance of providing a forum to discuss and act together to impact local and global welfare positively has been illustrated by worldwide cooperation between various external actors such as governments, non-government organizations, political leaders, local communities, and youth groups.
- *Reshaping incentives.* Increasingly, universities are reconsidering their global relevance in the 21st century. The institutions turned their attention to serving the public good after they were faced with increasingly vocal criticism of elitist practices. If academic institutions wish to be seen as forward thinkers, that global reaffirmation cannot be ignored.
- *Preparing public-minded leaders.* Universities are big institutions with different objectives, but teaching is a fundamental goal of an academic institution. For graduates to have a real impact on the world, it is not enough to learn in the classroom. Competitive academic institutions produce graduates who are capable of translating what they have learned in books into real-world applications.

Additionally, SDSN Australia/Pacific (2017) cited more benefits the universities can gain by employing SDGs in their practices:

- *Demonstrating university impact.* The SDGs provide a new and integrated way of communicating and demonstrating how universities contribute to global and local well-being, and therefore their impact and relevance, to external stakeholders, including governments,

financial institutions, and the community.

- *Capturing demand for SDG-related education.* As global citizens seeking meaningful social and environmental contributions, the SDGs are relevant to both young and old people. Moreover, the demand for graduates who understand and can implement the UN's 2030 Agenda will be growing as governments and businesses increasingly adopt SDGs as strategic priorities. In the future, the institution will be able to demonstrate its ability to cope with these changing circumstances by early adoption of education related to the SDGs.
- *Building external and internal partnerships.* The fact that it provides a common framework between different sectors and organizations to connect and cooperate on shared interests is one of the advantages of the Agenda for Sustainable Development. This will enable universities to pursue new collaboration with government, industry, and society in the field of research and education. The framework may also help identify common interests in various areas of the university, helping to foster cross-disciplinary cooperation, collaboration, and innovation.
- *Accessing new funding streams.* More and more, calls for funding are being placed on attaining the SDGs by government agencies, international banks, and philanthropists.
- *Adopting a comprehensive and globally accepted definition of a responsible and globally aware university.* To become agents of change, universities are increasingly reevaluating their role in the 21st century and considering how they can be more responsive to society's needs with a view to solving global challenges. The SDG is a global consensus framework that provides an organizational structure for what this looks like in the university. In addition, universities must have a moral imperative to support the SDGs as part of their social mission and core activities given that they play an important role in ensuring the success of the SDGs.

Integrating SDGs into a University's Core

A step-by-step guide proposed by SDSN Australia/Pacific (2017) gives an overview of how a university can integrate SDGs into its system. It consists of five steps but, since every university is unique in terms of size, structure, values, priorities, existing work in sustainable development, and access to funding, these factors will affect how they approach the situation. The steps

they presented here only offer general guidance.

1. *Map what you are already doing.* Identifying possibilities for increased engagement begins with mapping what your university is already doing to support and contribute to the SDGs across all areas of the university or within selected areas of the university. Additionally, it is an effective tool for highlighting existing initiatives and discovering synergies across the university.
2. *Build capacity and ownership of the SDGs.* Knowing the commitment of the university toward SDGs across research, learning, teaching, operations, governance, and culture is necessary in building capacity and ownership of the SDGs. Discussing the importance of SDGs locally and globally to stakeholders, such as student organizations, leads them to develop a shared understanding of the SDGs, get to know other people's work and interests, identify areas where cooperation and action can be coordinated as well as foster collective and individual ownership of the process and community of practice.
3. *Identify priorities, opportunities, and gaps.* This step involves bringing together all the stakeholders to decide the actions on the SDGs and to identify opportunities to collaborate cooperatively and extensively in achieving the SDGs.
4. *Integrate, implement, and embed.* The aim of this step is to ensure that the university is moving forward in the right direction by implementing the best way of integrating and implementing commitment and actions on the SDGs. The strategic plan of the university, research framework, training and education framework, corporate engagement frameworks, future students' messages, or so on can be included in these strategies and policies.
5. *Monitor, evaluate, and communicate.* Detailed and solid monitoring, evaluation, and communication practices enable the university to have a wider share of SDG knowledge. They also enable the creation and sharing of stories that draw support for further SDG engagements in the future.

All steps are important to achieve the SDGs at a university level. This chapter focuses on "Step 4: Integrate, Implement, and Embed" and details how

SDGs can be integrated into a QA framework to ensure that SDG gaps are addressed in the same way that the quality of the university's programs and processes are guaranteed.

Quality Assurance and Quality Assurance Frameworks

Although quality means different things to different stakeholders, quality assurance (QA) in education is generally easier to define. According to UNESCO (2007), it is an “ongoing, continuous process of evaluating (assessing, monitoring, guaranteeing, maintaining, and improving) the quality of a higher education system, institutions, or programmes”. Earlier in 2003, it was also defined as “systematic management and assessment procedures to monitor performance of higher education institutions” (UNESCO, 2003).

Benefits of QA, according to Newton (2013), include:

- institutions learning from others through the process of peer review;
- institutions being made aware of differences through review and benchmarking exercises;
- assisting the functioning of HEIs by focusing on teaching and research processes;
- facilitating institutional change agendas; and
- assisting policymakers, students, academics, employers, managers, and administrators to make greater evidence-based decision making.

It should be noted that QA can either be done internally or externally. In internal QA, intra-institutional practices monitor and improve the quality of higher education; in external QA, measures are done at the inter- or supra-institutional level to assure the quality of HEIs and programs (UNESCO, 2007).

QA was previously imposed through a set of fixed criteria applied to the whole educational system (Lumanta et al., 2021). However, QA eventually shifted towards a more flexible set of criteria that recognizes that institutions have individual experiences with the concept of learning continuously evolving and with institutions continuously adjusting, reflecting, and reforming (Reisberg, 2010).

These criteria, formalized through different QA frameworks, guide universities in their internal and external assessment. Examples of these frameworks relevant to the Association of Southeast Asian Nations (ASEAN) region are the Asian Association of Open Universities (AAOU) framework, the Commonwealth of Learning (COL) QA toolkit, the Asia-Pacific Economic Cooperation (APEC) QA of online learning toolkit, and the ASEAN University Network (AUN) QA model (Lumanta et al., 2021).

UPOU has, however, engaged in a continuous discourse to articulate a QA framework suitable for an Open and Distance e-Learning (ODEL) institution. Lumanta et al. (2021) discussed that, though efforts were made to demonstrate quality in online learning, these have been disconnected and not integrated into a holistic framework. This and the rise of the need to create sustainable universities have challenged UPOU to move towards developing its own framework that integrates SDGs into its QA framework.

Quality Assurance and a Sustainable University

A sustainable university puts sustainability at the center of its teaching and programs; it is able to achieve its goals without compromising the needs of the future generations (QS International, 2021). It educates and empowers the masses by making them act, making sustainability a central priority, and providing useful insights on urgent societal challenges. Universities contribute directly to the SDGs through the following ways (SDSN Australia/Pacific, 2017):

- a. *Learning and teaching:* SDG 4 (Quality Education), which requires inclusive, equitable quality education and promotes lifelong learning opportunities for all, recognizes the importance of training to achieve sustainable development. Universities ensure that students have the knowledge, skills, and motivation to understand and tackle the challenges of SDGs. Universities can also mobilize and empower the youth by providing in-depth academic or vocational training to implement SDG solutions.
- b. *Research:* Universities, through their broad research capacity and activities, play an essential role in providing the relevant knowledge, evidence bases, solutions, and innovations to help them achieve this goal. Universities can do the following to achieve a good start:
 - encourage and promote the SDGs as a topic of research within the university;

- support the full spectrum of research approaches needed to address the SDGs, including interdisciplinary and transdisciplinary research;
 - support and incubate innovation for sustainable development solutions;
 - actively support national and local implementation of the SDGs;
 - advocate for national support and coordination of research on the SDGs; and
 - support capacity building for developing countries to undertake and use SDG research.
- c. *Organizational governance, culture, and operation of the university:* Within their campuses, communities, and regions, universities are often large entities and can have a significant impact on social, cultural, and environmental well-being. These effects, which are directly linked to all areas of achieving the SDGs, can have a significant impact on their implementation through good behavior by universities. At a glance, universities can strengthen their governance structures and operational policies in line with the objectives of the SDGs.
- d. *External leadership:* Action and cooperation by all actors will be crucial for success in achieving the SDGs. Universities, which have a specific position in society, can contribute to the local, national, and international response to the SDGs through their individual or collective role. By having a quick look, universities can
- strengthen public engagement and participation in addressing the SDGs;
 - initiate and facilitate cross-sectoral dialogue and action on SDG implementation;
 - play a lead role in policy development and advocacy for sustainable development;
 - demonstrate the importance of the university sector in SDG implementation; and
 - demonstrate university sector commitment to the SDGs.

The Three Pillars of Sustainability

First outlined in the paper titled “Our Common Future” in 1987, the three pillars of sustainability (environmental, social, and economic) have been widely used to assess policies and development plans and projects

(Emerick, 2022). These pillars offer a framework for policies to promote practices such as environment-friendly policies, promoting gender equality, protecting human rights, and responsible economic activities, which will lead to the achievement of sustainable development and growth. Environmental sustainability is the practice of utilizing the resources to meet one's needs without compromising the beauty and health of the natural resources. This includes conservation, recycling, and reduction (of pollution, waste, and greenhouse gas production) and other practices that help preserve the environment. Social sustainability, on the other hand, revolves around the principles of equity, justice, and inclusion, where everyone in society can have access to resources, opportunities, and basic human needs regardless of their status.

To achieve this, it is necessary to protect the vulnerable populations, invest in clean energy and education, ensure that employees receive fair wages, provide adequate housing and healthcare, and promote gender equality and cultural diversity. Ensuring that the resources of our planet are used responsibly in order to create a better future for all and the ability of an economy to sustain itself for a long time is the emphasis of the idea of economic sustainability. It covers concepts such as resource equity, sound financial management, wise utilization of natural resources, and effective governance and regulation.

These three pillars need to be considered in developing a QA framework that incorporates SDGs. Meanwhile, there is also an existing framework for sustainable universities, The United Nations Environment Programme (UNEP) Sustainable University Framework. The next section takes a closer look at this framework and examines it in relation to a currently adopted QA framework.

The United Nations Environment Programme (UNEP) Sustainable University Framework

In the interim of developing a QA framework fit for ODeL, UPOU currently follows the ASEAN University Network (AUN)-QA Framework in benchmarking its programs since major tools provided by the UP System have been based on AUN-QA. However, AUN-QA indicators at the program level do not specifically lay out the steps to achieve a sustainable university, which UPOU targets at present and in the future.

Launched on the 8th of July 2021, the UNEP Sustainable University Framework (UNEP, 2021) outlines a process on how to become a sustainable institution and how sustainability can be promoted in each of the university's four core areas. This framework presents the university as being composed of four core areas: (a) Environment and Climate, (b) Teaching and Research, (c) People and Society, (d) and Administration and Governance. Each core area consists of activities of the university that it performs, called "aspects." Given that each university is unique, there are no same universities that could have the same number and type of aspects per core area. One aspect may also fall under different core areas, this will be decided by what makes the most sense in that university's setting. According to the UNEP framework, the most typical aspects that fall under each core area are as shown in Table 1.

Table 1

UNEP Framework Core Areas and their Most Common Aspects

Environment & Climate	Teaching & Research	People & Society	Administration & Governance
Water, waste, biodiversity, climate mitigation and adaptation, travel, construction and energy	Teaching, research and student engagement	Diversity, equality, engagement and participation, access, community, health and well-being	Leadership, ethics, human resources, business links, governance, finance

Comparison with the AUN-QA Institutional Framework

The AUN is widely acknowledged to be a crucial mechanism for creating an influential and well-known community in higher education (AUN, n.d.). The AUN-QA framework has been adapted by the University of the Philippines (UP) System as a guide to assess the quality of its programs and its institutional processes. By following these sets of standards, the University of the Philippines System can enhance its systems to meet specific benchmarks, facilitating the exchange of faculty and students across ASEAN universities, promoting collaborative research endeavors, and facilitating credit transfer within the network. On the whole, AUN-QA contributes to elevating the overall quality of education at the university. As UPOU aims to incorporate sustainability in its QA framework, it is ideal to compare AUN-QA framework

to the UNEP sustainability framework to see their similarities and differences to help the university formulate its own sustainability framework. The AUN-QA institutional framework consists of 25 criteria across different aspects of a university. This includes its mission and vision, leadership and management, policies, human resource management, student engagements, and support and curriculum review and design. Table 2 shows the similarities between the two frameworks.

Table 2

AUN-QA Institutional Framework Criteria

Environment & Climate	Teaching & Research	People & Society	Administration & Governance
	Policies for Education, Research and Service	Community Engagement and Service	Vision, Mission and Culture
	Student Recruitment and Admission	Service Results	Governance
	Curriculum Design and Review		Leadership and Management
	Teaching and Learning		Strategic Management
	Student Assessment		Human Resource Management
	Student Service and Support		Financial and Physical Resource Management
	Research Management		External Relation and Network
	Intellectual Property Management		Internal Quality Assurance System
	Research Collaboration and Partnerships		Internal and External QA Assessment
	Research Results		IQA Information System
			Quality Enhancement

			Educational Results
			Financial and Market Results

A comparison of the two framework shows that the AUN-QA framework does not have any criteria related to “environment and climate,” while the majority of its criteria fall under “administration and governance” and “teaching and research,” with the least number of criteria under “people and society”. The UNEP framework suggested some activities to achieve “quick wins” toward attaining a sustainable university. For environment and climate, one major activity that any aspiring university should do to achieve sustainability is to study the carbon management hierarchy. In addition to this, teaching university students lifelong lessons about the environment and climate that they may use for the rest of their lives is an excellent approach to benefit the environment positively. It is crucial to broaden the scope of the sustainability “message” by not limiting it to simply the “green” issues but by including societal and financial components as well. This will encourage people and society to join in the university’s aims. An effective leader with strong leadership and management skills is required to effectively manage and reach the university’s aims toward sustainability. This will secure the university’s commitment and authority to act, furthering its sustainability agenda.

The environmental aspect of the university is one of the most challenging concerns to solve, which makes creating a sustainable institution a difficult undertaking. According to Ralph and Stubbs (2013), different barriers cause difficulties in integrating environmental sustainability into universities including:

- financial constraints;
- lack of understanding and awareness in communities inside the university, which results in confusion and lack of commitment to implementation from the responsible staff;
- resistance to change when the concept is introduced to other disciplines or unit of the university; and
- need for a solid institutional approach where all elements of the university are working in synergy.

Incorporating SDG in a UoF QA Framework: The UPOU Case

In the previous section, several gaps have been identified to see which parts of the UNEP Sustainable University need to have a greater focus on when creating the framework with the AUN-QA institutional framework as the benchmarking basis. The “environmental and climate” criteria, along with “people and society,” should be greatly considered in developing UPOU’s framework.

To further make sure no SDG has been missed out, a mapping of the SDG to the AUN-QA institutional level criteria was also done (see Table 3).

Table 3

Mapping of the SDGs to the AUN-QA Institutional Level Criteria

Criterion 1. Vision, Mission, and Culture	SDG category
1.1 Senior leaders ensure that the vision and mission meet stakeholders’ needs and to their satisfaction. Stakeholders’ needs and satisfaction may be gathered from surveys, dialogues, focus group discussions, statutory and regulatory requirements, etc.	17: Partnership for the Goals
1.2 Senior leaders foster institutional culture, including a set of values to align with the vision and mission of the institution. The culture and values promote desirable behaviors of leaders and employees to achieve the strategic goals of the institution.	17: Partnership for the Goals
1.3 The vision, mission, and culture are articulated, cascaded, and demonstrated for implementation. These are articulated in policies, guidelines, programs, and communication media and are cascaded to all levels of staff. Senior leaders and management staff are seen as role models in demonstrating desired behavior.	17: Partnership for the Goals
1.4 Review of the vision, mission, and culture is carried out to meet stakeholders’ needs and to their satisfaction. The review may include but not limited to management review meeting, strategic planning, cultural audit, organizational performance, and internal and external assessment or audit.	17: Partnership for the Goals
1.5 The vision, mission, and culture, and their development processes are improved to meet stakeholders’ needs and to their satisfaction.	17: Partnership for the Goals

Criterion 2. Governance	
2.1 Governance system, including board, council, senate and/or advisory committee, is established to set strategic directions given the specific context of the institution and to ensure accountability, sustainability, and transparency as well as to mitigate potential risks. Governance may include but not limited to the approval of strategic direction, financial and resource plans, management controls and risks, compliance with statutory and regulatory requirements, code of conduct and ethics, policies on conflict of interest, disclosure, reporting and audits.	16: Peace, Justice, and Strong Institutions
2.2 Decisions from governance bodies are translated into action plans, policies, and guidelines to safeguard corporate and academic governance and to maintain a governance system that practices good corporate citizenship, protects the interests of stakeholders, and fulfills its responsibility to the community and the environment.	16: Peace, Justice, and Strong Institutions
2.3 Review of the governance system of the institution is carried out. Such a review should be objective, transparent, and independent.	16: Peace, Justice, and Strong Institutions
2.4 The governance system of the institution is improved for institutional effectiveness and better risk management.	16: Peace, Justice, and Strong Institutions
Criterion 3. Leadership and Management	
3.1 Senior leaders establish a management structure with defined roles and responsibilities, decision-making, communication, and reporting to achieve the vision, mission, and culture and strategic goals of the institution. All appointments to management position are approved and made in consideration of institutional and/or regulatory requirements.	16: Peace, Justice, and Strong Institutions
3.2 Senior leaders are personally involved in communicating and engaging stakeholders in driving the vision, mission, and culture and strategic goals of the institution.	16: Peace, Justice, and Strong Institutions
3.3 Review of the leadership and management structure of the institution is carried out. Review of leadership may include peers, direct reports, board of directors or its equivalent, and employees.	16: Peace, Justice, and Strong Institutions
3.4 The leadership and management structure of the institution are improved for management effectiveness and for achieving desired levels of organizational performance.	16: Peace, Justice, and Strong Institutions
Criterion 4. Strategic Management	

<p>4.1 Strategy planning is carried out to fulfill the vision, mission, and culture as well as the strategic goals of education, research, service and/or other defined strategic areas. The planning encompasses strategy development, implementation, and evaluation and considers the internal capabilities, external environment, and inputs from stakeholders.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>4.2 Strategic plan is cascaded and translated into long- and short-term action plans for implementation at all levels. The strategic goals are translated into organizational units and individual goals.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>4.3 Key performance indicators and targets are established to measure the performance of strategic goals of the institution. The performance of the institution and its organizational units serves as the input for review.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>4.4 The strategic planning process as well as key performance indicators and targets are improved to meet the strategic goals of the institution.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>Criterion 5. Policies for Education, Research, and Service</p>	
<p>5.1 System to formulate policies for education, research, and service is established. It is essential that stakeholders are consulted, are involved, or are participants in the formulation process. Policies may include but are not limited to code of ethics for education, research and service, academic freedom, protection of human subjects and animals, conflict of interest, legal and financial accountability, as well as how the institution contributes to society.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>5.2 Process to monitor compliance to policies is documented, communicated, and implemented.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>5.3 Review of policies for education, research, and service is carried out. Mechanisms may include but are not limited to external reviews, internal and external assessment, compliance audits, and peer observation. Relevant indicators should be established to measure benefits to and satisfaction of stakeholders.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>5.4 Policies for education, research, and service are improved to ensure institutional effectiveness and to meet stakeholders' needs and to their satisfaction.</p>	<p>16: Peace, Justice, and Strong Institutions</p>
<p>Criterion 6. Human Resource Management</p>	

6.1 Human resource planning (considering succession, promotion, redeployment, termination, and retirement) is carried out to fulfill the needs for education, research, and service. Both long- and short-term human resource planning covering full-time and part-time staff is established to support the vision, mission, and strategic goals of the institution.	17: Partnership for the Goals
6.2 Recruitment and selection criteria including ethics and academic freedom for appointment, deployment, and promotion are determined and communicated. A system of setting such criteria for all categories of staff is in place.	16: Peace, Justice, and Strong Institutions
6.3 Competencies including leadership skills of various staff categories are identified and established.	16: Peace, Justice, and Strong Institutions
6.4 Training and developmental needs of staff are identified and activities are implemented to fulfill them. Activities may include but not limited to scholarships, seminars, conferences, workshops, symposiums, online courses, or community of practices.	16: Peace, Justice, and Strong Institutions
6.5 Performance management system including rewards, recognition and coaching/mentoring schemes is implemented to motivate and support education, research, and service.	16: Peace, Justice, and Strong Institutions
6.6 Review of human resource plans, policies, procedures, and schemes is carried out to ensure that they are relevant and up-to-date in supporting education, research, and service. Relevant human resource indicators should be used to aid the review.	16: Peace, Justice, and Strong Institutions
6.7 The human resource plans, policies, procedures, and schemes are improved to support education, research, and service.	16: Peace, Justice, and Strong Institutions
Criterion 7. Financial and Physical Resource Management	
7.1 System to plan, implement, audit, and improve the financial resources of the institution to support its vision, mission, and strategic goals in education, research, and service is established and implemented. Key financial procedures and practices relating to education, research, and service should meet institutional and regulatory requirements. Financial statements and reports should be accurate and up-to-date.	16: Peace, Justice, and Strong Institutions

<p>7.2 System to plan, maintain, evaluate, and improve physical facilities and infrastructure such as teaching and learning facilities, laboratories, equipment and tools, etc. to meet the needs of education, research, and service is established and implemented. Management and monitoring of the facilities and infrastructure are in place to ensure that they are adequate and relevant.</p>	<p>9: Industry, Innovation and Infrastructure; 11: Sustainable Cities and Communities</p>
<p>7.3 System to plan, maintain, audit, and improve IT facilities and infrastructure such as computers, networks, backup, security, and access rights to meet the needs of education, research, and service is established and implemented. Management and monitoring of IT facilities and infrastructure are in place to ensure that they are adequate, relevant, and up to date.</p>	<p>9: Industry, Innovation and Infrastructure; 11: Sustainable Cities and Communities</p>
<p>7.4 System to plan, maintain, evaluate, and improve academic resources such as library resources, teaching aids, online databases, etc. to meet the needs of education,</p>	<p>9: Industry, Innovation and Infrastructure;</p>
<p>research, and service is established and implemented. Management and monitoring of the academic resources are in place to ensure that they are adequate, relevant, and up to date.</p>	<p>11: Sustainable Cities and Communities</p>
<p>7.5 System to plan, implement, evaluate, and improve the environment, health and safety, and access to people of special needs is established and implemented. The environment, health and safety policies and practices should meet institutional and regulatory requirements. Conducive environment for teaching and learning as well as promoting the well-being of staff and students are essential.</p>	<p>3: Good Health and Well-Being</p>
<p>Criterion 8. External Relations and Network</p>	
<p>8.1 Plan for external relations, networks, and partnerships is established to achieve the vision, mission, and strategic goals of the institution. Partners and networks may include but not be limited to business and industry, universities, professional bodies, alumni, government, and non-government organizations.</p>	<p>17: Partnership for the Goals</p>

<p>8.2 Policies, procedures, and agreements to foster external relations, networks, and partnerships are implemented. Memorandums of Understanding (MoU), partnership contracts or agreements, collaboration partnerships, charters, etc. are common mechanisms used to establish and maintain partnership or relationship. Contract or agreement should include critical details such as period of partnership, terms and conditions, and mutual expectations.</p>	17: Partnership for the Goals
<p>8.3 Review of external relations, networks, and partnerships is carried out.</p>	17: Partnership for the Goals
<p>8.4 External relations, networks, and partnerships are improved to achieve the vision, mission, and strategic goals of the institution.</p>	17: Partnership for the Goals
<p>Criterion 9. Internal Quality Assurance (IQA) System</p>	
<p>9.1 Structures, roles and responsibilities, and accountability of IQA are established to meet the strategic goals and quality assurance of the institution. The quality assurance unit(s) and its affiliations should guide the institution in raising the quality of education, research, and service as well as other defined strategic areas.</p>	17: Partnership for the Goals
<p>9.2 Strategic QA plan encompassing strategies, policies, stakeholders' engagement and activities as well as QA promotion and training is established to meet the strategic goals and quality assurance of the institution. To raise commitment, appropriate ways to engage the stakeholders in developing the QA plan should be carried out.</p>	17: Partnership for the Goals
<p>9.3 The strategic QA plan is cascaded and translated into long- and short-term action plans for implementation. The strategic QA plan is translated into strategic goals of the QA unit(s) and its affiliations.</p>	17: Partnership for the Goals
<p>9.4 System to document, review, and communicate QA policies, systems, processes and procedures is implemented. Documentation should be systematically filed, stored, archived, and updated. Communication to stakeholders should be planned and tailored to its purpose.</p>	17: Partnership for the Goals
<p>9.5 Key performance indicators and targets are established to measure the performance of quality assurance in the institution. Results of performance indicators should be released to relevant stakeholders in a timely manner for improvement.</p>	17: Partnership for the Goals
<p>9.6 The strategic QA planning process and key performance indicators and targets are improved to meet the strategic goals and quality assurance of the institution.</p>	17: Partnership for the Goals

Criterion 10. Internal and External QA Assessment	
10.1 Plan for internal and external QA assessment is established to meet institutional and regulatory requirements. Internal and external assessment is necessary to ensure that policies, systems, processes, and procedures remain relevant and effective in meeting the strategic goals of the institution.	17: Partnership for the Goals
10.2 The internal and external QA assessment is regularly carried out by trained and independent staff and/or experts. Criteria to appoint internal assessors and assigned areas for assessment should be established to ensure that assessment is objective, evidence-based, and independent.	17: Partnership for the Goals
10.3 The findings and results of the internal and external QA assessment are reviewed. Strengths and weaknesses of the QA system should be identified and analyzed.	17: Partnership for the Goals
10.4 The internal and external QA assessment processes are improved to meet the strategic goals of the institution.	17: Partnership for the Goals
Criterion 11. IQA Information System	
11.1 Plan for IQA information management including collection, processing, and reporting of data and information to and from stakeholders in supporting education, research, and service is established. An institution may collect information and generate knowledge through various mechanisms including but not limited to surveys, dialogues, focus group discussions, tracer studies, research, market analysis, competitive analysis, and benchmarking.	16: Peace, Justice, and Strong Institutions
11.2 IQA information including data analytics is relevant, accurate, and readily available to stakeholders in a timely manner that aids decision making while assuring its integrity, confidentiality, and security. Information about the institution, awards, programs and courses, achievements, quality assurance, etc. should be accurate, relevant, and up-to-date and readily available to stakeholders. Data analytics may include but not limited to trend analysis, projections, comparisons, cause-and-effect analysis, and correlation and variance analyses. The confidentiality and security policy and procedures should be communicated to all relevant staff and external parties such as vendors, suppliers, partners, etc.	16: Peace, Justice, and Strong Institutions
11.3 Review of IQA information management system and the quantity and quality of data and information as well as their integrity, confidentiality, and security is carried out to ensure that they are relevant and aid decision making.	16: Peace, Justice, and Strong Institutions

11.4 The management of IQA information and their plans, processes, and policies are improved to support education, research, and service.	16: Peace, Justice, and Strong Institutions
Criterion 12. Quality Enhancement	
12.1 Plan to continually enhance institutional quality including policies, systems, processes, procedures, and resources to seek best practices in education, research, and service is established. The plan demonstrates the institution's commitment and its contribution to the holistic development of quality assurance.	16: Peace, Justice, and Strong Institutions
12.2 Criteria for selecting comparative and benchmarking information and partners to improve performance are established. The partners may include educational and non-educational establishments with the singular purpose of seeking continual improvement and organizational learning.	16: Peace, Justice, and Strong Institutions
12.3 Comparative and benchmarking information to enhance QA practices and encourage innovation is carried out for key processes and performance results in education, research, and service identified by the institution.	16: Peace, Justice, and Strong Institutions
12.4 Review of the process for selection and use of comparative and benchmarking information is carried out to ensure that they remain relevant and effective.	16: Peace, Justice, and Strong Institutions
12.5 The process for selection and use of comparative and benchmarking information is improved to continually seek best practices in education, research, and service.	16: Peace, Justice, and Strong Institutions
Criterion 13. Student Recruitment and Admission	
13.1 Plans, policies, and communication for student admission to various programs are established. Channels to disseminate such information may include but are not limited to websites, social media, outreach activities, publications, press media, emails, and marketing collaterals.	16: Peace, Justice, and Strong Institutions
13.2 Criteria to select quality students for each program are established. Criteria may include but not limited to admission tests, national examination, past academic performance, language proficiency, and regulatory requirements.	16: Peace, Justice, and Strong Institutions
13.3 Procedures to monitor the implementation of the recruitment and admission of students are in place.	16: Peace, Justice, and Strong Institutions

13.4 Measures are established to monitor student recruitment and admission. Measures may include but are not limited to enrolment figures, cut-off points, results of admission tests, trends, targets, ratios, correlation analysis, and GPA.	4: Quality Education
13.5 Student recruitment and admission are improved to ensure that they remain relevant and effective.	4: Quality Education
Criterion 14. Curriculum Design and Review	
14.1 System to design, develop, monitor, review, and approve curricula for all study programs and courses with input and feedback from stakeholders is established to ensure that they remain relevant and up-to-date.	4: Quality Education; 10: Reduced Inequalities
14.2 System to formulate and align expected learning outcomes of the program and its courses to stakeholders' needs is established. Expected learning outcomes should be formulated systematically based on an established educational taxonomy.	4: Quality Education; 10: Reduced Inequalities
14.3 Syllabi and delivery plans of the program and its courses are documented, communicated, and delivered based on the expected learning outcomes. Program and course specifications are used to document how the expected learning outcomes would be achieved.	4: Quality Education; 10: Reduced Inequalities
14.4 Review of the curriculum design and review process and curricula is carried out. The review may include but not limited to internal and external review panels, internal and external assessment, and benchmarking.	4: Quality Education; 10: Reduced Inequalities
14.5 The curriculum design and review process and curricula are improved to ensure that they remain relevant and up-to-date to meet the changing needs of stakeholders.	4: Quality Education; 10: Reduced Inequalities
Criterion 15. Teaching and Learning	
15.1 System to select appropriate teaching and learning activities that are aligned to the educational philosophy and the achievement of the expected learning outcomes is established. Stakeholders' feedback, students' evaluation, and students' performances are key inputs to determine the effectiveness of the teaching and learning activities.	4: Quality Education 10: Reduced Inequalities

15.2 System to engage, assign, and approve academic staff deployment based on merit, qualification, expertise, and experience is implemented. The quantity and quality of academic staff (full-time and part-time) should be appropriate for the study programs and courses which they are assigned to teach.	4: Quality Education; 10: Reduced Inequalities
15.3 Teaching and learning activities enhance life-long learning and are constructively aligned to the achievement of the expected learning outcomes.	4: Quality Education; 10: Reduced Inequalities
15.4 Teaching and learning activities are monitored and evaluated for quality and improvement. Monitoring and evaluation instruments may include but not limited to student evaluation or course feedback, peer evaluation or observation, curriculum evaluation, expert review panels, and internal and external QA assessment.	4: Quality Education; 10: Reduced Inequalities
15.5 The educational philosophy and teaching and learning activities are improved to achieve the expected learning outcomes, quality of teaching and learning, and life-long learning	4: Quality Education; 10: Reduced Inequalities
Criterion 16. Student Assessment	
16.1 System to plan and select appropriate types of student assessment during the course of study is established. Student assessment should cover student admission, continuous assessment, and final/exit test before graduation.	4: Quality Education; 10: Reduced Inequalities
16.2 Student assessment is constructively aligned to the achievement of the expected learning outcomes. In fostering constructive alignment, a variety of assessment methods should be adopted and be congruent with the expected learning outcomes. They should measure the achievement of all the expected learning outcomes of the program and its courses.	4: Quality Education; 10: Reduced Inequalities
16.3 Student assessment methods and results of the assessment are reviewed to ensure validity, reliability, and fairness and the achievement of the expected learning outcomes. Mechanisms to ensure validity, reliability, and fairness may include but are not limited to marking schemes, rubrics, examination regulations, and appeal procedure.	4: Quality Education; 10: Reduced Inequalities
16.4 The types of student assessment and assessment methods are improved to ensure their validity and reliability towards the achievement of expected learning outcomes.	4: Quality Education; 10: Reduced Inequalities

Criterion 17. Student Services and Support	
17.1 Student services and support and student monitoring systems are planned. Student services and support may include but are not limited to academic advice, counseling, co-curricular activities, grievance handling, and other student support services. Student monitoring system includes tracking student progress, academic performance, and workload.	3: Good Health and Well-Being; 4: Quality Education
17.2 Student services and support and student monitoring systems are implemented to meet the needs of stakeholders. Qualified support staff with relevant competencies are assigned to deliver the desired level of service quality. Student monitoring system is used to aid student learning, improve student well-being, and enhance educational policies and procedures.	3: Good Health and Well-Being; 4: Quality Education
17.3 Review of student services and support and student monitoring system are carried out to seek improvement and to raise the quality of services provided.	3: Good Health and Well-Being; 4: Quality Education
17.4 Student services and support and student monitoring system are improved to meet stakeholders' needs and to their satisfaction.	3: Good Health and Well-Being; 4: Quality Education
Criterion 18. Research Management	
18.1 System to oversee, direct, implement, monitor, and review research activities, resources, research staff quality, and research-related activities is established. The governance and management of research activities should be distinctively separated so as to comply with all institutional and regulatory requirements and to protect the safety and welfare of all employees and experimental subjects.	17: Partnership for the Goals
18.2 Strategic approach to source for research funding and to promote research, innovation, collaboration, and research excellence is implemented to achieve the vision and mission of the institution. It should be broadly aligned with the national and agency research objectives, the advancement and discovery of new knowledge and contribution to the betterment of society and mankind.	17: Partnership for the Goals
18.3 Key performance indicators are used to evaluate the quantity and quality of research. These may include but are not limited to number of research projects, research funds and grants, awards, publications, collaborative projects, research partnerships, patents, and copyrights.	17: Partnership for the Goals

18.4 Research management is improved to raise the level of research and innovation.	17: Partnership for the Goals
Criterion 19. Intellectual Property Management	
19.1 System to manage and protect inventions, patents, copyrights, and research results is established. The intellectual property management framework should encourage and protect research, innovation, invention, creative work, technology transfer, and commercialization. It should also meet institutional and regulatory requirements.	17: Partnership for the Goals
19.2 System to record, store, and retrieve intellectual property is implemented.	17: Partnership for the Goals
19.3 System to review the management of intellectual property is carried out.	17: Partnership for the Goals
19.4 Management of intellectual property is improved to protect the university and research staff and public interest.	17: Partnership for the Goals
Criterion 20. Research Collaboration and Partnerships	
20.1 System to establish research collaboration and partnerships to meet research goals is established. Partnerships may include but are not limited to business and industrial corporations, universities and associations, professional and research bodies, and government and non-government organizations.	17: Partnership for the Goals
20.2 Policies and procedures to foster collaboration and partnerships are implemented. Memorandums of Understanding (MoU), partnership contracts or agreements, collaboration partnerships, etc. are common mechanisms used to establish and maintain partnerships or relationships. Contract or agreement should include critical details such as period of partnership, terms and conditions, intellectual property rights, and research ethics.	17: Partnership for the Goals
20.3 System to review the effectiveness of research collaboration and partnerships is carried out.	17: Partnership for the Goals
20.4 Research collaboration and partnerships are improved to meet research goals.	17: Partnership for the Goals
Criterion 21. Community Engagement and Service	
21.1 Plan to engage the community and to provide service to meet the vision and mission of the university is established. Community engagement and services may include but not limited to the provision of consulting services, professional advice, editorial services, and community service.	8: Decent Work and Economic Growth; 17: Partnership for the Goals

<p>21.2 Policies and guidelines for community engagement and service are implemented. Policies, guidelines, and procedures may include accountability, compliance, legal and financial, code of ethics, and conflict of interest.</p>	<p>8: Decent Work and Economic Growth; 17: Partnership for the Goals</p>
<p>21.3 System to measure and monitor the community engagement and services is carried out. Relevant indicators should be established to measure benefits and satisfaction of stakeholders.</p>	<p>8: Decent Work and Economic Growth; 17: Partnership for the Goals</p>
<p>21.4 Provision of community service and community engagement is improved to meet stakeholders’ needs and to their satisfaction.</p>	<p>8: Decent Work and Economic Growth; 17: Partnership for the Goals</p>
<p>Criterion 22. Educational Results</p>	
<p>22.1 Pass rates and dropout rates of all study programs and courses are established, monitored, and benchmarked for improvement.</p>	<p>4: Quality Education</p>
<p>22.2 Average time to graduate for all study programs is established, monitored, and benchmarked for improvement.</p>	<p>4: Quality Education</p>
<p>22.3 Employability of graduates of all study programs is established, monitored, and benchmarked for improvement.</p>	<p>4: Quality Education</p>
<p>22.4 Satisfaction levels of stakeholders on the quality of graduates are established, monitored, and benchmarked for improvement.</p>	<p>4: Quality Education</p>
<p>Criterion 23. Research Results</p>	
<p>23.1 Type and volume of research by academic and research staff are established, monitored, and benchmarked for improvement.</p>	<p>17: Partnership for the Goals</p>
<p>23.2 Type and volume of research by students are established, monitored, and benchmarked for improvement.</p>	<p>17: Partnership for the Goals</p>
<p>23.3 Type and volume of research publications are established, monitored, and benchmarked for improvement.</p>	<p>17: Partnership for the Goals</p>
<p>23.4 Type and volume of intellectual property are established, monitored, and benchmarked for improvement.</p>	<p>17: Partnership for the Goals</p>
<p>23.5 Amount of research fund for each type of research activity is established, monitored, and benchmarked for improvement.</p>	<p>17: Partnership for the Goals</p>

23.6 Results of research and innovation, including commercialization, incubation, establishment of start-ups, etc., are established, monitored, and benchmarked for improvement.	17: Partnership for the Goals
Criterion 24. Service Results	
24.1 Type and volume of community engagement and service and contribution to society are established, monitored, and benchmarked for improvement.	17: Partnership for the Goals
24.2 Societal impact and achievement of community engagement and service and contribution to society are established, monitored, and benchmarked for improvement.	17: Partnership for the Goals
24.3 Impact on students and staff of community engagement and service is established, monitored, and benchmarked for improvement.	17: Partnership for the Goals
24.4 Satisfaction of stakeholders in community engagement and service and contribution to society is established, monitored, and benchmarked for improvement.	17: Partnership for the Goals
Criterion 25. Financial and Market Results	
25.1 Financial performance and indicators for education, research, and service are established, monitored, and benchmarked for improvement.	16: Peace, Justice, and Strong Institutions
25.2 Market performance and indicators for education, research, and service are established, monitored, and benchmarked for improvement.	16: Peace, Justice, and Strong Institutions

The SDGs addressed were SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 10 (Reduced Inequality), SDG 11 (Sustainable Cities and Communities), SDG 16 (Peace, Justice, and Strong Institutions), and SDG 17 (Partnership for the Goals), only eight out of 17 SDGs (47%).

Meanwhile, there are gaps in addressing SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 5 (Gender Equality), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land). UPOU has constituted an SDG Oversight Committee to address these gaps and the policies proposed by the committee could be integrated into the UPOU QA framework.

At present, UPOU focuses on reporting six SDGs identified by the UP System

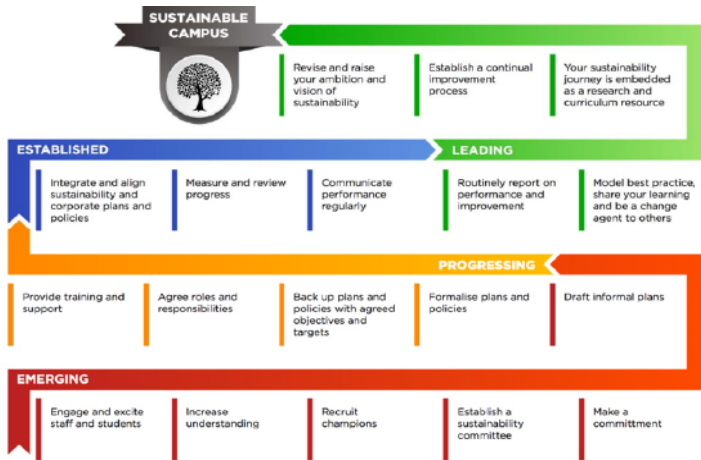
Technical Working Group (TWG): SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals). Out of these six goals, UPOU's strength as an institution relies on its quality education (SDG 4). While the other goals are not totally neglected, the number of programs and initiatives for each of them is smaller compared with that for SDG 4.

In addition, the UPOU Quality Assurance Office conducted a comparative analysis using other QA frameworks. It was observed that "Gender Equality" was not present in any of the presented QA frameworks that were compared against the AUN-QA program-level framework. The number of articles that mention together the terms "quality assurance" and "gender equality" being incorporated in decision-making in universities is also limited and, if included, these terms are given only the most basic definition.

A four-step framework to achieve a "sustainable university" was proposed by UNEP. It works by first identifying the university's particular aspect or areas or activities falling under one of the four core areas and then going through the four steps or levels, progressing its goals starting from (1) emerging to; (2) progressing to; (3) established to; and (4) final step in which the university is leading towards a sustainable campus/university. This framework can greatly help UPOU in planning the incorporation of SDGs into its QA framework. These steps also do not deviate from the guide presented by SDSN Australia/Pacific (2017) on how SDGs can be integrated into a university's core.

Figure 1

UNEP's Framework for a Sustainable Campus



Universities, therefore, need to expand their programs and initiatives to increase their “sustainability aspects” and apply the UNEP framework to progress to a “sustainable campus.”

To achieve sustainable development goals in quality assurance, Stukalo and Lytvyn (2021), meanwhile, proposed the following recommendations:

Table 4

Recommendations for Internal and External Quality Assurance Systems for SDG Achievement

National level	Institutional level	Study program level
To ensure that higher education standards include competencies relevant to sustainable development goals, including their knowledge, in-depth understanding, and ability to implement them in everyday life and in the workplace	To consider SDG achievements as strategic goals and as priority in institutional policy	To foster continuous enhancement of teaching on the basis of SDGs

National level	Institutional level	Study program level
These standards should be reflected and integrated into the accreditation criteria to be reviewed and evaluated through external assessment	To include SDG considerations as one of the requirements during internal QA procedures	To promote the integration of sustainable development topics into courses
To collect and analyze the results of external QA regarding SDGs and publish outcomes of such analysis on the QA agencies' websites and include them as a separate section in the QA agencies' annual reports	To ensure the monitoring of department, faculty, and student efforts in joining and developing initiatives on SDG achievement	To encourage teamwork among faculty, non-academic staff, and students to implement sustainable development practices and activities in the workplace
To make SDGs a focus at the agencies' webinars and expert trainings and to include them in guidelines and other publications		To establish short trainings to increase environmental responsibility and to promote the higher education mission for SDG achievement
		To share and disseminate the work carried out in sustainable development and quality
		To encourage and fund projects devoted to sustainable development
		To use environment-friendly technologies (facilities, paper-free, sustainable consumption, etc.) in universities

Considering the gaps presented and the recommendations listed, incorporating SDG in the QA framework may be done by adding criteria on sustainability to the framework. The criteria should be included at the institutional, program, and course levels where learning outcomes and activities can be revisited or assessed on whether or not they are promoting

any elements of sustainability.

Tables 5 and 6 outline the recommended criteria for sustainability at the institutional and program levels, based on the literature presented in this chapter.

Table 5

Criteria on Sustainability at the Institutional Level

Criterion XX. Institutional Sustainability
XX.1 SDG achievements are considered as strategic goals and priorities in institutional policy. Committees focusing on SDGs are in place and play a role in developing policies for sustainability. Plans and policies are backed up with targets and objectives. SDG oversights are identified and policies are created to address these oversights.
XX.2 The department, faculty, and student efforts to join and develop initiatives on SDG achievement are monitored. Performance is also regularly communicated.
XX.3 A continuous process of improvement as a sustainable university is set into motion with room to revise and raise the vision for sustainability.
XX.4 Best practices for sustainability are reported and are disseminated to a wider audience.

Table 6

Criteria on Sustainability at the Program Level

Criterion YY. Program Sustainability
YY.1 Sustainable development topics are integrated into teaching and the development of courses.
YY.2 Sustainable development practices and activities are encouraged among faculty, non-academic staff, and students both in the classroom and in the workplace.
YY.3 Short training courses that increase environmental responsibilities and promote the higher education mission for SDG achievement are conducted.
YY.4 Research addressing the SDGs is conducted, shared, and disseminated, and is properly funded. Gaps in the SDGs are identified and more research is directed towards narrowing or eliminating these gaps.
YY.4 The program uses environment-friendly technology such as green facilities, paper-free tools, and sustainable consumption.

These are recommendations and could be improved through further workshops and discourses. Moreover, depending on which framework an institution has used as a basis, the specific requirements can even be integrated into an already existing criterion. For instance, YY.1 can be integrated into a criterion for teaching and YY.4 can be integrated into a criterion for facilities and infrastructure. However, by outlining them in this chapter, these criteria serve as a jumping board to fully integrate SDGs in UPOU's QA framework as it approaches the UoF.

References

- B2B Marketing. (2019). *Education for sustainable development and its benefits to your university*. QS. <https://www.qs.com/education-for-sustainable-development/>
- El-Jardali, F., Ataya, N., & Fadlallah, R. (2018). Changing roles of universities in the era of SDGs: Rising up to the global challenge through institutionalizing partnerships with governments and communities. *Health Research Policy and Systems*, 16(1). <https://doi.org/10.1186/s12961-018-0318-9>
- Emerick, D. (2022). *What are the three pillars of sustainability? Unsustainable*. <https://www.unsustainablemagazine.com/the-three-pillars-of-sustainability/>
- Heiss, J. (n.d.). *The role of higher education in sustainability science for implementing the SDGs*. https://en.unesco.org/sites/default/files/panel_3_presentation_juliaheiss.pdf
- Lumanta, M. F., Garcia, P. G., Lapitan, A. S., & Ortiguero, I. G. (2020). Situating quality concepts, issues, and measures in open and distance education. In *Quality initiatives in an open and distance e-learning institution: Towards excellence and equity* (pp. 1-22). University of the Philippines Open University. <https://networks.upou.edu.ph/32136/quality-initiatives-in-an-open-and-distance-e-learning-institution-towards-excellence-and-equity/>
- Mawonde, A., & Togo, M. (2019). Implementation of SDGs at the University of South Africa. *International Journal of Sustainability in Higher Education*, 20(5), 932–950. <https://doi.org/10.1108/ijsh-04-2019-0156>
- Newton, J. (2013). *Is quality assurance leading to enhancement?* <https://www.eurashe.eu/library/quality-he/Newton.pdf>
- QS International. (2021). *What is a sustainable university and why should you study there?* Top Universities. <https://www.topuniversities.com/student-info/choosing-university/articles/what-sustainable->

university-why-should-you-study-there

- Ralph, M. M., & Stubbs, W. (2013). Integrating environmental sustainability into universities. *Higher Education*, 67(1), 71–90. <https://doi.org/10.1007/s10734-013-9641-9>
- Reisberg, L. (2010). *Quality assurance in higher education: Defining, measuring, improving it* [Powerpoint presentation]. University Center of Boston for International Higher Education. [http://www.gr.unicamp.br/ceav/pdf/unicamp_qa_day1_final\[1\].pdf](http://www.gr.unicamp.br/ceav/pdf/unicamp_qa_day1_final[1].pdf)
- SDSN Australia/Pacific. (2017). *Getting started with the SDGs in universities: A guide for universities, higher education institutions, and the academic sector*. Australia, New Zealand and Pacific Edition. Sustainable Development Solutions Network – Australia/Pacific, Melbourne.
- Stukalo, N., & Lytvyn, M. V. (2021). Towards sustainable development through higher education quality assurance. *Education Sciences*, 11(11), 664. <https://doi.org/10.3390/educsci11110664>
- Sustainable Development Goals | United Nations Development Program. (n.d.). UNDP. <https://www.undp.org/arab-states/sustainable-development-goals>
- The Times of India (2022). *What are QS world university rankings and why do they matter?* <https://timesofindia.indiatimes.com/home/education/study-overseas/what-are-qs-world-university-rankings-and-why-do-they-matter/articleshow/90730291.cms>
- UNEP's Sustainable University Framework. (2021). *UNEP - UN Environment Program*. <https://www.unep.org/resources/toolkits-manuals-and-guides/uneps-sustainable-university-framework>
- UNESCO European Centre for Higher Education (2007). *Quality assurance and accreditation: A glossary of basic terms and definitions*. <https://unesdoc.unesco.org/ark:/48223/pf0000134621>
- UNESCO IIEP (2007). *External quality assurance in higher education: making choices*. <https://unesdoc.unesco.org/ark:/48223/pf0000152045>
- UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific (2003). *Higher Education in Asia and the Pacific 1998-2003*. <https://unesdoc.unesco.org/ark:/48223/pf0000130338>
- Why We Are Here | Discover AUN | ASEAN University Network. (n.d.). *AUN*. <https://aunsec.org/discover-aun/why-we-are-here>
- Xue, Q. (2022). Increasing commitment to the sustainable development goals across universities worldwide. *Sustainable Horizons*, 2, 100021. <https://doi.org/10.1016/j.horiz.2022.100021>

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ABOUT THE COVER

The University of the Future (UoF) is the anticipated response to the disruptions in the educational landscape. The blurred lines connecting the vertices signify the tensions between realities of the present and future imaginings, thus suggesting the “uncertainty” of the processes that actively influence the future configuration reflecting flexibility. The connection between objects signifies the unity of different elements to build a continuously adapting networked environment. The icons within the vertices represent learning that creates a path to a future-proof education system. The color blue connotes “freedom,” which embodies the intention of the UoF to inspire the beginnings of explorations into learning alternatives in order to produce future-ready leaders.

