ITU Academy
empowering minds

Georgia Tech

2nd ITU-ACADEMIA PARTNERSHIP MEETING

Developing skills for the digital era

Atlanta, Georgia, United States

2-3 December 2019

FINAL REPORT

INTRODUCTION

1. The 2nd ITU-Academia Partnership Meeting took place in Atlanta, Georgia, USA, from 2 to 3 December 2019. It was organized by the International Telecommunication Union and hosted by the Georgia Institute of Technology (Georgia Tech).
2. The theme of the Meeting was "Developing skills for the digital era".
3. The Meeting attracted over 50 participants from 17 countries, primarily from academic institutions. Other participants included representatives from government, industry, regulators, ITU Centers of Excellence and international organizations.
4. The key objective of the meeting was to discuss the impact of the digital transformation on higher education and to identify opportunities for strengthening collaboration between ITU and academic institutions in developing capacities and skills, and contribute towards the global goal of preparing a workforce that is fit for the digital future.
5. Further information, including the agenda, the presentation slides, summary conclusions, the list of participants, and photos are available at: https://www.itu.int/en/ITU-D/Capacity-Building/Pages/events/2019/academia2019.aspx

Monday 02 December 2019

Opening ceremony and keynote address

6. The ITU-Academia Partnership Meeting 2019 was opened by Dr Rafael L. Bras, Provost, Georgia Institute of Technology and, on behalf of ITU, Dr Susan Teltscher, Head, Capacity and Skills Development Division, ITU.

7. A keynote address was delivered by Max Louwerse, Professor of Cognitive Psychology and Artificial Intelligence, Tilburg University, Netherlands. The topic of his keynote address was "Creating Ambassadors of Planet Earth: Where Virtual Reality, Serious Gaming, and Artificial Intelligence Meet Education."

8. In his keynote address, Professor Louwerse shared his insights on what he characterized as Ambassadors of planet earth. He expressed the view that Sustainable Development Goal (SDG) 4 on quality education is perhaps the most important of all the Sustainable Development Goals. However, Professor Louwerse felt that the current educational system is not functional, and has not changed in over a 1000 years, yet over that time society has evolved. There needs to be a re-think in how children are taught in order to ensure they are engaged; and how learning is assessed, with problem solving being at the centre rather than getting the right answers in an examination. Education needs to be ubiquitous, inclusive and applied.

9. He gave the example of how knowledge institutions, industry, governments, governmental organizations, and citizens across the world work very closely together in the International Space Station (ISS) as it orbits the earth 16 times a day. This collaboration is a rare global phenomenon, which is aimed at the same goals, to create a better, healthier and safer world. He compared this rare global unity to the global objective of the, SDGs, where the world has united on the 17 developmental goals. To achieve this transformation in education requires a collaborative approach by academia, industry and governments.

10. The lofty aims of the SDGs get challenged when one thinks of how for example to educate all the children of the world in the digital era while ensuring that the quality of that education remains high. Further, how best can we educate generations of curious minds, and equip them with the skills of the 21st century economy and society? One answer lies in using educational virtual reality. He gave the example of SpaceBuzz, a non-profit organization that has built an educational virtual reality project developed to offer school children an immersive astronautical experience. Through advanced virtual reality the Spacebuzz rocket ship allows its crew to experience the so-called 'overview effect', a cognitive shift in awareness of the fragility of planet Earth reported by astronauts during spaceflight. The mission of SpaceBuzz is to turn all children into ambassadors for planet Earth.

11. Creating ambassadors of earth is educating today's kids for the future. The challenge today is not so much about resources, because the hardware and software is already there. The real challenge may lie in the organizational structure. How to bring academia, knowledge institutions, industry, governments, governmental organizations, and citizens together; and how to team up the gaming

industry, software companies, educators, policy makers, science museums, media companies, teachers, schools, and academia worldwide.

Session 1: Getting ready for the digital transformation: the role of academic institutions

12. The world is undergoing a major digital transformation, driven by the new digital technologies. This session looked at the role of universities in shaping the digital transformation, and how they are changing their academic programmes to embrace these emerging topics and technology trends.

13. One area of academic discipline that has been heavily impacted by the digital transformation is the field of management education. There has been a shift in the manner in which executives and business students are learning and want to learn, and universities are having to adapt. Programmes such as Masters of Business Administration (MBA), which used to be cash cows for universities, have been negatively impacted and a number of other similar programmes have had to be shut down. Business executives and students are looking for different types of learning, based on differentiated learning interventions per level and per person, differentiated content and personalized learning styles per individual. As a result and with so much customization, a number of organizations in the tech field are developing their own in-house education and management training capabilities and programmes for their executives, further threatening the relevance of universities in the provision of training in this field. This is putting pressure on academic institutions to adapt in ways they have not been forced to before.

14. Panelists discussed the need for universities to increase the speed with which they bring new course offerings to the market, by improving decision making processes and eliminating bureaucracies, especially in public, state-funded academic institutions. Universities were also urged to improve the way they use digital technologies to create and deliver content, leveraging on the use of available data to provide personalized learning pathways for students. The clear message was that the classic classroom way of teaching and learning was no longer appropriate. There was need to refocus on applicability. While technologies are creating the challenges, they are also providing potential solutions.

15. Panelists observed the shift over the years in the focus of learning, from physics, to biology and now to social sciences. From now and perhaps for the next 100 years, companies that gain competitive value are those that study human behaviour and convert it into economic value. In the same vein, universities that base their teaching methodologies on human behaviour and the use of data analytics, get to understand their students better.

16. Panelists looked at how universities are adjusting their curriculum in order to ensure students have the kinds of disciplines needed for the digital era and as a way to prepare students for the digital transformation. It was highlighted that digital technologies that are developed to tackle the world's most challenging problems require that today's student not only understands the technologies but also how these technologies affect user communities and society at large.

17. Universities were urged to introduce curricular interventions that advance interdisciplinary inquiry, such as entrepreneurship education. Curriculum design that advances entrepreneurship education includes human centred design, and looking at "beyond how to start a start-up". Most companies in the digital era need people to look beyond the delivery of their products and services to the market, but also their impact on society. Interdisciplinary education is seen as providing that societal perspective to the impact of technology, and an entrepreneurial focus helps to deepen students' understanding of the technology dimension on people and society. There is no longer a clear line between "for profit" organizations and social enterprise. Governance issues, Government,

environment among others, are becoming matters of social concern for shareholders and therefore require organizations to push for and adopt new business models.

18. Panelists were taken through a two-year project at Georgia Tech on how a university can evolve as part of its transformation in getting ready for a digital economy. The imperatives for change are the changing nature of work, the changing skills needs and capabilities of the 21st Century and in particular the impact of technologies and data analytics on the future of education. The overarching recommendation of this study was for a future college not conceived solely as a physical place one enters at a particular age and exits when a degree is completed, but rather as a platform for an increasingly diverse population of learners. This was part of a proposal called the "Georgia Tech Commitment to a Lifetime Education". This challenge could only be met through several pathways that included use of data for decision making at the university, and the integration of guides, coaches and partners on the educational journey.

19. Panelists noted key aspects of this research project which pointed to the need for a cultural change within universities and the need to adopt a culture of innovation. Importantly, universities such as Georgia Tech, which are strong in producing graduates in technical skills, need graduates with other skills including cognitive skills, such as problem solving, judgement and creativity; interpersonal skills, such as communications and leadership; and intrapersonal skills, such as resilience, adaptability and discipline if they are to be successful in the twenty-first century workplace. This calls for flexible learning experiences and continual learning opportunities. Thus universities have to develop new learning products to address these new requirements. Further, AI-augmented teaching methods such as the use of AI teaching assistant was introduced, with Jill Watson being the most famous AI Teaching Assistant introduced at GTI.

20. Panelists advised universities to adopt a philosophy for change that is routed in data and science rather than gut-feeling; to be realistic in their change programmes; to avoid the trap of falling for the curse of "too much money" but rather be driven by the need to change.

21. A presentation was made on the online Master of Science in Computer Science degree program that was run at Georgia Tech Institute. The program was launched in 2013 by the College of Computing at GTI, which is the largest Computing College in the USA. The degree is run on the basis of students' self- organizing on social media and learning comes from the interaction among students. The students are basically learning on their own, with support from their Lecturers. Technology is introduced in simulations to bridge the gap on practical skills. Assignments are in the form of essays, and students create their own data. Grading is automatic and feedback is instant. This approach has redefined learning, and introduced a cultural transformation to the way online learning is conducted. The program has been so successful that the dropout rate is around 5%, and the student completion rate between 80-95%.

Session 2: How academic institutions are being digitally transformed

22. The session discussed the major institutional digital transformation changes that universities are undergoing in order for them to stay relevant in the digital era. Digital transformation for a university influences four major areas, namely, teaching; learning; research; and credentialing. Some of the key questions arising from this transformation are: how to evaluate learning and how to use modern technological tools to create a most effective learning environment.

23. The session demonstrated how a university has leveraged digital technologies to create an effective learning environment. It uses data analytics to improve learning, reduce time taken to finalise a degree program by students increase graduation rates and close gaps between races, gender, and ethnic groups among students. This is an example of how data, which is the fuel of the digital economy, can be used to build a university's strategic plan.

24. Panelists also spoke of the role of the university in a digital society in developing digital citizens. As society undergoes digital transformation, so should a university transform with it. That means inevitably universities will have to use more digital tools in terms of evaluation of learning as well as in their pedagogical practices. Panelists emphasized that digital transformation does not replace face-to-face interactions which are still needed to guide the students.

25. The session also noted that digital transformation for a university means transforming the institution as a whole rather than just parts of it. Pre-requisites for the digital transformation of a university includes establishing a framework for an informed, aligned and agile decision making process. This entails having in place the proper governance that supports digital transformation. Information technology (IT) is one key service that is at the core of the digital transformation of a university. For this transformation to succeed, there needs to be mutual engagement between IT and the institution. For example, the IT department needs to understand the university's strategic goals and direction, and to align its governance with the mission and goals of the university. There is also need to ensure that the governance design within a university encourages and does not stifle innovation. This is a departure from the past, where IT saw itself - and was also seen within the university - purely from a technical perspective.

Session 3: Challenges faced by the 21st century University

26. The session discussed a wide range of issues and challenges faced by the 21st century University. One of the challenges has to do with the use of technologies for teaching and learning, and how this is influencing changes in approaches to teaching. Universities need to align their pedagogical approaches with the level of digital technologies available on the market.

27. The panelists observed that due to these changes, universities are adopting new methods of teaching such as hackathons and flipped classroom, even though it is difficult to measure working hours of the teacher and ensure the quality of e-learning sessions.

28. Panelists discussed issues ranging from open educational resources (OER) and the copyright models associated with OER, the personalization of learning and personalized technologies for social inclusion, the challenge of assessing digital competences and the tools to be used for measuring digital literacy.

29. The following issues were shared in the discussions:

- There has been a low level of support towards digital transformation within universities.
- Technology needs to be embedded in education with an ethical purpose.
- The traditional university is outdated, and needs to be replaced by a new, disruptive educational model that is more inclusive in terms of marginalized groups (women, minorities etc.).
- Markets in developing countries have a unique opportunity to embrace this disruptive educational model since they are in their early stages of digital technology adoption and are beginning to produce entrepreneurs and innovators for the digital economy.
- Understanding of the motivations for informal learning can inform restructuring of the formal learning reforms.
- Learning needs to take into account unique environments in which universities operate and these may differ from country to country.
- Understanding how students interact in groups and their "social gravity" helps to understand their learning needs and motivations.
- Universities need to understand that they no longer have a monopoly on knowledge as was the case before. Anybody can contribute to knowledge creation.

- There is an urgent need to reform intellectual property (IP) and copyright systems. Knowledge needs to be provided to the community through open educational resources, open patents and open licenses for copyright.
- While access to knowledge and information is becoming ubiquitous, universities are facing the challenge of ensuring that information students are getting is authentic and of high quality.
- Personalization of learning is about adapting technology to enable people within a particular environment to participate more actively in learning. This increases the level of participation, and social inclusion in the learning process. Passive response and negative response to learning has been traced back to the traditional learning methodology.
- Digital competency is best developed in a job context. This is part of applied learning by doing.
- Students need to be treated as stakeholders in the reform of the learning environment, rather than being viewed as just clients or customers of the learning institution.

30. Panelists noted from the foregoing discussions that there is a widespread opinion ranging from the great promise and optimism to existential doubt on the future of the university.

31. A scalability model might help the university in terms of dealing with issues of diversity and inclusivity but on the other hand it might also produce a winner-takes-all outcome.

Tuesday 03 December 2019

Session 4: Developing a workforce fit for purpose: the importance of academia- industry collaboration

32. The session discussed the importance of collaboration between academic institutions and the private sector to ensure that graduates coming out of universities are fit for purpose and have the skills and competencies that industry wants. This is more imperative in a digital economy where the pace of technological change is moving very fast.

33. Panelists looked at the challenges facing the education system in continents such as Africa, ranging from the limited number of students graduating from school finding space in higher education institutions, to the quality of the education that is not equipping them with the digital skills. Today's leadership core skills are in the areas of entrepreneurial thinking, data and decision making, projects and communicating for impact. Learning and teaching have to adapt to these changing circumstances.

34. Panelists shared case studies of how their universities have leveraged industry relationships to teach programmes that respond to the needs of industry. These were cases of collaboration with the private sector in developing and delivering academic programmes that are aligned to the digital economy. One case study involved collaboration between an academic institution and a global telecom/ICT company to develop and teach a degree programme on entrepreneurship in the digital economy. In order to make outgoing university students market-ready, universities need to teach them to be problem solvers and creative thinkers. Some of the methods used for collaboration with industry include internships, industry partnerships, and an emphasis on future thinking.

35. Another case study involved a group of private sector companies in a region in the United States who discovered that digital tech jobs in their region were taking too long to fill, and there were no people within the region who held the competencies to do those jobs. The major employers in the region put together a task force to identify their main digital skills needs and then dissected them into two categories of specialists and generalists. Armed with this list of competencies, these companies approached universities in the region, and they jointly mapped out the learning outcomes they want

from the students. The universities then adapted their programmes to produce graduates that have the competencies specified in the study as required by industry.

36. This case study showed the importance of identifying the needs of industry and developing teaching programmes that address those needs. University-private sector partnerships must demonstrate clear benefits to learners and employers. One of the lessons highlighted in this case study is that university-private sector partnerships are built on a culture of trust.

37. Universities need to be conscious of the changing environment, and instead of reacting to it, they need to be part of the change drivers. Another case study covered how industry supported a university to establish a technology-based startup incubator. In addition, the private sector has also helped to develop services for consolidated companies to generate new projects. In another project on continuous training, the university has taken training to the companies for middle managers with alignment for cultural and digital transformation.

38. The session also looked at the issue of academia partnerships from the triple helix of the environment, economy and society. The players here are government (key to stable interactions), academia (key to knowledge) and industry (key to production). Each of these players bring a useful contribution to the others. Academia contribute research, teaching and training, while industry provides human and production capital, and Government provides political and financial capital. Academia and industry need each other: industry has the market demand for certain skills, which academia must supply through appropriate curriculum and teaching to produce a trained and skilled workforce. On the other hand, academia provides industry with the necessary research and knowledge inputs.

39. Panelists noted that the current dichotomy within the digital economy is a reflection of the tension between the present and the future. Thus duality pits individuals versus organizations; processes versus personalization of services for clients; a proactive environment versus alignment; and disruption versus stability.

40. Panelists noted that Academia–industry collaboration require long–term partnerships, trust, continuous communication and going beyond classic borders. Panelists also noted the need to encourage north–south collaboration in order to stem brain drain, and have universities in the south to benefit from the digital knowledge advancements in the north. Finally, panelists highlighted the fact that teaching must change mindsets and influence students to be job creators rather than job seekers.

Session 5: Universities as drivers of AI research and innovation

41. The session highlighted that the majority of current innovations in AI are done by professors and students at universities and only later on are they transformed into some products by companies. Universities prepare the majority of the datasets; most AI startups are started at university colleges; most research is done at universities and products and services that end up in industry come from university research. This makes universities pioneers of research and innovation in AI. There has been a sharp rise in technology-based startups. The panel showed how AI research is growing globally, led by the big economies in the US, China and Japan.
42. Panelists also noted that AI is not just a subject for a particular or specific discipline, and as such it should be taught in every subject at university.

43. However, the panel highlighted the need for AI to solve the development problems of the majority rather than only for the minority. There is also need to incentivize AI research in developing countries, which are lagging behind their counterparts in the developed world.

44. The panel demonstrated how research from university laboratories find their way into the market as commercial products. Products tend to follow a pipeline from university to industry. This pipeline starts with university research, then develops to ideation labs where the research statement is formalized. It then moves to incubators where issues of intellectual property and patents are dealt with. The last steps are spinout, which is industry backed start-up, and then commercial adoption.

45. Panelists looked at research on facial analytics, which has been used to improve identity matching in face recognition. Using AI, the research compares the acquired and processed facial trait of an individual with all the stored templates in the database and gives a ranked list of matches. Facial analytics is an emerging research space born from biometrics that provides contextualized information images of people without encroaching on their privacy. However, after first appearing in September 2012, facial analytics have found their way into wide commercial use. By 2019 the facial recognition market is estimated at $3.2 billion, and projected to reach $7 billion by 2024. The biggest market drivers are surveillance in the public sector and numerous other applications. This massive market application of an AI innovation from the laboratory shows not just the power of the technology but also the power of university research in the age of the digital economy.

46. Most of the successful AI hubs are at universities. Often they are able to drive the development of new algorithmic approaches, fundamental limit theorems, and novel applications (often outside the core interest of large computing companies and startups).

47. One key to successful AI research and innovation is academia-industry partnerships. They fund joint research and facilitate sabbaticals, dual appointments and internships.

Session 6: How the digital transformation is changing academic programmes: the example of e-health

48. The session recognized that digital technologies are becoming more ubiquitous in the medical field, for doctors, clinicians and also for patients. The session looked at the impact of the digital transformation on academic programmes, with a special focus on e-health. Recognizing that the area of health is one in which new digital technologies are having a huge impact, such as in medical diagnosis, surgery, medical imaging, electronic health records, and drug discovery, the session discussed new academic programmes that are emerging in view of digital developments, in particular new interdisciplinary programmes.

49. One of the presentations discussed the teaching of artificial intelligence to medical students. It highlighted the increasing application of AI technologies in the medical field. For this reason, a new university course was developed in China on AI in medicine, in collaboration with an industry partner. The course is designed and fine-tuned with teaching materials specific for medical students and combines theory with experimental practice. The course is devoted to help students strengthen their understanding of AI theory, and learn to apply the theory to solve practical medical problems.

50. In another case study, a university identified a set of inter-professional informatics competencies that need to be acquired during study to ensure that graduates of healthcare programmes have the necessary skills to perform in a digital world. Following from that, the University developed a technology-enhanced game to teach informatics to 14 health practice programmes (e.g.: nursing,

medicine, physiotherapy, midwifery, pharmacy, dentistry). Key competencies embedded in the game include assessing patient and family digital literacy, avoiding technology mediated adverse events, and understanding interoperability. The idea behind creating a serious game was to make the learning process exciting, and to place technology at the centre of the encounter with the patient.

51. Due to the increasing uptake of digital health technology in the provision of health, there is a need to increase interactive/experimental components of curricula. This is done by increasing interprofessional educational opportunities. A more person-centred approach to teaching health workers assures the acquisition of a set of competencies that support an interdisciplinary workforce.

52. The session also looked at the challenges facing health systems in terms of achieving the Sustainable Development Goals. These challenges are myriad, ranging from the huge investments needed in the health sector, to addressing the gap between the number of trained health workers and people needing health attention. A solution to the health workforce crisis could be found through leveraging digital technologies such as AI. The challenges can only be addressed by new generations of health workers in close collaboration with bio-engineers, computer scientists and regulators. The bio-health Computing Schools are educational programmes that provide the health community with a unique and transformative opportunity to expand their skills in a variety of areas, including advanced research strategies, innovation, sustainable business planning, ethics and regulatory affairs. The session shared a practical example of how the Bio Health Computing Schools of Grenoble Alpes University is playing that role and addressing those challenges. The presentation looked at the learning strategy used for the programme, the design framework, the learning applications and the admissions criteria.

Session 7: Strengthening ITU-academia partnerships

53. This session discussed how ITU and the academic community could strengthen their collaboration to develop capacities and skills for the digital transformation. It was made up of a panel of discussants from diverse groups of academic institutions across different regions of the globe, and who have been interacting with ITU in the past. Some of the ideas and proposals coming out of the discussions were the following:
    - ITU and academic institutions could collaborate in the development and delivery of training in the field of emerging technologies, for example ITU-certified curricula.
    - Academic institutions could benefit from accessing useful data bases and resources that ITU gathers.
    - ITU can play an active role in fostering collaboration and building trust between Academia, industry and policymakers in Governments. ITU could establish an online platform where all academic members could have a presence and network among each other.
    - Academic institutions can contribute to the work of ITU in various ways, among which are; acting in advisory capacity in some specific activities of ITU; participation in the work of ITU Study Groups; performing editorial functions for ITU publications; contributing to joint research activities; and writing papers and chapters for ITU publications.
    - ITU could set up research think tanks (hosted by academic institutions) bringing together academics from all over the world to carry out cutting edge research in the field of digital development (beyond the technical aspects) and to develop ethical guidelines on the development and applications of digital technologies.

Final conclusions and closing ceremony

Dr Susan Teltscher, Head of Capacity and Skills Development Division presented a short summary and main takeaway points from the meeting. The summary report is available at https://www.itu.int/en/ITU-D/Capacity-Building/Pages/events/2019/academia2019.aspx

Dr Jian Song, Tsinghua University, China, announced the 3rd ITU-Academia Partnership Meeting, which will be held in Beijing in April 2021, hosted by Tsinghua University. He invited all participants to come to China and attend the meeting.

The meeting closed with closing remarks by ITU and the host.