GOLA!

GLOBAL ONLINE LEARNING ALLIANCE

NATIONAL SERIES ON SKILLS TRANSFORMATION – SOUTH AFRICA 7 APRIL 2022

HIGHER EDUCATION: SKILLS, DIGITAL LEARNING, QUALITY & POST-COVID POLICIES

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GOLA Report

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FORMAT AND PARTICIPANTS

SECTION 1. Format and participants

1.1 Introduction

The purpose of this private video meeting of South African university officials, organised in partnership with *Coursera*, was to discuss skills and digital transformation in higher education. In regular meetings of the Global Online Learning Alliance (GOLA), officials have spoken of the need to develop and transform the skills of young people to better prepare them for jobs of the future. University participants were encouraged to discuss the actions and policies of their institutions, and to make recommendations where appropriate.

The higher education sector in South Africa is ready to embrace technology to enhance teaching and learning. Along with digital and information skills, universities can leverage the symbiotic relationship between technology in education and the knowledge economy. The unique format of the meeting was designed around four roundtable groups of university officials- each with a *Coursera* moderator who provided a closing synthesis.

The roundtable groups were split into four main discussion areas:

A. **Skills**: Digital and Information Literacy. The University and Soft Skills

B. **Online Learning**: Policies and Guidance for Online Degrees and Platforms

C. **Reimagining Education**: Flexible Learning and Teaching. Lessons from the Pandemic

D. **Quality Assurance: Using** Technology and Information to Improve Quality

Section 1.2 provides an executive summary of the discussions; section 1.3 gives the meeting format and main discussion points addressed in each of the roundtable groups; section 1.4 gives details of all participants listed by group and in section 2, a dissemination of the issues addressed, and recommendations made.

We would like to thank all participants for taking time out of their busy schedules to participate in this meeting and offer their invaluable and erudite contributions. Most of South Africa's universities were represented in this meeting along with the Ministry of Higher Education. The dedicated roundtable groups allowed everyone to converse in private, have good time to express their own thoughts and to discuss recommendations for skills transformation, online learning, research and teaching in South Africa.

Some overarching issues for higher education in South Africa, addressed in this meeting include:

- Prioritising digital and soft skills development, problem-solving and critical thinking
- Linking information and media literacy to academic literacy
- Policies for the future of online degrees and learning platforms in South Africa
- Flexible learning and teaching environments that reflect the 21st century jobs market
- Lessons from the Covid pandemic and how technology can redefine academia
- Proper us of data and information management systems to support evidence-based quality assurance

In section 1.3 we provide more detail of the specific questions within each roundtable group

1.2 Executive Summary

This executive summary is based on the major points raised by the opening speaker and all officials participating in the roundtable groups.

<u>Opening Statement</u>
The National Plan for Post-School Education and Training 2021–2030 embodies the key elements of research, innovation, community engagement and partnerships. The experience of the Covid pandemic led to universities implementing multimodal teaching and learning plans, supported in part by the department of higher

education through the allocation of a COVID-19 Responsiveness Grant (CRG). University plans actions included the: acquisition of devices for students and staff; upgrade of Learning Management Systems (LMS) and ICT equipment; and training of staff and students in the use of alternative teaching and learning strategies; delivery of online teaching and learning materials; and catch up programmes.

The majority of universities reported high levels of engagement by students for teaching and learning purposes during the lockdown. Lessons from the monitoring of the CRG include: universities used online application and registration processes successfully in these two years and these processes do work and can be used going forward. Department of Higher Education and Training has an all-encompassing approach to online courses, combining the principles of learner centeredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the provision of learner support, and the maintenance of rigorous quality assurance over the design of learning materials and support systems. We should ensure that our university graduates are equipped with entrepreneurial skills. The President of South Africa launched the economic reconstruction and recovery plan for the country to ready every student for economic participation.

<u>Soft Skills and Employability</u>
Student selection and information literacy thus needs to be a competency such that their skills at distinguishing quality feeds content back into the knowledge society. A well-defined digital skills curriculum should introduce productivity, creativity, programming, communication, collaborative tools and some artificial intelligence. Universities are keen to maintain their distinctive and uniquely identifying characteristics. Can soft skills be nationally mandated when they are hard to measure against different socioeconomic circumstances and that every institution has its own unique character?

In the context of the fourth industrial revolution, what we have been seeing for the last three decades is the beginning of an exponential rate of change, driven by digital innovation. So within a few years of graduation, students encounter opportunities for jobs that did not even exist when they registered for their degrees. The role of universities is partly to anticipate but fundamentally to produce people who have a wide range of competencies with the flexibility to move into jobs that do not yet exist. The digital space is awash with misinformation, so what skills do learners need to distinguish between the huge variety of sources of information? How does one go about integrating graduate outcomes such that they are aligned with employability without the supporting long-term data?

The question of how South African universities can be more responsive to industry and identify new trends is constrained by the rigidity of the country's regulatory framework. The long-term provision of relevant skills for the digital age requires a fresh look at the investments and funding of education. This includes basic education, as several university professors note the deficits of students coming from K12 schools and their need to adjust to university life and expected academic standards. Integration with the school system is currently very poor and universities are expected to pick up a lot of slack.

<u>Pedagogy and Assessment</u>
There are several background and historical factors particular to South Africa when thinking about pedagogical improvement and the recommendation of policies for online learning. The university of the future needs to strengthen organisational and technological systems to ensure that pedagogy adapts to the future of work. The final output should be for the students to become creators of knowledge through the fostering of independent learning. The experience of online learning during the periods disrupted by the pandemic has been one of emergency remote teaching and learning. Now is a good opportunity to take a step back and understand the notion of digital pedagogy, prior to determining instructional design. Although pedagogical design for the virtual learning environment requires a team of collaborators, it may evolve over time whereby university faculties address this in continuous professional development (CPD).

Amongst educators it is commonly expressed that we are yet to see the ideal scenario for online assessment. For universities, the experience of embarking on multi-modal online learning platforms has been that assessment is not so effective, because so many examples of contrivances have occurred that it puts the academic integrity of the university in question. The framing of questions is also critical. Exam questions need to be put in a way that they simply cannot be searched. Established online degree courses have already mastered this and this speaks to instructional design. Developing

online assessment, needs the regulatory bodies to play a strong leadership role in working with universities and centres of teaching and learning to set appropriate standards such that any online exam can be certified compliant. Different pedagogies require different approaches. One cannot just put face-to-face material online, which requires a different approach to teaching and learning. Recommendations include a more assessment for learning approach and that academic integrity becomes automated at the institution.

Digital Literacy

A common sentiment amongst several participants was the identification of the need for a concerted effort at the high school level in South Africa. Learners coming into universities will not be used to working with a learning management system or have the requisite digital skills required. They need a lot of support. Can more be done at the national level to coordinate between basic and higher education and better prepare students for university life? Any digital learning policy must aim to provide quality educational content that is curated, evaluated, and approved. The policy ecosystem that drives governance of edtech is necessary before ICT integration starts and deciding which technology to purchase.

When considering the development of digital capacities it should be conceptualised as part of a broader suite of literacy development. As undergraduates develop then the breadth and depth of digital skills modules needs to improve in line with the levels of study and be closely integrated with their main courses to ensure better transitioning into postgraduate work. For improved engagement between learners and teachers, it is critical to ensure the capacity is in place to build the necessary skills and competencies. What we need is capacity development on the part of the lecturers and their new competencies, and capacity development on the part of the students and their digital literacy. Capacity building for both students and staff on the blended learning approaches is key.

Personal development planning for faculty staff is a strong recommendation. It also helps identify which areas require attention, such as digital literacy skills as highlighted during the pandemic. University staff are now needing more enhanced skills with the need for more digital content design, online and project-based assessment. Supporting staff with these deeper skills feeds back into quality assurance of the academic programs.

Data, Safety and Well-Being

In establishing programs to give students a wider range of skills in response to the changing market, it is important for students to understand the role that data now plays in systems and processes. Students must understand their digital footprint and its associated risks, with lecturers who can provide guidance to online safety. Risks of facial recognition need to be understood and the dangers of cyberbullying must be safeguarded against. Such risks can be mitigated with strong e-safety policies in universities.

One experience of Covid was that of empathy with students. The pandemic somehow revealed the importance of empathy with staff members readily advocating for students. University staff took the initiative, including being more innovative with their teaching. Prior to Covid there were often discussions about screen time and the impact this has on one's health and well-being. During the pandemic screen time grew exponentially. The addictiveness of digital technology is not just the unique domain of students and young people – the devices themselves, the software, the application are all designed to grab and hold you.

Students need to be taught what sites are secure and how to recognise those that are not; how to manage their own personal confidential information and educators should be looking to enforce this culture of experience. There is a sense that the online threats to student well-being have accelerated in recent times and there is now a greater sense of urgency to develop systematic frameworks with regulations that can be implemented swiftly. Some universities in South Africa have realised how outdated their policies and procedures for online learning are.

There is also the realisation that the student codes of conduct are outdated, especially for online spaces.

<u>Quality and Change</u>
Quality assurance is critical. The sudden need to implement emergency remote learning saw a dip in the quality of education, not just in South Africa but worldwide. E-learning solutions should have quality assurance tests with recommendations from government that give universities the guidance to test for functionality, adaptability, navigation and engagement. Quality varies as different universities have different problems and different levels of digital readiness. It takes time to adjust to blended learning, to conduct online assessment and during this process quality assurance (QA) needs to be adjusted accordingly. Quality enhancement starts from the program design, through to implementation and assessment. Throughout the process there needs to be checks and balances to make sure there is authenticity in the assessment design.

The proper use of data is strongly encouraged. As management systems have been upscaled recently we are seeing more data come into universities in South Africa where they can now access data and dive deeper into subject specifics. The reporting is now starting to inform strategies with the ultimate aim of quality education. The shift to greater use of ICTs and e-learning educational practices requires change management guidelines. Effective transformation requires an university-wide approach to improve and enhance operating processes, technology, leadership, and academic talent. For the university to deliver desirable outcomes there are some change management principles recommended: have a clear vision of how change will improve quality; align with the institution's existing culture; communicate constantly; devise an incentive-based approach to change for faculty staff; and take incremental steps

<u>Educational Technology</u>
The role, influence and use of online learning platforms is, for some, a fine balancing act. What does it mean to be a student at a particular university? This is a fundamental question for institutions. How much does the university adopt a wider variety of platforms? As universities have embraced more learning technologies, we are starting to see some disruptive practices that bring greater flexibility to teaching and learning. Blended learning if not the norm now, is becoming that way. From the two years of pandemic disruption, the use of blended learning technologies has created a wider experience for students who are only too keen to embrace the technological advancement.

The major barriers and lessons learnt from the Covid pandemic are that the cost of investing resources in new technology can often be prohibitive, and the quality of the edtech in improving learning and teaching varies substantially. There are many thousands of choices of edtech applications but in the context of sustainable pedagogy it is still in its infancy and more feedback from universities needs to be absorbed by the vendors and developers such that technology designs are better suited to learning outcomes. Automated assessment technologies remain the biggest challenge. Even good proctoring applications are open to students figuring out how they work and then find ways to beat to the system.

1.3 Format of Virtual Meeting & Group Discussions

In section 1.4 we list the participants of this video meeting by the roundtable groups. The most immediate lesson of online video conferencing is to ensure that every participant has a voice. Small groups are essential. So, after opening statements the event was broken into small groups each with a moderator to take notes and support the conversation.

Prior to the break-out rooms there was an opening statement from Zukile Mvalo, Deputy Director, General Skills Development, Ministry of Higher Education, Science and Innovation, Government of South Africa

The following was the video conference format:

Part 1: Opening Statement: Zukile Mvalo, Deputy Director, General Skills Development, Ministry of Higher Education, Science and Innovation. *15 minutes*

Part 2: Four main roundtable groups, each with a moderator record discussions and take note of the key points raised. *65 minutes*

Part 3: Closing synthesis by the four *Coursera* chairs. *10 minutes*

The total time of the video conference was 90 minutes.

In each roundtable group the floor was open for all participants to freely express their ideas and make policy recommendations. The discussion points in each roundtable were prepared in advance as follows:

Group A: Skills Development. Digital & Information Literacy. Role of the University in Soft Skills

South Africa has a high global market potential in the ICT sector with a growing need for soft skills, language, and communication skills as well as the requisite technical skills. Equally, other key sectors of the economy would benefit from more innovation and creativity as industries seek to employ more modern technologies and processes. Employers put particular emphasis on communication skills, teamwork, critical thinking, the ability to apply numeracy & IT skills, and thus overall work-preparedness.

Skills: The jobs market urgently needs communications, problem-solving, teamwork and organisational skills. What programs has your university recently established to give students a wider range of skills in response to the fast-changing jobs market?

Digital Literacy: Responses to the DHET survey of student access and use of learning materials indicated a considerable need to improve digital skills and information literacy. What institutional policy recommendations would you make to improve and prioritise the digital skills development amongst South African university students?

Employability: Given the need for emerging skills in areas such as artificial intelligence, how can South African universities be more responsive to industry in identifying new trends, adapt to socio-technological changes and thus develop the granularity of courses?

The University: Is it the role of the university to satisfy the jobs market by introducing soft skills development programs on campus or should the priority be just the intellectual development of society?

Initiatives: Should the Department for Higher Education & Training do more to lead skills transformation initiatives in South Africa and engage with other sectoral ministries to have better 'whole government' synergy? If so what recommendations should eb made to the DHET?

Group B: Online Learning. Policies and Guidance for Online Degrees & Platforms

The DHET Survey on students access to learning materials during the pandemic found that the biggest obstacles to students' engagement with e-learning are network connectivity, cost of data and intermittent problems with electricity. Other challenges included students not having a consistent pace of study, being unfamiliar with asynchronous learning and not having the adequate digital skills to make the optimal use of platforms. Overall, the feedback of students indicates that South African universities are able to adapt and engage with technologies, yet it is important to emphasise that the technology is a tool and not a replacement for teaching and learning.

Pedagogy: What improvements would you recommend to teaching and learning in the online environment to ensure better student engagement and interaction? Accordingly, is instructional design for online learning something the university is now incorporating into faculties?

Investment: Is your university investing in flexible content delivery platforms and the information infrastructure to improve student access? If so what programs are needed to improve student digital and information literacy?

Assessment: A common sentiment amongst educators is that we are yet to see the ideal scenario for online assessment. Given the experience of the last couple of years, is your institution now looking at designing a new assessment and evaluation strategy for online learning?

System Management: With e-learning technologies allowing for improved data collection and analysis, how is your university utilising education management data to support faculty practice and course design?

Best Practices: Have you examples of best practices and technologies for online and e-learning that proved most successful during the disruption caused by the pandemic? Furthermore, what particular concerns need to be addressed regarding privacy and security to safeguard learners online?

Group C: Reimagining Education. Flexible Teaching & Learning – Lessons from the Pandemic

Recent post-pandemic surveys indicate this to be an opportunity to reimagine learning and teaching,

and not to waste the lessons learnt from the crisis. Students and institutions have learned of the benefits of a more technology-infused learning and teaching environment. By embracing technology, universities can create flexible teaching and learning that is adaptable to disruption and characterises the 21st century workplace.

Reimagining the Campus: What initiatives have you implemented to modernise the learning experience with flexible and inclusive teaching? For example, producing short on-demand lecture sessions or managing larger collaborative online learning communities amongst students.

Covid Lessons: How has teaching and learning changed due to the pandemic and what would an optimal and inclusive blended learning environment look like in the 'new normal'?

Self-Directed Learning: Survey comments testify to students taking greater responsibility for their own learning. How has the pandemic confronted your assumptions what students can do and the ability of academic staff to adapt to new approaches such as asynchronous learning?

University Distinction: ICT for education and e-learning may result in more homogeneity in higher education, not just in South Africa but around the world. So, what makes your university distinctive and are you looking again at the question of "what is my institution best known for?"

Student Engagement: Completion rates for students studying online in many countries are considerably lower than face-to-face. Hence, what training and upskilling of faculty members is required to deliver blended learning in the future to ensure students do not disengage, and we avoid high drop-out rates?

Group D: Quality Assurance. Utilising Technology and Information to Improve Educational Quality

The DHET Survey on students access to learning materials during the pandemic indicated this to be an opportunity to embark on collaborative initiatives to consider the implication of a 'new normal' for quality enhancement. Student feedback points to an opportunity to improve the quality of university education by creating enriching learning and teaching environments. Academic staff play a central role in creating such enriched environments.

Governance: Given a wide range of new risks associated with online content, contact and conduct, how can South African universities protect learners from the risks of technology and simultaneously improve digital and information literacy amongst students?

Automated Quality Assurance: What quality assurance programs have been implemented in South African universities using technology to automate the QA process, while meeting the national quality assurance framework in higher education?

Pedagogical Research: What examples do you have of your institution investing in research on how teaching and learning could be reconceptualised from the experiences of academics during remote learning to make sure that the crisis is not wasted but used to improve quality?

Professional Development: What recommendations would you make for implementing professional development of academic and faculty staff to support the quality of new educational technologies and online learning?

Change Management: What guidelines should be given to senior university leaders who need to apply a structured process that ensures the coherent delivery of the shift to ICT and e-learning educational practices?

Roundtable Discussions

As stated above, the meeting was split into four roundtable groups. Given the nature of the topics and the often overlapping issues, the dissemination of the discussions (sections 2.2 to 2.5) is based on the issues addressed across the groups rather than a simple delineation by roundtable. From the discussions, six main areas best define the conversations as follows:

Soft Skills and Employability

Pedagogy, Instructional Design and Assessment

Digital Literacy

Data, Safety and Well-Being

Quality Assurance and Change Management

E-Learning, Platforms and Edtech

This report also includes Appendix A to accompany opening speaker Zukile Mvalo and two Appendices (B and C) on Digital Skills Framework gratefully provided by the University of Western Cape CoLab for eInclusion and Social Innovation.

1.4 Participants

We would like to thank all those for participating and providing such outstanding contributions. The opportunity for them to openly converse in small groups provides us with a discerning judgement on the key issues and immediate policy recommendations. It is an honour for the organisers to host such a distinguished gathering of officials. Participants are listed from the opening statements and then by group A to D.

Opening Statements

Zukile Mvalo, Deputy Director, General Skills Development, Ministry of Higher Education, Science and Innovation. *Opening Speaker*

Kgomotso Sekwale, International Relations Department, Ministry of Higher Education, Science and Innovation

Group A: Skills Development. Digital & Information Literacy. Role of the University in Soft Skills

Prof Robert Balfour, Deputy Vice Chancellor: Teaching & Learning, North-West University

Prof Randall Carolissen, Dean of Johannesburg Business School, University of Johannesburg

Prof Martin Hall, Acting Deputy Vice Chancellor, Transformation, University of Cape Town

Dr Antoinette Lombard, E-skills Director, Vaal University of Technology

Dr Amon Magadza, Professor of ICT for Education, Rhodes University

Nicole Morris, Dean of Student Affairs, Sol Plaatje University

Dr Cila Myburgh, Director of Enrolment and Student Administration, University of Pretoria

Dr Nicola Pallitt, Head of Technology-Enhanced Teaching and Learning, Rhodes University

Elizabeth Rakgotho-Booi, Business Intelligence Data Architect& Scientist, Office of the Rector & Vice-Chancellor,University of the Western Cape

Prof Bhekisipho Twala, Deputy Vice-Chancellor: Digital Transformation, Tshwane University of Technology

Group Moderator: Lauren Muller, Director for sub-Saharan Africa & Europe, Coursera

Group B: Online Learning. Policies and Guidance for Online Degrees & Platforms

Dr Johan Badenhorst, Director: e-Learning and Educational Technology, Central University of Technology, Free State

Prof Ruth Hoskins, Dean of Teaching and Learning, University of KwaZulu-Natal

Neil Kramm, EdTech Academic Developer, Rhodes University

Prof Lis Lange, Deputy Vice-Chancellor: Teaching and Learning, University of Cape Town

Dr Munienge Mbodila, IT Lecturer and Researcher, Faculty of Economics and Information technology Systems, Walter Sisulu University

Prof Sigamoney Naicker, Chief Director: Inclusive Education and Extra-Ordinary Professor, University of the Western Cape

Prof Lawrence Obi, Dean: School of Science and Technology, Sefako Makgatho Health Science University

Dr Sonja Strydom, Deputy Director: Centre for Learning, Stellenbosch University

Mike Swanepoel, Head of Digital Learning Experience Design & Innovation, Nelson Mandela University

Hannalie Van Rensburg, Head of Academic Planning and Quality, University of Pretoria

Group Moderator: Mike Damiano, Director of National Education Initiatives, Coursera

Group C: Reimagining Education. Flexible Teaching & Learning – Lessons from the Pandemic

Dr Mumthaz Banoobhai, Senior Director: Higher Education Development and Support, Tshwane University of Technology

Theo Bhengu, Director: Development Grants, Office of DVC: Teaching, Learning & Community Engagement, Sefako Makgatho Health Science University

Dr Piet Bothma, Dean of Educational Information & Technology School of Education, University of the Witwatersrand

Dr P R Gumede, Senior Director – Content, Mangosuthu University of Technology

Dr Ben Kotze, Dean of Teaching and Learning, Central University of Technology, Free State

Dr Bernard Sebake, Director: Student Governance and Development, Nelson Mandela University

Prof Shirley Sommers, Deputy Vice Chancellor Teaching & Learning, University of Mpumalanga

Prof Surendra Thakur, KZN e-Skills CoLab Director, InSeta Research Chair in Digitalisation, Durban University of Technology

Group Chair: Valerie Lisova, Sales Development Representative, Coursera

Group D: Quality Assurance. Utilising Technology and Information to Improve Educational Quality

Raymond Crown, ICT Director and Digital Transformation Leader, University of the Western Cape

Dr Shafeeka Dockrat, Director: Student Development and Support, Tshwane University of Technology

Dr Mariette Fourie, Quality Manager: Academic Programmes, Quality Enhancement Office, North-West University

Prof Sarah Gibson, Associate Professor, University of KwaZulu-Natal

Dr Pragasen Mudali, Acting Deputy Dean: Teaching and Learning, Senior Lecturer: Computer Science, University of Zululand

Nokulunga Ndlovu, EDIET Division, School of Education, University of the Witwatersrand

Dr Ndivhudzannyi Nndwamato, Professor of Curriculum Studies, University of Venda

Dr Luzaan Schlebusch, Dean of Teaching and Learning, Central University of Technology, Free State

Dr Noluthando Toni, Director of Teaching Development, Nelson Mandela University

Group Moderator: Louay Dayoub, Sales Development Representative, Coursera

DISCUSSIONS

SECTION 2. Discussion

2.1 Opening Statements

The opening statement was provided by Zukile Mvalo, Deputy Director, General Skills Development, Ministry of Higher Education, Science and Innovation.

Zukile Mvalo

This opening statement is in conjunction with Appendix A

The Government of South Africa has developed a wide range of policies for education and training, response to the Covid pandemic and promoting skills and innovation-based university education. In the five year Science, Technology and Innovation plan, as part of the National Development Plan, extending from 2020 to 2025 expanded access to education and training is critical to South Africa. The post-school education system needs to succeed in being part of the solution to tackling the high rate of unemployment where we see about 3.3 million young people between 15 – 24 being out of work.

A previous white paper for post-school education and training was approved by cabinet and now the department of higher education has developed a plan to implement the training and delivery of quality and diverse learning opportunities. National Plan for Post-School Education and Training 2021–2030 embodies the key elements of research, innovation, community engagement and partnerships will be supported by dedicated planning, funding, quality assurance and ongoing monitoring mechanisms. The areas that will grow gradually include distance, online and open learning in the higher education, TVET and CET sectors, in line with demonstrable improvements in quality and capacity. Post-school teaching and learning must be prioritised. At the same time, lecturers' pedagogical, curriculum development and research capacities will be improved, together with their abilities to harness digital technologies to support teaching and learning in innovative ways.

The experience of the Covid pandemic led to universities implementing multimodal teaching and learning plans, supported in part by the department of higher education through the allocation of a COVID-19 Responsiveness Grant (CRG) to be utilised for teaching, learning and assessment activities in a plan that has been approved by the Minister. University plans actions included the: acquisition of devices for students and staff; upgrade of Learning Management Systems (LMS) and ICT equipment; and training of staff and students in the use of alternative teaching and learning strategies; delivery of online teaching and learning materials; and catch up programmes as students return to campuses. Here it was key for the department to monitor the implementation the CRG. Most universities reported high levels of engagement by students for teaching and learning purposes during the lockdown period, made possible through provision of devices and data to students.

Lessons from the monitoring of the CRG include: universities used online application and registration processes successfully in these two years and these processes do work and can be used going forward to avoid difficulties associated with application and registration; the department had to plan the start of the academic year to align it with the release of the National Senior Certificate results by the Department of Basic Education; and remote learning has proven to be an alternative mode of delivery when students are offered with tools necessary for this, however it cannot be used 'solo'. Physical interaction is especially important in teaching and learning purposes as it is the only way to teach certain skills of human development. A consideration of flexibility with regards to policies and regulations is necessary. For example, the Higher Education Quality Committee (HEQC) of the Council on Higher Education (CHE) allowed programs that were accredited for a contact mode of delivery to be offered in hybrid and online modes. The CHE developed a new online accreditation application form that allows for institutions to take account of a range of delivery modalities including online.

The position of the Department of Higher Education and Training on online courses is an all-encompassing approach which combines the

principles of learner centeredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the provision of learner support, and the maintenance of rigorous quality assurance over the design of learning materials and support systems. The QCs have executive responsibility for quality assurance in education and training. They develop and implement a system of quality assurance for education and training, including program accreditation, institutional audits, capacity development and standards development. ICT is increasingly becoming a critical ingredient for meaningful participation in a globalized world. It is also an indispensable infrastructural component for effective education provision and is central to the notion of opening learning opportunities in the post-school system.

The advancement of a knowledge-based economy within a globalised world means engineering education institutions are responsible for producing graduates who possess exceptional technical and soft skills. Soft skills are critical, especially to increase opportunities of young people for employability. We have observed how important is critical thinking, teamwork, problem solving, collaboration, creativity even when young people compete in World Skills International Competitions and recently in World Skills Africa Competition held in Namibia, with learners, amongst others, from Durban University of Technology and Tshwane University of Technology. The OECD Learning Compass 2030 distinguishes between three distinct types of skills: cognitive skills, which include critical thinking, creative thinking, learning-to-learn; social and emotional skills, which include empathy, self-efficacy, responsibility, and collaboration; and practical and physical skills, which include using innovative technologies.

The President of South Africa, in October 2020, launched the economic reconstruction and recovery plan for the country, whereby seven priority areas have been identified. It remains that university graduate unemployment is low compared with any other graduate unemployment in South Africa's post-school system. We should ensure that our university graduates are equipped with entrepreneurial skills. This will further decrease youth unemployment in the country. Youth unemployment must be urgently addressed, so the department in collaboration with universities introduced a national programme called entrepreneurship development in higher education. This program focuses on: readying every student and graduate for economic participation through entrepreneurial activity, with an emphasis on women; supporting academics across disciplines to develop entrepreneurship; and supporting universities as entrepreneurial and innovative ecosystems.

Amongst everyone there is an understanding that the Covid pandemic severely tested the capacity of tertiary education in South Africa. The impact of the pandemic has been largely determined by social-economic circumstances and it has brought to the fore deep inequalities which persist in South Africa. Yes this is a once in a lifetime opportunity to inject new perspectives into how South Africa can improve the fabric and infrastructure of the post-school education system and how also how to respond in ensuring the provision of more opportunities in particular young people.

2.2 Soft Skills and Employability

Universities are keen to maintain their distinctive and uniquely identifying characteristics. This is no less the case in South Africa – a country with considerable socioeconomic inequalities. Equity and social justice are important features of higher education and the Covid pandemic further exposed social inequality. So can soft skills be nationally mandated when they are hard to measure against different socioeconomic circumstances and that every institution has its own unique character? Without long-term data on the effectiveness of soft skills development in tertiary education it may be that generic skills programs do not meet the requirements of a university to be culturally responsive. Ultimately, students should have access to the data and information that allows them to make informed decisions for themselves.

The debate over how much the university should satisfy the jobs market by introducing soft skills development or mainly prioritise the intellectual development of society is a long-standing question often brought into focus when graduate unemployment is weighing down on economic output. Both are important, though most academics prefer to put more emphasis on intellectual development. For example at the University of Cape Town, about half the courses are informative degrees and half are professional and technical degrees. It can be easy to lessen the impact of informative studies, such as humanities but when looking at a long time horizon (over a decade), we see that those graduates are doing very well in both industry and the public sector. In the context of the fourth industrial revolution, what we have been seeing for the last three decades is the beginning of an exponential rate of change, driven by digital innovation. So within a few years of graduation, students encounter opportunities for jobs that did not even exist when they registered for their degrees. These new fields are being created all the time, from nanotechnology to machine learning. Hence,

taking a pure functionalist approach by mapping the needs of industry, when business itself is behind the curve – not always knowing what the next innovation will be. This has been seen in the financial services sector, which has been caught off guard with decentralised finance and fintech innovations. The role of universities is partly to anticipate but fundamentally to produce people who have a wide range of competencies with the flexibility to move into jobs that do not yet exist.

One comment in regard to these soft skills was whether we are doing a disservice with such terminology and in fact these are now core skills as we recalibrate higher education to the demands of the fourth industrial revolution. Such soft skills as communications and problem-solving are given secondary importance to the mainstream technical education, when in fact they are of critical importance. Institutional recognition of this can contribute to driving student motivation to participate in the programs that give them the competencies for their future careers.

When Vaal University of Technology looked at all their programs, a few years ago, they made sure that some basic skills are incorporated into all programs, including communication and ICT skills. Another feature of preparing students is the academic advisor who will focus on other skills like emotional intelligence, goal setting, time management, financial skills and stress management. This is not compulsory, but the institution emphasises to students the importance of these softer skills to be an employable graduate.

The digital space is awash with misinformation, so what skills do learners need to distinguish between the huge variety of sources of information? It is a challenge for universities to have the agility to respond to a fast-changing world and be able to assess the different levels between individuals in faculties. Universities are the gatekeepers of academic freedom and bastions of quality academic provision, so how does one go about integrating graduate outcomes such that they are aligned with employability without the supporting long-term data?

Work programs are becoming increasingly common amongst South African universities which focus on soft skills development. These may often be introduced as voluntary programs after graduation. To tackle the challenge of finding work it could be that some of these programs are introduced to students during their degree studies but then there is a concern of overloading the curriculum. Academic staff are hesitant to have these types of work development programs being too long. Higher education institutions should look at such vocational preparation amongst a mix of activities that includes mentorship and even internships to close the gap between what the institutions are providing and what industry needs.

In South Africa, public sector employment has fallen, and business has not picked up the slack. Universities can be very staid and are clear that their academic integrity cannot be driven by the employment market. Yet, in South Africa, there is large scale graduate unemployment and considerable under-employment whereby highly skilled graduates are having to do unskilled work to make a living. Hence, it may be that universities being left to their own academic devices is not going to be supported by the wider society being drastically re-shaped by external market forces.

The question of how South African universities can be more responsive to industry and identify new trends is constrained by the rigidity of the country's regulatory framework. Given the considerable social technological changes in trade and business there is a need for closer proximity between industry and university placements. Programs of workplace and integrated learning along with internships are all enabling for graduates but in terms of relevance to industry and bringing the curriculum closer to a lifelong learning model requires structural changes to tertiary regulation and accreditation. For example, the world of micro-credentials remains fairly remote from what is practicably possible in South Africa.

The long-term provision of relevant skills for the digital age requires a fresh look at the investments and funding of education. This includes basic education, as several university professors note the deficits of students coming from K12 schools and their need to adjust to university life and expected academic standards. Integration with the school

system is currently very poor and universities are expected to pick up a lot of slack because of poor performance in schools. Furthermore, the technical and vocational system in South Africa needs to do more in terms of dealing with the high levels of youth unemployment. The economy needs people who are job ready, and this is a real concern for educators as they see systemic failure in the vocational output.

2.3 Pedagogy, Instructional Design and Assessment

There are several background and historical factors particular to South Africa when thinking about pedagogical improvement and the recommendation of policies for online learning. These factors include the historical antecedents of the country; institutional vulnerability; how institutional dynamics may impede the pedagogical development of online teaching and learning; and the graduate attributes and competencies. The university of the future needs to strengthen organisational and technological systems to ensure that pedagogy adapts to the future of work. The final output should be for the students to become creators of knowledge through the fostering of independent learning. This means moving from the top down approach to more interactive sessions appropriate for virtual learning environments. This learner-centred approach can help faculty staff better identify those students at risk or where intervention is needed.

A lesson from the Covid pandemic has been to appreciate the importance of instructional design in terms of the core curriculum. This has not been done in the past. Another experience of faculties has been the lack of guidance at the institutional level. How much are academics expected to do? Online course design requires a whole production team of professionals and experts for coding, subject matter, digital interaction, videography etc. The professor is no longer the star of the show.

The experience of online learning during the periods disrupted by the pandemic has been one of emergency remote teaching and learning. Now is a good opportunity to take a step back and understand the notion of digital pedagogy, prior to determining instructional design. There are different pedagogical and academic dimensions to take into consideration before getting to the questions of student engagement and online collaboration. Staff training and academic development will underpin the value and importance of instructional design as these new learning spaces evolve within institutions and faculties start appointing specialist design staff to work alongside the academic and teaching staff.

Although pedagogical design for the virtual learning environment requires a team of collaborators, it may evolve over time whereby university faculties address this in continuous professional development (CPD). Different forms of technology and presentation equipment are nothing new to academic staff, digital learning may have more complexities and is certainly more ambitious, yet the technical skills will, over time, become part of teaching development. The question for the university is how to look at this from an institutional point of view. Opportunities will come into play, such as developing unique learning content, innovative forms of assessment and having a strategy for instructional design that reflects the academic philosophy of the university. Students will inevitably become more involved in digital and content design.

Covid took everyone out of their comfort zone. Education technology benefited. For some time there has been resistance to e-learning systems and learning management systems (LMS). Implementation is not uncommon, but adoption has been poor the world over. South Africa has been no different, but one impact of the pandemic was the massive upscale in the number of teachers and faculty staff who started using LMS, because they had to. The wider effect has been for academics to up their game. To start developing ideas for online and digital content – and with that to be acutely cognisant of the pedagogy. We are also seeing a drive around CPD and capacity development in the teaching profession, prioritising digital literacy and online pedagogy.

Amongst educators it is commonly expressed that we are yet to see the ideal scenario for online assessment. And the experience of the last couple of years has effectively been emergency assessment, especially in basic education. For universities, the experience of embarking on multi-modal online learning platforms has been that assessment is not so effective, because students were copying and so many examples of contrivances have occurred that it puts the academic integrity of the university in question. The University of KwaZulu-Natal, for example, employed ICT specialists who came in with proctoring technologies, monitoring of the live streaming of candidates during assessment and facial recognition technology. The latter being especially important for online assessment to ensure that students are who they are supposed to be sitting the exam. The framing of questions is also critical. Exam questions need to be put in a way that they simply cannot be searched online – they are "ungooglable". Established online degree courses have already mastered this and this speaks to instructional design, in which assessment needs to

be integrated into the design as well as content.

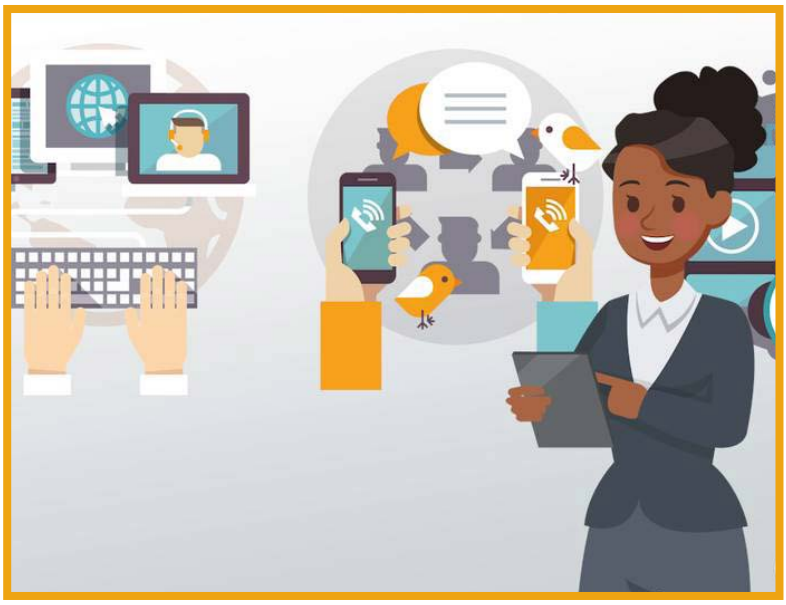
Developing online assessment, needs the regulatory bodies to play a strong leadership role in working with universities and centres of teaching and learning to set appropriate standards such that any online exam can be certified compliant. Along with the necessity of blended learning there needs to be a national effort with collaboration amongst the government and universities. Without a national drive, universities have been solving the challenges on their own, leading to a patchwork of standards and quality of teaching. The training of staff in developing good quality online assessment materials is now a priority for some universities to ensure authenticity and to have in-built protections to ensure the integrity of the exam. One application, as piloted by Rhodes University, is e/merge Africa, an educational technology network for researchers and practitioners in higher education. It is different to proctoring, not as bandwidth intensive, requiring students to take selfies to verify their identity. The app also listens to sounds in the student's space, so one can hear whether they are talking to someone or discussing the assessment with a third party. It remains that the way questions are asked is the key to having a secure online assessment.

It is suggested that the desire to improve the quality of learning and develop the necessary skills makes self-learning a top priority. Education systems are over-reliant on existing structures where students rely on their teachers, textbooks and physical campus. How do we make learners more reliant on themselves? Here technology can play a role by encouraging students to do things themselves, but the technology needs to be embedded into an instructional system. From an educator perspective, we cannot always expect students to behave in the virtual world as they would in class, nonetheless they still need to be taught the necessary digital skills. Hence, it could be said in terms of the education system, the key is to provide learners with the new skills and technology that the economy demands.

Experience of the last two years has seen the workload increase which has brought about greater concern for the well-being of both students and staff. The approach to professional development needs to be careful, requiring a fit-for-purpose approach. What adaptations to professional development need to be made and are they evidence-based? Professional development opportunities should be aimed at mitigating risks of implementing blended learning and new technologies in education. Different pedagogies require different approaches. One cannot just put face-to-face material online, which requires a different approach to teaching and learning. Recommendations include a more assessment for learning approach and that academic integrity becomes automated at the institution. These are elements of successful online learning which professional development should reflect.

2.4 Digital Literacy

A common sentiment amongst several participants in the meeting was the identification of the need for a concerted effort at the high school level in South Africa. Learners coming into universities will not be used to working with a learning management system or have the requisite digital skills required. They need a lot of support. Can more be done at the national level to coordinate between basic and higher education and better prepare students for university life? Not all kids will go to university but those that have tertiary aspirations should be better prepared with digital competencies with possible extra-curricular courses while still in K12 education. Currently, it is quite a challenge for faculties who recommend that there should be some form of "kick start" module for digital literacy to have students ready for blended learning.



Sol Plaatje University now provides first year students with a laptop on arrival, enabling them to participate immediately in the compulsory first year program on digital and information literacy support. Given that students come from a variety of different backgrounds, the data reveals that the university needed to review the program and adopt a more

differentiated approach with beginner, intermediate and advanced modules. Based on their own graduate employability survey, they developed three key programs, looking at innovation for the world of work. Preparations for final year students allow them the opportunity to develop further competencies in entrepreneurship, business development or organisational skills. Linked to these are soft skills programs, such as leadership development – all of which have an element of digital literacy.

When considering the development of digital capacities it should be conceptualised as part of a broader suite of literacy development. The research they have done at North-West University, at undergraduate and postgraduate levels, indicates that the digital needs of students remained fairly constant beyond the first year module. They have found it worthwhile to have transition modules for digital and technology literacy for those learners coming from school to university life. On the one hand, dedicated digital skills and workplace readiness modules are useful but on the other hand, consideration needs to be made of the bigger curriculum picture. As undergraduates develop then the breadth and depth of such modules needs to improve in line with the levels of study and be closely integrated with their main courses to ensure better transitioning into postgraduate work.

Many business schools in South African universities have repurposed themselves to reflect digital transformation, especially so in the context of development of the African continent. Enrolments in such new business courses and executive outreach programs show there is a strong appetite for such programs that combine entrepreneurial and business skills with digital competencies.

The use of open architecture learning management systems and leveraging all their features to meet the strategic goals of a large university is a lesson learnt from Covid. With open source there is also a community of developers and users worldwide constantly upgrading and adding more content to the system. An LMS has the advantage of configuring permissions for students to download content for asynchronous learning, and with login data we are seeing much more extensive use of analytics. The login data can also help identify student participation in individual lessons. Proper use of such data can have a real positive impact on reducing the dropout rate. For improved engagement between learners and teachers, it is critical to ensure the capacity is in place to build the necessary skills and competencies. What we need is capacity development on the part of the lecturers and their new competencies, and capacity development on the part of the students and their digital literacy. Capacity building for both students and staff on the blended learning approaches is key.

Personal development planning for faculty staff is a strong recommendation. Recognition whether it be academic, research or organisational is an important motivating factor and having personal development plans encourages staff with the carrot and not stick approach. It also helps identify which areas require attention, such as digital literacy skills as highlighted during the pandemic. University staff are now needing more enhanced skills with the need for more digital content design, online and project-based assessment. Supporting staff with these deeper skills feeds back into quality assurance of the academic programs.

2.5 Data, Safety and Well-Being

In establishing programs to give students a wider range of skills in response to the changing market, it is important for students to understand the role that data now plays in systems and processes. So introducing modules for data science and analytics can give the learners a new perspective on the role of data in the modern world and particularly the automation of data-driven decision making. For a university it is a major challenge to overhaul an entire computer science program but by adding modules that contribute to problem-solving skills can give the students additional competencies for the fast-changing jobs market.

An interesting point raised about experiences from Covid was that of empathy with students. The pandemic somehow revealed the importance of empathy with staff members readily advocating for students, especially those who did not have access to WiFi nor the funds to pay for additional mobile data bundles. University staff took the initiative, including being more innovative with their teaching practices, such as gamification which introduces fun, structure and goals into learning. Furthermore, gamification systems collect large amounts of data about performance which can be used to provide real-time adaptive feedback to students. Hence, the Covid crisis revealed adaptability amongst faculty staff, student advocacy and innovation in teaching practices. South Africa has its own unique problem of load shedding that disrupts the electricity supply, which along with poor internet connectivity did impact the mental well-being of students. This hinderance to access, along with isolation raised psychosocial issues that most staff are not trained to cope with.

Prior to Covid there were often discussions about screen time and the impact this has on one's health and well-being. During the pandemic screen

time grew exponentially. Mental health concerns regarding the screen time and usage have led the likes of UNESCO, in 2018, to frame gaming in the context of a disorder depending on the amount time spent playing. Digital technology has an addictive personality. Associated mental health issues around isolation, depression and anxiety are symptoms that have justified such classification. The addictiveness of digital technology is not just the unique domain of students and young people – the devices themselves, the software, the application are all designed to grab and hold you. These are smart devices working with the reward centre of the brain, forming new habits with new frequencies. The apps, the games, the scrolling through social media are all designed to offer emotional reward. We need to be acutely aware of this in the context of education and pedagogy. Digital mentoring of students is important such that they are aware of the digital footprint they leave, their online activities may be there forever, impacting future employers who now look at social media profiles when assessing job candidates. Dealing with complexities such as data privacies and digital footprints is something that requires ongoing education and mentorship. Students need to be taught what sites are secure and how to recognise those that are not; how to manage their own personal confidential information and educators should be looking to enforce this culture of experience.

There is a sense that the online threats to student well-being have accelerated in recent times and there is now a greater sense of urgency to develop systematic frameworks with regulations that can be implemented swiftly. From the meeting a number of policy recommendations and issues were highlighted by participants that included the greater need for accreditation and codes of practice for online learning; more parental supervision during online learning at home requires greater parental awareness and understanding of the threats and vulnerabilities; the government must establish data privacy frameworks and educators do more to teach children the importance of protecting their own personal data; and continuous professional development needs to have its own digital competency content about safeguarding learners online.

Some universities in South Africa have realised how outdated their policies and procedures for online learning are. Equally the implementation of policies needs strengthening to improve the quality of university education by enriching the learning environment. There is also the realisation that the student codes of conduct are outdated, especially for online spaces. Existing policies, both nationally and institutionally need to be fit for purpose as digital transformation gathers apace. But policy takes time and new policies are often met with slow implementation. A softer approach is institutional guidelines such as simple "netiquette" and guiding students to understand the impact of their digital footprint. Such small steps usually have the benefit of a common-sense based approach that better lays the groundwork for full policy implementation.

2.6 Quality Assurance and Change Management

Quality assurance is critical. The sudden need to implement emergency remote learning saw a dip in the quality of education, not just in South Africa but worldwide. E-learning solutions should have quality assurance tests with recommendations from government that give universities the guidance to test for functionality, adaptability, navigation and engagement. So, apart from the pedagogical requirements, quality assurance best practices should be to ensure that e-learning solutions create an intuitive experience, that course material can be easily found and updated, that the software aids collaboration and properly helps students engage with the learning process. Now things have stabilised, institutions can pay more attention to internal quality assurance processes. By focusing on quality teaching, learning and assessment, North-West University are driving the process of both ensuring formal access to higher education and epistemological access to disciplines.

Quality varies as different universities have different problems and different levels of digital readiness. It takes time to adjust to blended learning, to conduct online assessment and during this process quality assurance (QA) needs to be adjusted accordingly. QA has long been a consideration for lecturers and faculty staff, with online learning and assessment then it now enters the domain of students needing

to have a better appreciation of quality. They should understand when taking part in examinations that it must be their own work and that they are accountable for that. The danger of being faceless online is that students think they may be able to get away with any digital trickery they can get their hands on.

Quality enhancement starts from the program design, through to implementation and assessment. Throughout the process there needs to be checks and balances. For example, when doing curriculum renewal or program design from scratch there are certain systems that need to be looked at, some can automate by online form submission. When it comes to quality of delivery and quality of assessment, the processes cannot be grouped together by automating everything, there needs to be the checks and balances at all levels to make sure there is authenticity in the assessment design.

The proper use of data is strongly encouraged. As management systems have been upscaled recently we are seeing more data come into universities in South Africa where they can now access data and dive deeper into subject specifics. The information on how learners are performing provides an insight into which policy areas need addressing such as types of assessment. The reporting is now starting to inform strategies with the ultimate aim of quality education. There is a wealth of resources available online, some of it good, some not so good, so a policy recommendation is to classify open educational resources (OERs) and then matching that with both the institutional and national higher education policy.

The shift to greater use of ICTs and e-learning educational practices requires change management guidelines. Effective transformation requires an university-wide approach to improve and enhance operating processes, technology, leadership, and academic talent. Engagement and discussion with stakeholders is critical and institutions are recommended to avoid resources being just focused on the project without first obtaining stakeholder commitment. Top down instructions for new educational technologies are more likely to be met with resistance and hence fail.
For the university to deliver desirable outcomes there are some change management principles recommended: have a clear vision of how change will improve quality; align with the institution's existing culture; communicate constantly; devise an incentive-based approach to change for faculty staff; and take baby steps to start with – change management requires a relentless form of incrementalism. Furthermore, it is critical for the university to have in place the means to monitor and evaluate the outcomes of any changes made, especially to learning and teaching through the use of digital technologies.

Many people insist that technology cannot lead pedagogy. The primacy of pedagogy is critical, yet the technological direction of travel is clear, so it is important to have a high-performing digital education ecosystem. An ecosystem in the sense that it is both inclusive and the responsibility of the whole society delivered by a collaborative university sector that is unified in ensuring quality education. In South Africa, like many countries there has been plenty of criticism of the emphasis on technology and not on the teachers and lecturers. Given that technology is not a replacement of teachers we need to be careful of the messaging, particularly making sure that attention is paid to skills, competencies and the support mechanism for academic staff.

2.7 E-Learning, Platforms and Edtech

The role, influence and use of online learning platforms is, for some, a fine balancing act. What does it mean to be a student at a particular university? This is a fundamental question for institutions. The universities already have the information and digital ecosystems. Students are registered and the institution has a duty of care particularly over data and privacy protection. So how much does the university adopt a wider variety of platforms? The student affairs department may encourage a soft skills learning platform and the medical department may demand a virtual doctor simulator. Each platform becomes a new knowledge marker for the students, changing the nature of the university's offering.

The major barriers and lessons learnt from the Covid pandemic are that the cost of investing resources in new technology can often be prohibitive, and the quality of the edtech in improving learning and teaching varies substantially. The barriers to engagement are more subtle. When using e-learning to engage students, are the barriers technological or pedagogical? Clearly, just understanding the tech is not enough to inform education systems management. Rather it is how the technology is used by staff and students. There are many thousands of choices of edtech applications but in the context of sustainable pedagogy it is still in its infancy and more feedback from universities needs to be absorbed by the vendors and developers such that technology designs are better suited to learning outcomes.

As universities have embraced more learning technologies, we are starting to see some disruptive practices that bring greater flexibility to teaching and learning. For example, the learning management system (LMS) is relatively easy and now essential, but new technologies such as extended reality (XR) which incorporates virtual and augmented realities are being incorporated into e-learning systems. XR can be used in a variety of disciplines, from teacher education to medical training and foreign

language immersion. Simulations and XR can benefit educators by providing a standardised way to teach foundational skills and knowledge and in the virtual world, students can repeat a lesson or task as many times as they need. But a well-maintained high-speed network is critical. As with any emerging technology that collects data, institutions that are looking to implement XR should create and regularly assess privacy, data security, identity, bias perpetuation, and bullying and harassment policies. Technology can be a powerful tool for creating empathy, but it can also lead to invasion of privacy and harassment.

Blended learning if not the norm now, is becoming that way. From the two years of pandemic disruption, the use of blended learning technologies has created a wider experience for students who are only too keen to embrace the technological advancement – so long as they have the devices and connectivity. For many students in South Africa, especially in more rural areas, the exposed digital divide has meant that such enthusiasm has been tempered by access to digital resources. These imbalances need to be addressed by government, network operators and social partners.

Of course, e-learning and the use of learning management systems has been underway for over a decade in most universities. In terms of codes of practice it has often been a mess, with institutions experimenting with various technologies and vendors whilst not having an overall teaching and learning strategy for e-learning. Now most institutions have all or a large part of their content digitalised, with the next step being full digital transformation which encourages interaction and robust assessment. What is apparent now is the university leaders are talking about instructional design at the strategic and pedagogical level. Automated assessment technologies remain the biggest challenge. Even good proctoring applications are open to students figuring out how they work and then find ways to beat to the system.

At North-West University, The Centre for Teaching and Learning intervened very early on during the pandemic to develop a set of design principles for teaching materials for the online modality. The experience they had with existing open distance learning students was very helpful in developing a pedagogically informed and educationally sound approach to teaching and learning. They have also learnt through distance education, that the use of many smaller assignments is not as educationally stimulating, or educationally rigorous, as, for example, the development of project-based longer assignments; so, they applied that kind of insight into the online experience of students. This meant a kind of mediation step between what was happening pre-Covid, and what needed to happen with the transition to online learning to ensure an effective pedagogy.

Regarding the role of the university, the on-campus experience and "university life" is invaluable. Online learning is not going to replace that but certainly can complement and enhance the higher educational experience for students, as well as allowing faculties to explore greater academic diversity. As accelerated by the pandemic and driven by technology, hybrid is the mode being employed in the world of work and the university institution will inevitably be part of this social change. Society will dictate the pace of such change and institutions are now having to compete in the global sphere, yet it must not be forgotten that the university is the master of content, the repository and curator of human knowledge.

- End -

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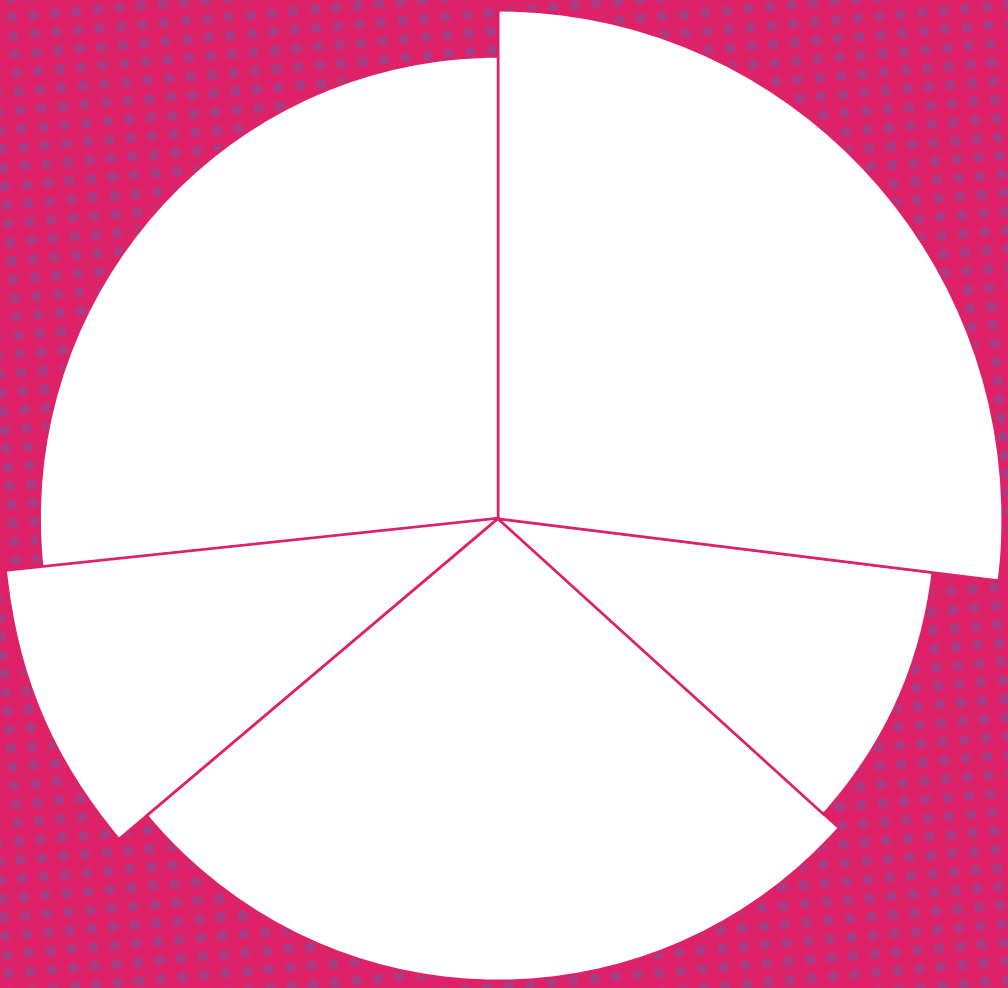
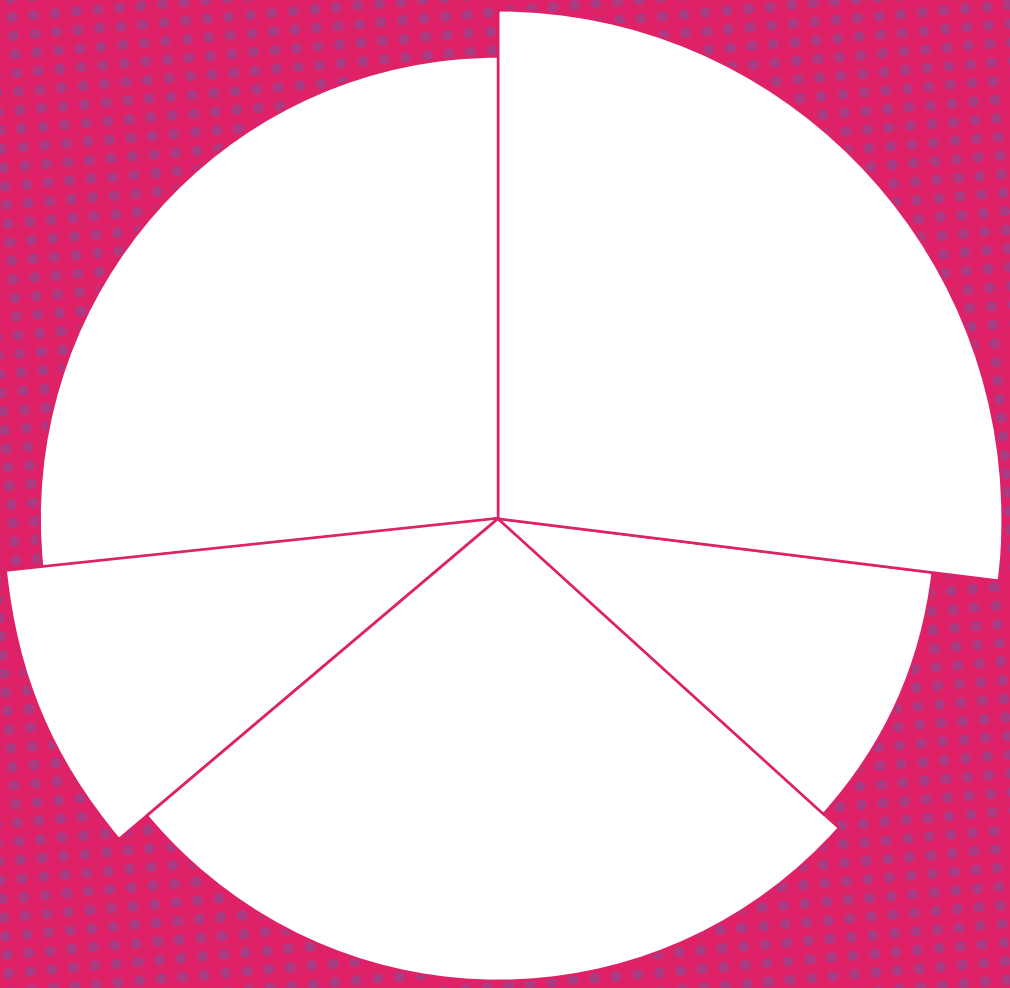


APPENDICES



APPENDIX A

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

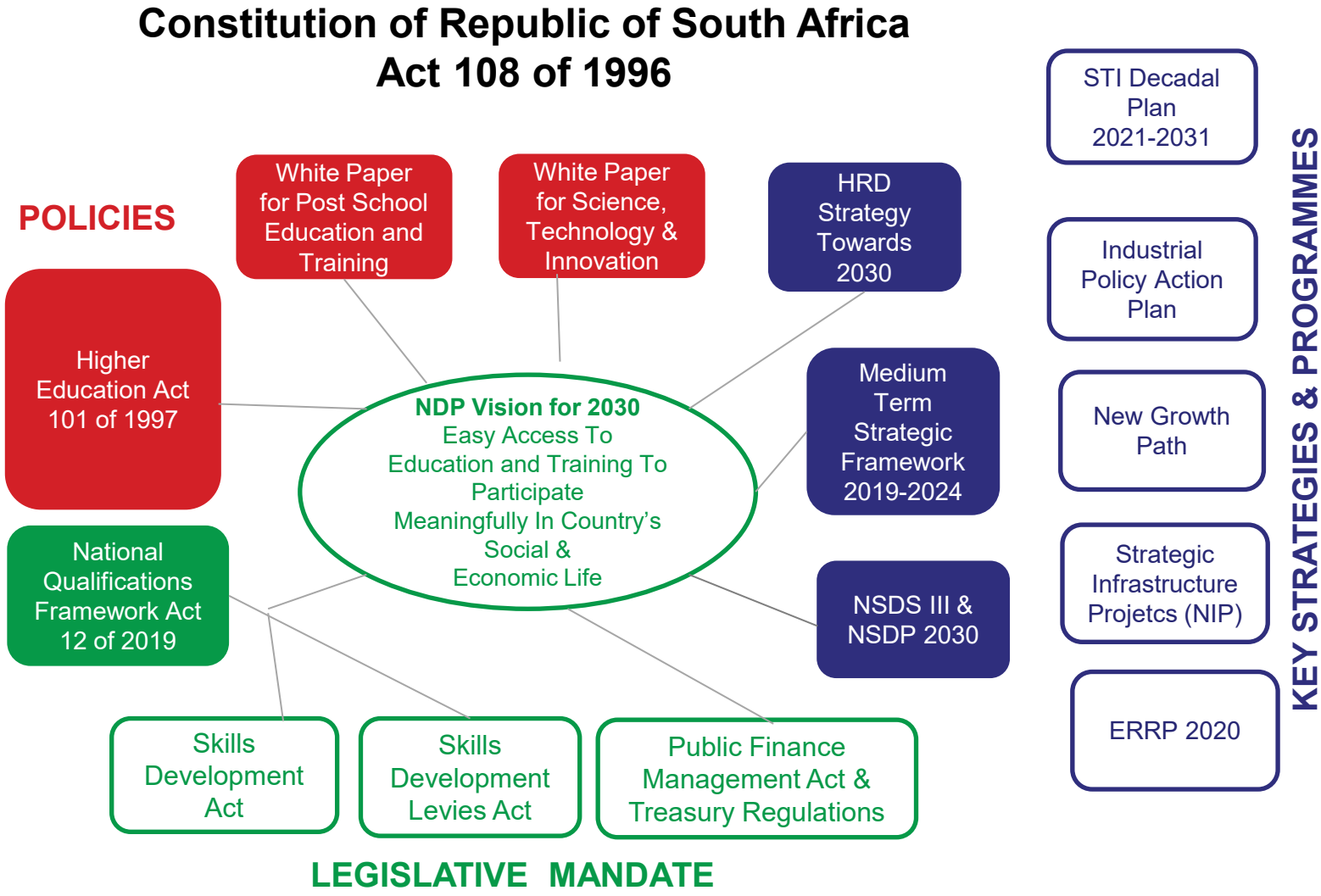
SOUTH AFRICAN HIGHER EDUCATION : SKILLS , DIGITAL LEARNING, QUALITY & POST COVID POLICIES

Virtual Meeting

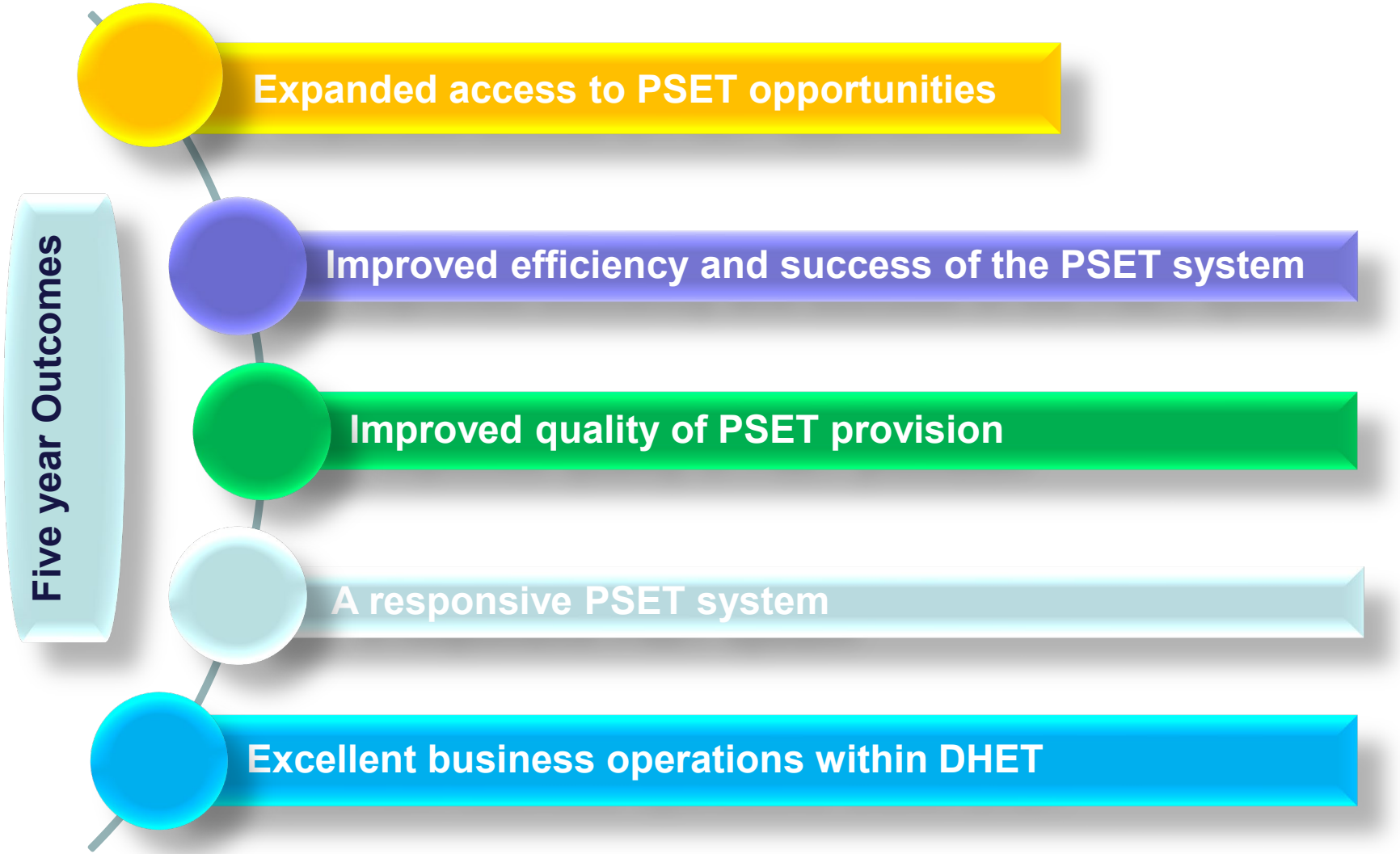
Thursday, 7 April 2022, 14:00

SKILLS TRANSFORMATION : CONTENT PAGE

Key Policies, Legislation & Strategies that steer Skills Development



PLANNED FIVE-YEAR OUTCOMES: 2020 – 2025 (SP)



NATIONAL PLAN FOR POST-SCHOOL EDUCATION AND TRAINING 2021–2030

- The Plan envisages a diversity of quality learning opportunities, both public and private, for students. The distinct missions, specialised programmes, modalities of provision, research and innovation foci, localities, community engagements and partnerships of this diverse system will be carefully steered and supported by dedicated planning, funding, quality assurance and monitoring mechanisms.

- In terms of the Policy Framework for Open Learning in the postschool system : distance, online and open learning in the higher education, TVET and CET sectors will be permitted to grow **gradually**, in line with demonstrable improvements in **quality**, **success rates** and **institutional capacity**.

- Most importantly, the quality of pos-tschool teaching and learning must be prioritised. At the same time, lecturers' pedagogical, curriculum development and research capacities will be improved, together with their abilities to harness digital technologies to support teaching and learning in innovative ways. The development of open learning/digital pedagogies/blended learning will be supported.

- During COVID-19 pandemic adjusted alert levels, universities implemented multimodal teaching and learning plans in order to achieve the goal of successfully completing the academic years.

- The implementation of the plans was supported in part by the department through the allocation of a COVID-19 Responsiveness Grant (CRG) to be utilised against teaching, learning and assessment activities in a plan that has been approved by the Minister.

The university plans generally addressed the following issues:

- Acquisition of devices for students and staff, and for the distribution of these to the recipients;

- Upgrade of Learning Management Systems, ICT hardware, bandwidths, ICT security features, acquisition of appropriate software applications;

- Distribution of data to students and staff;

- Training of staff and students in the use of alternative teaching and learning strategies;

The university plans generally addressed the following issues:

- Development and delivery of online teaching and learning materials; synchronously and asynchronously;
- Development of print-based teaching and learning materials and delivery to students;
- Uploading teaching and learning materials to USBs and delivery to students;
- Development and delivery of alternative assessment strategies; and
- Catch up programmes as students return to campuses.

The Department monitored the implementation of the university COVID-19 responsive grant teaching and learning plans and lessons learned from this exercise include:

- What is obvious, is that; if students are provided with resources, hybrid mode of delivery is possible. The majority of universities reported high levels of engagement by students for teaching and learning purposes during the lockdown period and this was made possible through provision of devices (laptops and/or IPads) and data to students, as a result they managed to continue with studies wherever they were and completed the academic years, *albeit* at various stages including extending the academic year by a few month(s).

The Department monitored the implementation of the university COVID-19 responsive grant teaching and learning plans and lessons learned from this exercise include:

- Online application processes do work and can be used going forward to avoid difficulties associated with application and registration. Many universities used online application and registration processes successfully in these two years of COVID-19 pandemic adjusted alert levels.

- The department had to plan the start of the academic year to align it with the release of the National Senior Certificate results by the Department of Basic Education. Secondly, the department had to support universities with resources that would assist them to cope with the effects of COVID-19.

- Remote learning has proven to be an alternative mode of delivery when students are offered with tools necessary for this, however it cannot be used ‘solo’. Physical interaction is very important in teaching and learning purposes as it is the only way to teach certain skills of human development. Extensive research has to be conducted to establish the extent to which remote learning can be depended on and its effects to the youth that is still growing up.

The Department monitored the implementation of the university COVID-19 responsive grant teaching and learning plans and lessons learned from this exercise include:

- A consideration of flexibility with regards to policies and regulations is necessary. For example, the Higher Education Quality Committee (HEQC) of the Council on Higher Education (CHE) allowed programmes that were accredited for a contact mode of delivery to be offered in hybrid and online modes. The HEQC approved Quality Assurance Guidelines for Emergency Remote Teaching during the pandemic, and these were widely distributed to higher education institutions.

- The CHE developed a new online accreditation application form that allows for institutions to take account of a range of delivery modalities including online modalities, in one programme application and this did take some of the pandemic issues into account. Activities that used to be undertaken physically continued using online and hybrid modalities. Site visits, meetings and workshops were able to be undertaken through online means.

The Department of Higher Education and Training's Position on Online Programme and Course Offering:

- **Open Learning**, is defined in the *White Paper for Post-school Education and Training* (DHET; 2013), as an all-encompassing approach which combines the principles of learner centeredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the recognition for credit of prior learning experience, the provision of learner support, the construction of learning programmes in the expectation that learners can succeed, and the maintenance of rigorous quality assurance over the design of learning materials and support systems.

- The *White Paper for Post-School Education and Training* (DHET; 2013) supports the development of a PSET system based on open learning principles, where quality learning environments are constructed which take account of student context and use the most appropriate and cost-effective methods and technologies.

- In the White Paper the DHET commits to build an expanded, effective and integrated PSET system. Furthermore, in Chapter 7 of the White Paper the DHET also commits to working towards creating a PSET landscape based on open learning principles.

The Department of Higher Education and Training's Position on Online Programme and Course Offerings:

- The QCs have the executive responsibility for quality assurance in education and training, and the promotion thereof. They develop and implement a system of quality assurance for education and training, including programme accreditation, institutional audits, quality promotion and capacity development, standards development and the implementation of the relevant Qualifications Sub Framework.
- Whilst the department supports the development of post-school system based on open learning principles; at the same time, it acknowledges that ICT is increasingly becoming a critical ingredient for meaningful participation in a globalized world. It is also an indispensable infrastructural component for effective education provision and is central to the notion of opening learning opportunities in the post-school system.
- The department sees online qualifications, part qualifications, programme and course offerings as viable mode of delivery that has to be pursued and supported. Centrally, is that online programme and course offerings have to adhere to all norms and standards, applicable to the delivery of quality education and training.

University Education and Soft Skills :

- *The advancement of a knowledge-based economy within a globalised world means engineering education institutions are responsible for producing graduates who possess exceptional technical and soft skills* (South African Journal of Higher Education, Volume 35 No. 4, Stellenbosch, September 2021.

- Soft skills are forever critical, especially to increase opportunities of young people for employability. I have observed how important is skills such as critical thinking, teamwork, problem solving, collaboration, creativity even when young people compete in World Skills International Competitions and recently in WorldSkills Africa Competition held in Namibia, Swakopmund, with learners, amongst others, from Durban University of Technology and Tshwane University of Technology competing in areas such as Mechatronics and Fashion Technology, to mention the least.

- The OECD Learning Compass 2030 distinguishes between three different types of skills (OECD, 2018[1]): **cognitive and meta-cognitive skills**, which include critical thinking, creative thinking, learning-to-learn and self-regulation **social and emotional skills**, which include empathy, self-efficacy, responsibility and collaboration **practical and physical skills**, which include using new information and communication technology devices.

University Education and Entrepreneurship :

- Our own skills strategy to support Economic Reconstruction and Recovery Plan, includes, amongst other interventions : entrepreneurial development, it is a fact that university graduate unemployment is low compared with any other graduate unemployment in our post-school system, should we ensure that our university graduates are also equipped with entrepreneurial skills, this will further decrease youth unemployment in our country.
- The Department (in collaboration with Universities South Africa) introduced a national programme called Entrepreneurship Development in Higher Education (EDHE) Programme; this programme focusses amongst others, on the following areas :
  - ❖ equipping every student and graduate for economic participation through entrepreneurial activity, with an emphasis on student women;
  - ❖ supporting academics across disciplines to develop entrepreneurship through teaching, learning and research; and
  - ❖ supporting universities as entrepreneurial and innovative ecosystems, which includes relevant policy development.

Conclusion

- There is an understanding that COVID-19 Global health pandemic tested our own capacity as the country to withstand the shocks caused by COVID-19 global health pandemic has been largely determined by our social-economic circumstances and it has brought to the fore deep inequalities which persist in our country until today.

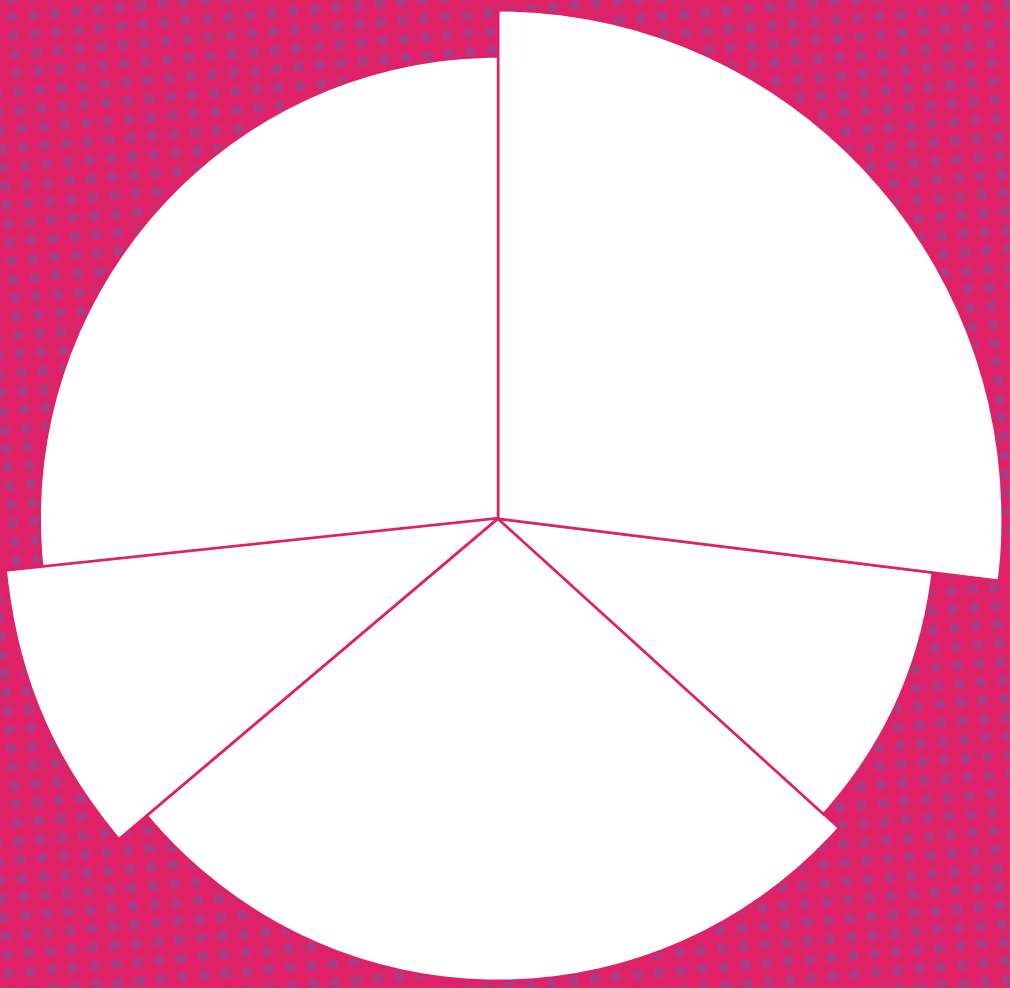
- This global health pandemic provides us, with a lifetime opportunity to inject new perspectives into how we can turn our post-school system fabric around, but also how we can really imagine our very post school system to respond amongst others to the provision of more opportunities in particular for our young people.

END

END

THANK YOU

QUESTIONS / CLARITIES / INPUT



APPENDIX B

Digital Skills Framework One (DSFOne) – Overview

A comprehensive framework accommodating a wide range of digital skills

1. Introduction

Computers and other digital devices (cell phones, smartphones, tablets) have become ubiquitous, persistent and pervasive. As these devices were put to new uses, and as the technology developed to enable new functionalities and new areas of use, the number of digital skills increased, as well as the demands made upon users. In order to systematize and structure these digital skills, a number of digital skills frameworks were developed over time. Many of these frameworks relate to specific sectors of use only, and the relationship between frameworks is often not evident.

This document provides *an overview* of a comprehensive digital skills framework that provides both an encompassing view of a wide range of digital skills, and the space to accommodate sectional or sectoral frameworks – *Digital Skills Framework One (DSFOne)*.

This document is accompanied by three posters. A deliberate choice was made to present the core aspects of the framework in visual format, either to mount it on a wall or to hand it out in A4 (preferably A3 or larger) format. In the text of this document, reference is made to the various posters at appropriate points under discussion.

Poster 1 provides an overview of the comprehensive DSFOne framework as whole, of which the user digital skills component (A and B on the poster) forms one component.

Poster 2 provides more detailed information (say, a second level of information) of the competence areas and competences in the user digital skills component.

Poster 3 provides more detail on

a) learning pathways in user digital skills and in ICT practitioner skills;
b) ways of thinking about skills sets in different sectors (either for the development of such skills sets, or for the evaluation or enhancement of existing skills sets);
c) how emerging technologies (or: transformative digital technologies (TDTs)) manifest themselves across the whole comprehensive digital skills framework.

2. A growing range of digital skills and frameworks

The digital skills (e-skills) that we have been using for years are constantly upgraded as new programmes and new functionalities are developed, or as we use them in new or other functions. New digital skills are often required for constantly developing new mobile devices, or for new areas of life, work and learning within which we function and for which new digital applications are constantly developed. Persons who are very proficient at using their smartphones, often find that the digital skills that are necessary for computers in the work context are very different from what they were used to on their smartphones, and the other way round.

On the whole, users and persons involved in developing strategies for digital skills or in training interventions are confronted with a bewildering array of digital skills, often resulting in confusion and unclarity as to which digital skills are applicable to whom, at which level, for which

purpose, and under which circumstances. This confusion is exacerbated by the fact that computers and other digital devices can be put to use in very different situations in life, work, learning and leisure.

To this can be added the fact that, for a large part of the population in many countries, the basic digital phone (also called the "feature phone") or smartphone might be the *first choice* or the *only* digital device available – device that must serve functions that for others would be fulfilled by computers. Often, learning programmes for digital skills are offered that do not make provision for the wide range of skills that are required in the new digital world.

With the accelerated development in technologies (and now with the impetus of COVID-19), the digital skills requirements have also accelerated, blurring boundaries between personal and work contexts and posing challenges in terms of a structured approach towards digital skills categories.

In some areas, such as the more professional world of ICT operations, professional organisations have been active to maintain structure in the rapidly developing digital skills world, ensuring that new skills are regularly identified and are fit into a logical structure or framework.

Over time, and through research and the active collaboration between industry/business, academia and government or civil society organisations, various thought frameworks were developed to manage the complexity, amongst them also digital skills frameworks. Some of these relate only to specific segments or sectors in which digital skills are used. Different from these frameworks, DSFOne takes an overarching perspective, being a framework that provides a space for other frameworks and that assists in making sense of their mutual relationships.

3. A comprehensive framework – DSFOne

Over the past decade, it has become clear that we need a *comprehensive digital skills framework* that provides a synoptic view, thereby helping us to understand the bigger picture of digital skills, and giving recognition to the fact that digital skills today are pervasive in all areas of work, learning and life. Only in this way can one ensure that the skills applicable to one area or sector are not elevated to a level where they are regarded as the one and only requirement for other areas where they might be less applicable, or are forced upon other areas. Only in this way can one ensure that all sets of digital skills find their *rightful* – but also their *relative* – place.

The objective with the development of a comprehensive framework was to accommodate the widest possible range of digital skills, from the digital skills required for activities in everyday life to those belonging to the world of work; from those of a general and basic kind, to the highly specialised skills in different professions; from those required to use digital devices, to those necessary to develop the code that makes these devices work. Evidently, the whole range of digital skills could not – and cannot, today still – be specified and listed, but the framework was designed to provide the *conceptual and logical space* where all of these digital skills can find their appropriate place.

Digital Skills Framework One (DSFOne) is proffered as a *comprehensive* digital skills framework. The element "One" suggests that this framework could be regarded as *a top-level view* of the different sets of digital skills, or the starting point of discussions on where the various other areas of digital skills, or digital frameworks themselves, fit into the whole. No claim is made that this is *the only* top-level framework that should be considered; rather: within the context of one particular view on digital skills, this framework provides both a top-level view and cascaded views at lower or more specific levels.

DSFOne was developed in the Western Cape CoLab for eInclusion and Social Innovation.[1]

The component of DSFOne that relates to most *users* of digital devices is called "user skills", which spans a range of digital skills, and levels of digital skills, from the basic level of "digital literacy" to highly advanced skills. While there is a single top-level view in DSFOne, there are various "deeper" or more detailed levels of digital skills, where individual skills are identified. (See further par. 4.)

In an attempt to define the second level of digital skills at a time when an acceptable international framework at this second level was not available, a South African "user skills sub-framework" was developed (2014-2016) in the Western Cape CoLab and used within the broader top-level DSFOne framework.

In the meantime, various frameworks of user skills appeared, of which one has impressed and has reached wide acceptance, namely DigComp – the digital skills framework for citizens developed in and for the EU.[2] DigComp is the most extensively developed model for citizen digital skills, both at a conceptual level and regarding examples of use. It has been validated in different contexts, it is widely used in many countries and in many sectors, and various studies have appeared on the assessment of the digital skills of specific populations based on the five competence areas in DigComp. It therefore becomes possible to undertake comparative studies between countries or sectors (etc.) based on DigComp. In addition, DigComp was accepted as the basis for further frameworks and other studies on digital competences in areas such as education and entrepreneurship development. In fact, a wide range of publications and implementation guides based on DigComp have appeared during the past six years.[3]

Using DigComp as the core component for the "user digital skills" stack in DSFOne therefore makes it possible to engage fruitfully in this wider international ecosystem of developers, implementers, planners and users of a widely accepted user framework for user digital skills in many areas of life, learning and work.

Due to the wide international acceptance of the DigComp framework, it was incorporated into the user skills component of DSFOne, with some adaptations regarded as necessary for local conditions in South Africa and for ease of use. Most significant of these is the addition of the competence *Transacting* – due to the increasing importance of digital transactions in the everyday lives of citizens (over the past years, and still increasing further). This competence is explicitly recognised in some frameworks[4] and deserves to be included in a modern-day comprehensive framework for digital skills.

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[1] Recognition is given to the important contribution of Leona Craffert and Wouter Grove of the CoLab to the development of DSFOne and its adaption over time. The Western Cape CoLab for eInclusion and Social Innovation is a programme of the University of the Western Cape..

[2] See S. Carretero et al., *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*. Luxembourg: Publications Office of the European Union. 2017. This is the updated and extended version of the earlier DigComp 2.0: R. Vuorikari et al., *DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: The Conceptual Reference Model*. Luxembourg: Publications Office of the European Union. 2016. In the updated and expanded version (2.1) more detail is provided on the competences, with use examples relating to each competence area and each proficiency level. DigComp has since become widely accepted and used also outside the EU.

[3] See S. Kluzer S. et al., *DigComp into Action – Get inspired, make it happen. A User Guide to the European Digital Competence Framework. (JRC Science for Policy Report). Luxembourg: Publications Office of the European Union. 2018*. Further references to published literature on DigComp can be found in the standard bibliographic sources.

[4] For example, it is present in the *Essential Digital Skills Framework* (EDS) of the UK.

In the earlier version of the user skills sub-framework in DSFOne (now replaced with DigComp) we had a category "Personal life, home & family", which has not been retained in the current version of the user skills stack. However, all of the functionalities required for that category can be found in the 24 competences across the competence areas described below (4.2).

4. The DSFOne framework

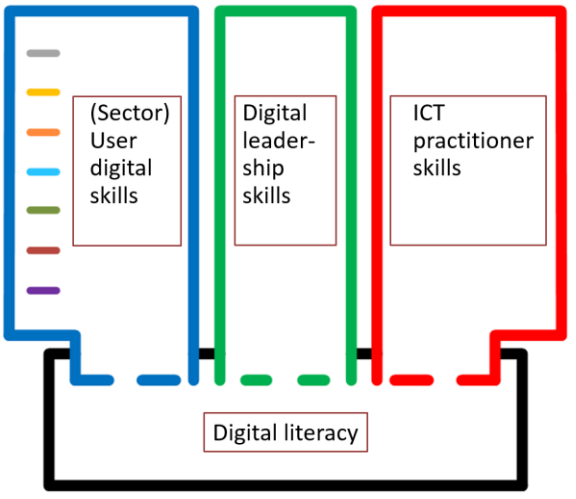
4.1 The top level and its constituents

All the "groupings" of skills that we encounter in discussions or in expectations for digital skills use (e.g. "digital skills for business", "broadband skills") can be explained by distinguishing the following "types" of digital skills – text colours as in the graphic below:

* *digital literacy* or *e-literacy* (which involves more than just a very basic level of digital skills, specifically digital skills that can lead to *meaningful use* in life, work and learning, both for individuals and in small organisations);
* *(sector) user skills*, which can be generic, or sector- (or profession-) specific (the latter represented symbolically by coloured bars in the framework proposed, on the left side); more advanced levels of user skills would be required in larger organisations or for more complex work in small organisations;
* *digital leadership skills* (for a definition, see 4.4);
* *ICT practitioner skills* (which some people would call "professional skills", although others would reserve the designation "professional" for a certain rigour and style in which ICT practitioners go about plying their trade).

The functionalities to be achieved in "digital literacy" and in "generic user skills" are essentially the same, and – when vertically positioned (see below 4.2) – the lower levels of these functionalities (namely levels A to C, out of eight levels[5]) can be regarded as what is often referred to as "digital literacy".

The different basic digital skills types can be presented on a canvas as follows:



[5] In DSFOne the designations A to H are used, different from DigComp that uses the numbers 1 to 8. This is done in order to make a clear distinction between the competences and the proficiency levels.

The colour bars on the left symbolise the different sectors or professions, etc. for which separate user skills sets have to be identified and developed. These separate skills sets are still user skills, even though they might be of a very specialist and professional nature. Sector-specific skills might be closely intertwined with higher levels of the generic user skills.

It is useful to view these skills as different "stacks", as in the diagram of the DSFOne framework. User skills are in a different stack than ICT practitioner skills. In the latter, the outcome of the action is an information systems (IS) or ICT result (or "artefact", as it is often called), such as a programme/application, service or functionality; in the former, the outcome is for the actor (user, operator, etc.) to be able to perform the job or profession in a better or more efficient way through the use of ICT or by making use of the outcomes of others plying their ICT trade, or to do things in everyday life better, or to be able to do them at all.

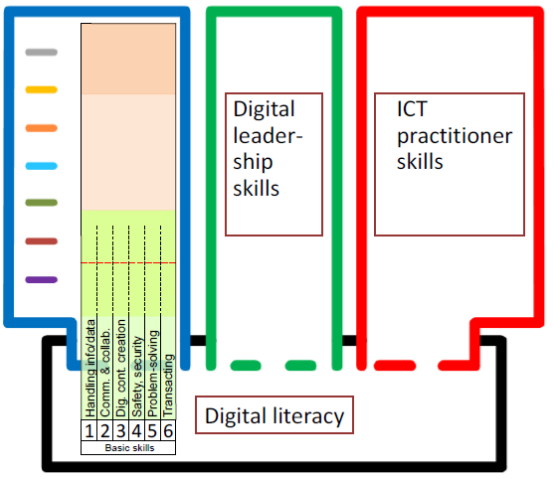
4.2 The user skills stack (DSFOne-UDS)

Following DigComp, and with the adaptations referred to in par. 3 above (including some rephrasing deemed necessary), we have *six competence areas* in DSFOne:

1. Handling information, data and digital content (incl. search, evaluation, storing)
2. Communication and collaboration
3. Digital content creation
4. Safety, security
5. Problem-solving
6. Transacting.

(The phrasing of competences 1-5 is slightly changed in relation to that of DigComp. In Competence 1, DigComp has "Information and data literacy", which introduces two concepts that might not be known to everyday users. Our purpose was to come as close as possible to the world of ordinary users, local and provincial policymakers or planners of digital skills interventions – at least at the basic level of the naming of the six competence areas.)

When these are positioned vertically within DSFOne, we have the following:



At the lower end of the user skills stack, up to the horizontal red line, we have *digital literacy* as required for ordinary citizens, whereas the more advanced levels of skills within the various

competences are above the line.[6] The levels above the red line are typically those required for the formal work sector – often referred to as "work readiness".

DigComp distinguishes eight proficiency levels – here indicated vertically by way of colour segments – from "foundational" at the bottom of the list to more advanced levels at the top. In DSFOne we follow the eight levels distinguished in DigComp – in the diagram above, represented by four colours, each for two of the levels (Poster 2):

Levels G-H: Highly specialised

Levels E-F: Advanced

Levels C-D: Intermediate

Levels A-B: Foundational

Levels A-C can be regarded as what is generally understood with "digital literacy" for ordinary citizens.[7]

We now have the following *structure*:

Competence areas (6)

Competences (24) across the 6 competence areas (see Poster 2)

For each of these, there are 8 possible proficiency levels, from foundational to highly specialised (see Poster 2).

In each of the six competences, and at each of the eight levels, DigComp provides one or more "examples of use", formulated in the style of "I can ….".[8] Relevant "examples of use" can be developed for local conditions, in some cases with separate examples for computers and for smartphone devices. (This is work in progress.)

Note: In order to have a proper overview of the user skills stack within the more comprehensive framework (that is, in DSFOne), it was deemed necessary to simplify the extensive and detailed presentation as contained in DigComp in order to present it on a single page or poster. (Poster 2)

In DSFOne we also include a pre-"Level A" at the bottom of the stack, namely "Basic skills" (not to be confused with "Levels A-B: Foundational" as above), to accommodate the very basic skills of being able to operate digital devices, knowing how to use a mouse or a trackpad, handling touch screen devices, getting access, connecting to wifi, obtaining data on a mobile device, etc.[9]

The list of competences for each of the competence areas and at the various proficiency levels might appear to be unrealistic and unreachable for a broad population in order to qualify them as "digitally literate". However, in many digital skills training programmes a selection will be made from the comprehensive list of competences, according to what is realistically applicable to the group for which the training programme is developed. For example: not everybody might

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[6] Depending on the context, and the expectations regarding digital skills competence in a given country or community, this red line could be one level higher, that is, at level D, rather than at level C. For some users the bar can be even set lower, namely at level B.

[7] In DigComp itself, this will be levels 1-3 out of 8 levels.

[8] For each element in the descriptor of the competence, there is an example of use, written in terms of learning outcomes.

[9] This is in line with the inclusion of such a level in the EDS framework of the UK. The Austrian version of DigComp also makes provision for a set of understandings and skills below Competence 1, namely "Foundation and Access", with the number of the competence being "0". (*The Digital Competence Framework for Austria - DigComp 2.2 AT*. Vienna: Federal Ministry for Digital and Economic Affairs, July 2021, p. 7.)

have to be able to do pivot tables in Excel, but most persons can benefit from the elementary use of Excel. There can also be changes over time: before the onset of COVID-19, online meetings might not have been on the training priority list of many workers; today (18 months into the pandemic) conducting online meetings and collaborating online have almost become a basic digital skill requirement in everyday life.

The ***sector*** *user digital skills* have to be determined for each sector, based on the trends and levels of digitalisation and digital innovation in that sector.[10] In some sectors, the generic user digital skills will be sufficient and those digital skills will simply be applied within the sector and for the actions to be effected. In other sectors, various more specific and sector-related competences might additionally be required, relating specifically to the nature of work within that sector.[11]

Of course, there will be some extent of overlap between the different activities across the whole of the framework, but at least it provides us with a rationale and a way of indicating which types of digital skills one is speaking about at a given point.

For learning pathways in the *sector user digital skills* stack, see Poster 3.

4.3 The ICT practitioner skills stack

The range of skills in the ICT practitioner sector is very well described in the *Skills Framework for the Information Age* (SFIA), and we should not try to reinvent this wheel. SFIA can rather be plugged into a more comprehensive framework, within which it will be clear that it is an important component, but does not constitute the whole of the universe of digital skills.

ICT practitioner skills are:

> "the capabilities required for researching, developing, designing, strategic planning, managing, producing, consulting, marketing, selling, integrating, installing, administrating, maintaining, supporting and servicing ICT systems."[12]

A deliberate choice is made to use the designation "ICT practitioner" instead of "ICT professional" for the group as a whole, in line with most international approaches regarding the terminology of choice.

This category consists of technical specialists and technologists, together with various kinds of support staff, consultants, providers in the ICT space, etc. As has been indicated earlier (4.1), the skills in this component or stack distinguish themselves from user skills, in that the outcome of the action is a programme/application, service or functionality, whereas the outcome from "(sector) user skills" is the ability to perform the job or profession better, or to do things in everyday life better.

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[10] For an example of how a *sector user skills set* can be developed (or an existing "user skills" set can be evaluated and updated/amended), see DSFOne Poster 3, the left bottom illustration. Follow the numbers of the yellow circles for the steps in developing or evaluating a specific "user skills" set.

[11] For example: in the sectors of teaching and training, skills in presenting learning content in an LMS and creating interaction with the learner/trainee, is increasingly becoming an essential competence.

[12] T. Hüsing, T. et al., 2013. *e-Leadership: e-Skills for Competitiveness and Innovation. Vision, Roadmap and Foresight Scenarios*, Bonn. 2013. p. 18.

In the area of ICT operations and practitioner skills, professional bodies have been active to maintain structure in the rapidly developing world of e-skills, ensuring that new skills are regularly identified and are incorporated into an updated logical structure. This structure is expressed in ICT competence models or frameworks, typically displaying a very well-integrated character of the different skills and other aspects (such as levels of responsibility or levels on a general learning or competence framework). In the English-speaking world, the most widely accepted and used framework is the *Skills Framework for the Information Age* (SFIA). In Europe, the *European e-Competence Framework* (e-CF) is widely used. (See Poster 1, Component C for a graphical representation of the essence of SFIA.)

SFIA actually moves outside of a narrow realm of information systems activities of a technical kind and includes components such as talent management, thereby expanding their framework to cover a more comprehensive view of the operations within and around the practitioner skills activities. This implies that skills are included within SFIA that would not be regarded as "practitioner skills" in other frameworks that do not cast their net so wide. One could therefore also think of SFIA as a framework for "ICT practitioner skills and environs", that is, not all digital skills included in this framework should be regarded as "ICT practitioner skills".

In the development of ICT practitioner skills, professional bodies are giving much attention to learning and training (both generic and vendor-specific), also regular and continuing up-skilling, and issues around certification and accreditation.

The advanced levels of structured and integrated expertise in practitioner skills are reached through different pathways (as is the case with user skills, see 4.2). These pathways all start from digital literacy, but instead of focusing on more advanced levels of *use*, most persons following this route will be interested in *the tech behind the use*, driven by curiosity, and doing one or more of the following: exploring, experimenting, seeking understanding, installing, setting up devices and networks, solving tech and user issues, advising on tech and uses, hacking, coding, building apps, etc. Gradually they will follow informal or formal pathways to a higher level of expertise, with some of them remaining at mid-level, but fulfilling an important role in the ICT practitioner space.

For learning pathways in the *ICT practitioner skills* stack, see Poster 3.

4.4 Digital leadership skills

"Digital leadership skills" (or: "e-leadership skills") should be distinguished from management skills relating to other segments of the framework, e.g. management in the ICT practitioner skills segment, or the traditional CIO role, or even the expanded role of the CIO in the COVID-19 age. Digital leadership skills are "strategic and related in particular to *innovation management*, rather than technology-management, skills – which are part of ICT practitioner skills".[13]

[13] *Ibid*. p. 19.

Since the time when the concept of "e-leadership skills" was first introduced into the discussions on digital skills, the concept of leadership continued to play a prominent role in the thinking around innovation and digital transformation. In various studies during the past five years, the roles of leadership in organisations, in sectors of business/industry and in society at large were analysed and insights were gained into the capabilities required in order to effect change in a new digital world. Currently, there are different conceptualisations of "digital leadership skills" and further work is required to reach a widely accepted definition and systematization. Until a widely accepted definition emerges, it might be useful to work with the following interim definition:

> "The capabilities needed to exploit opportunities provided by ICT, notably the Internet, digital devices and the new media,
>
> - to ensure more efficient and effective performance of different types of organisations,
> - to explore possibilities for new ways of conducting business and organisational processes,
> - to establish new businesses, organisations, platforms, applications or interventions,
> - to accomplish goals that rely on ICT through the direction of human resources and uses of ICT, and
> - to effect innovation (incl. social innovation) through digital means."[14]

This definition makes use of both the concept and the phrasing of other definitions of digital leadership (with due recognition to those), but purposefully expands those to include manifestations of digital leadership outside of the business/organisational context and in line with the innovative cases of digital leadership we have seen in the past few years as coming from unexpected quarters, as well as socially based interventions, e.g. through digital interventions or digital social innovation.

There might, of course, be many cases of overlap between "digital leadership" skills and the activities performed by, or under the leadership of, the CIO.

5. Skills relating to the so-called "emerging technologies"

Discussions on the digital skills of individuals are often overshadowed by the attention-grabbing and flashy applications of the "emerging technologies", for which we prefer to use the designation "transformative digital technologies" (TDTs) (e.g. artificial intelligence (AI), robotics, data analytics, extensive connectivity, virtual reality, augmented reality, quantum computing). The digital skills required to enable such applications (e.g. AI or robotics) are often pictured as the really important digital skills that will define the future and that should be pursued by everyone.

Of course, these digital technologies and the application areas made possible by them are indeed very important and directional for the future, and most countries need many more experts who can engage in the development of solutions incorporating these technologies, or who can lead in the interpretation of the (often unintended) impact of these technologies. These technologies often relate to, and build upon, the basic skills components in the comprehensive digital skills framework (DSFOne). To take an example: for users, AI could be a background technology in performing searches of which the user is not even aware, and could skew the results of searches (as we have already seen in multiple cases); for application developers, AI

[14] Partly from T. Hüsing, *ibid*. pp. 18-19; partly adapted by the author.

could be one of the instruments explicitly incorporated in the coding process in order to achieve higher efficiency or more sophisticated results, or to perform actions that would not have been possible without AI at all. (See Poster 3, bottom right for a graphical representation of how transformative digital technologies can present themselves across all components of DSFOne.)

6. The need for an update to DigComp

It is widely recognised that DigComp 2.1 needs a comprehensive update. The process has, in fact, already started to move towards DigComp 2.2.

As indicated above (par. 3), in DSFOne the competence *Transacting* has already been added to the five competences of DigComp. Some users of DigComp might argue that it was not necessary to single out this one competence, and that it should be understood and incorporated under the other competences, perhaps through a combination of those. However, in the everyday use of digital devices in the South African context – and I believe nearly universally, currently – it is necessary to indicate *Transacting* separately, for people to accept the competences as relevant to their current reality.

A few further dimensions need to be taken into account in a future update of DigComp, e.g.

a) issues around data and data literacy[15] (with dimensions of algorithms relating to data also forming part of this domain);

b) issues around AI and the way AI and data are used to profile individuals or to monetize user engagements with digital devices and the internet;[16]

c) issues around "information" and "information disorder"[17] (the evaluation of the quality of information or sources, the spreading of false or incorrect information, etc.);

d) issues around ethics (including algorithms and bias of various kinds);

e) the relationship between information literacy, data literacy, media literacy and digital literacy (or at least a clarification as to how these "literacies" relate in the current context where digital devices and digital resources are involved).

Regarding some of these dimensions the digital/technology scene has changed dramatically during the last few years, and DigComp has to be amended/updated in order to make provision for these changes. This no easy matter, and just adding competences (or sub-competences) to the existing competences will not solve the problem. In most cases, the existing competences have to be reconceptualised in the new digital context, and careful rephrasing is required. In some cases, the challenge is not around concrete skills to be acquired, but around an understanding of background conditions and forces relating to the use of technology that determines

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[15] For a promising inclusive view on data literacy, see the "Data Literacy Competence Model (DLCM)" as presented in T. Seymoens et al., "Data literacy on the road: Setting up a large-scale data literacy initiative in the DataBuzz project", *Journal of Media Literacy Education* 12(3), 2020, pp. 102-119. https://doi.org/10.23860/JMLE-2020-12-3-9

[16] This matter is also identified in Poster 3 (bottom right), yet without indicating how it could practically translate to user competences. It might be necessary to incorporate the concept of a well-defined set of "understandings" in the concept of "digital competences"/"digital literacy", e.g. on AI, robotics or the "internet of things". It can hardly be expected that ordinary users will have sufficient "understanding" of AI (etc.) to be able to implement it, except when it is packaged into, or linked to, known digital functionalities. However, ordinary users need to have sufficient "understanding" to know what can be expected from AI, to realize how their digital actions can be influenced by these "transformative digital technologies" (TDTs), or to be able to decide which actions to take in view of aspects such as the former.

[17] See C. Wardle & C. Derakhshan, *Information Disorder, Toward an interdisciplinary framework for research and policy making*, Strasbourg: Council of Europe. 2017.

the nature of the interaction and that might prejudice (or even endanger) the choices of the user, or, on the contrary, that might open new possibilities.

In DSFOne the choice has been made to keep to DigComp 2.1 for the time being (with the small changes outlined above and with the inclusion of *Transacting*), in order to ensure that we can engage fruitfully with the international DigComp community and can have a shared platform for comparability purposes (at least regarding the five competences in DigComp 2.1). Once DigComp 2.2 is finalised, the user digital skills component of DSFOne can then be updated/adapted accordingly.

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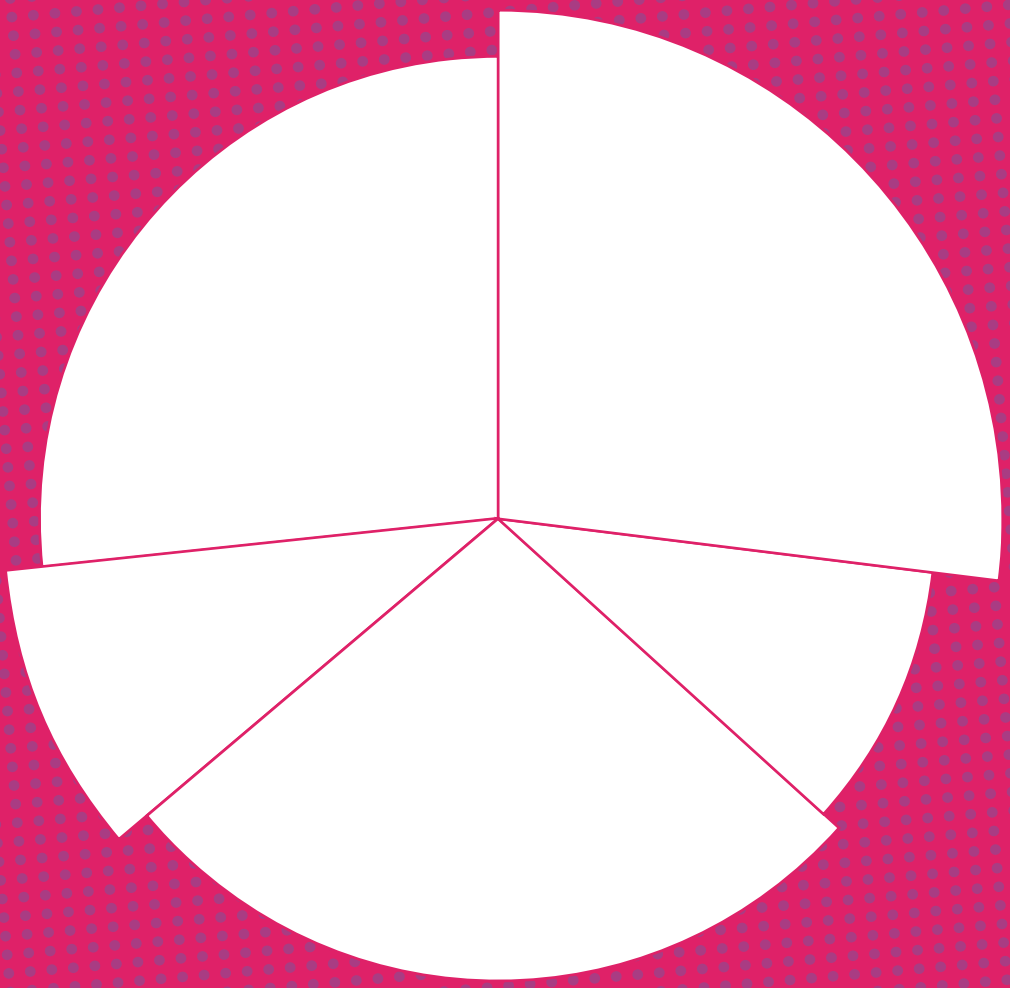
The latest versions of this *overview document* and of the *three posters* can be found on the website of the Western Cape CoLab for eInclusion and Social Innovation: www.wcapecolab.org/dsf1.



APPENDIX C

DSFOne - Poster 1

Digital Skills Framework One

Developed in the CoLab for eInclusion and Social Innovation, University of the Western Cape (UWC) Vs. 2.1 (Revised 2021)

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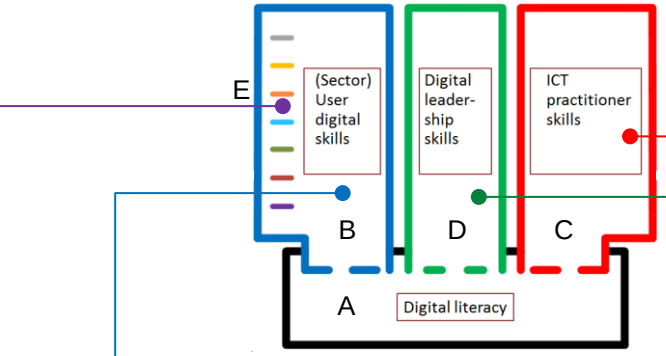
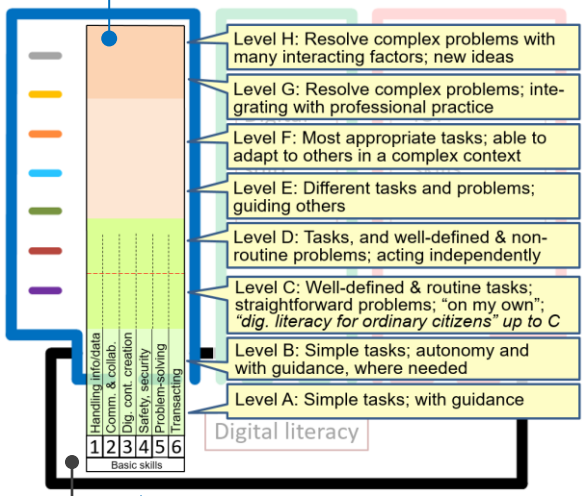


E. Sector user skills

The digital skills for work in a specific sector, type of organisation or profession. The skills sets must be worked out for each sector or profession.

Example:- new media:

1. Show understanding of the characteristics of the new media, convergence, etc.
2. Show understanding of digital formats, multi-platform requirements and copyright
3. Show mastery of key apps/suites in addition to the applicable general user skills
4. Demonstrate capabilities w.r.t. implementing advanced digital app combinations for handling multiple media sources
5. Demonstrate creative use of ICTs in the new media space (a.o. from concepts to visual and audio expressions).



B. User digital skills

Six competence areas are identified, each comprising of a number of competences (in this model referred to as "skills").

1. Handling information, data and digital content (incl. search, evaluation, storing)
2. Communication and collaboration
3. Digital content creation
4. Safety, security
5. Problem-solving
6. Transacting

At the lower end of the stack, provision is made for "basic skills" relating to the basic operations of digital devices, e.g. mouse, touch, connecting to wifi, etc.

8 proficiency levels are distinguished, in 4 categories: Foundational (A-B), Intermediate (C-D), Advanced (E-F), Highly specialised (G-H).

(For detail on the competences, see below.)

D. Digital leadership skills

"The capabilities needed to exploit opportunities provided by ICT, notably the Internet, digital devices and the new media,

* to ensure more efficient and effective performance of different types of organisations,
* to explore possibilities for new ways of conducting business and organisational processes,
* to establish new businesses, organisations, platforms, applications or interventions, and
* to effect innovation (incl. social innovation) through digital means."

(adapted from T. Hüsing et al., *e-Leadership: e-Skills for Competitiveness and Innovation*. Bonn. 2013)

A. Digital literacy

The ability of individuals to use digital tools and facilities to perform tasks, to solve problems, to communicate, to manage information, to collaborate, to create and share content and to build knowledge, in all areas of everyday life and for work.

Due to its widespread acceptance, the *DigComp* user skills framework of the EU (vs. 2.1) is accommodated here. Small changes are made and the competence "Transacting" is added, as in the *Essential Digital Skills Framework* (ESD) of the UK. The DigComp framework makes provision for proficiency levels from basic to specialised. For ordinary citizens: appropriate selection from levels A-C.

Competence areas and competences (skills) (examples):

1. Handling information, data and digital content
   - 1.1 Browsing, searching and filtering data, information & dig. content
   - 1.2 Evaluating data, information and digital content
   - 1.3 Managing data, information and digital content
2. Communication and collaboration
   - 2.1 Interacting through digital technologies
   - 2.2 Sharing through digital technologies
   - 2.3 Engaging in citizenship through digital technologies
   - 2.4 Collaborating through digital technologies
   - 2.5 Netiquette
   - 2.6 Managing digital identity
3. … (see further Poster 2).

In training, the various skills are developed through courses in MS Office / "G Suite" (Google), social media or other applications. Skills are device-independent, i.e. including mobile devices, or combinations of devices.

C. ICT Practitioner skills

C. Development & implementation:-
Systems development:
- Systems development management
- Systems design
- Software design
- Programming/software development
- Real-time/embedded systems dev.
- Animation development
- Data modelling and design
- Database design
- Network design
- Testing
- Safety engineering
- Information content authoring

User experience: …

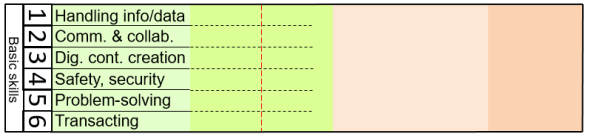
Installation and integration: …

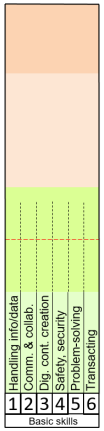
(*Detail of one of the categories in SFIA 7*. SFIA caters for recent approaches, such as Agile, DevOps, etc. through combinations of skills.)

SFIA is the most widely accepted framework for ICT practitioner skills.

SFIA (*Skills Framework for the Information Age*)		1. Follow	2. Assist	3. Apply	4. Enable	5. Ensure, advise	6. Initiate, influence	7. Set strategy, inspire, mobilise
A	Strategy and architecture							
B	Change and transformation							
C	Development and implementation							
D	Delivery and operation							
E	Skills and quality							
F	Relationships and engagement							

Digital Skills Framework One: Poster 2: Digital literacy & User skills

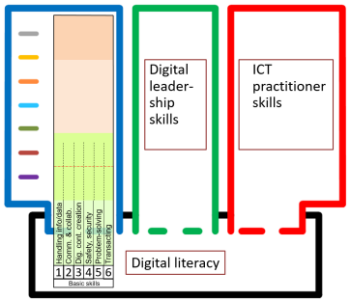


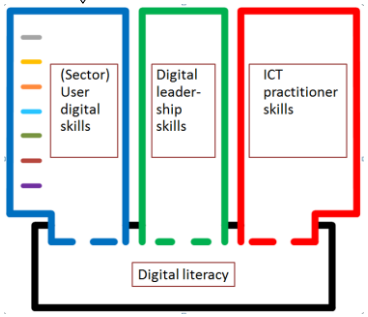


DSFOne-UDS ("User Digital Skills") is the sub-framework outlining the user digital skills stack of skills. The lower levels of this stack form what is called "digital literacy".

This sub-framework is based on the widely used DigComp framework developed in the European Union, This framework is sufficienty broad and inclusive to cater for a broad range of users. The competence "Transacting" was added to this framework (UDS) for use in ordinary settings where users use their digital devices for many daily transactions.

The columns in colour to the right indicate the levels on which the digital competences can manifest.

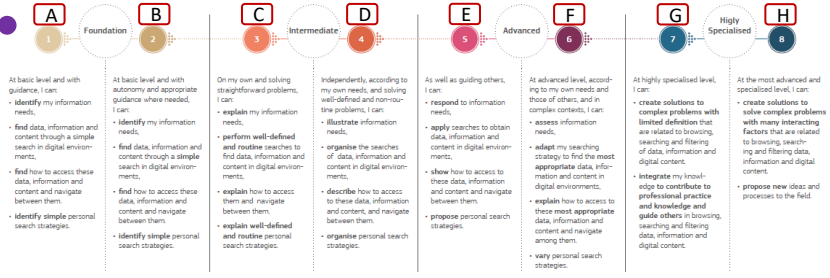




User digital skills (incl. "digital literacy")	Levels A-B: Foundational skills	Levels C-D: Intermediate skills	Levels E-F: Advanced skills	Levels G-H: Highly specialised skills
1. Handling information, data and digital content				
1.1 Browsing, searching, filtering data, inf. & digital content	Simple tasks; with guidance	Simple tasks; autonomy, and with guidance where needed	Tasks, and well-defined and non-routine problems; acting independently	Different tasks and problems; guiding others
1.2 Evaluating data, information and digital content				
1.3 Managing data, information and digital content				
2. Communication and collaboration				
2.1 Interacting through digital technologies				
2.2 Sharing through digital technologies				
2.3 Engaging in citizenship through digital technologies				
2.4 Collaborating through digital technologies				
2.5 Netiquette				
2.6 Managing digital identity				
3. Digital content creation				
3.1 Developing digital content		Well-defined and routine tasks; user acting "on her/his own"		Most appropriate tasks; able to adapt to others in a complex context
3.2 Integrating & re-elaborating digital content				
3.3 Copyright and licences				
3.4 "Programming" [for some: coding]				
4. Safety, security				
4.1 Protecting devices				
4.2 Protecting personal data and privacy				
4.3 Protecting health and well-being				
4.4 Protecting the environment				
5. Problem-solving				
5.1 Solving technical problems				Resolve complex problems; integrating with professional practice & guiding others
5.2 Identifying needs and technological responses				
5.3 Creatively using digital technologies				
5.4 Identifying digital competence needs				
6. Transacting				
6.1 Setting up online accounts (public or private services)				Resolve complex problems with many interacting factors; proposing new ideas
6.2 Managing money and transactions online				
6.3 Ordering items or services online and making payments				
Basic skills (handling devices, wifi, etc.) underlying all above.				
Ethical understanding and decision-making important for all.				

Typically regarded as "digital literacy"

This framework is built on the core concepts and content of the EU DigComp framework. Competence 6 ("Transacting") is added from the UK's EDS framework, due to its importance both for everyday device use and for business. This framework forms part of the broader comprehensive DSFOne framework. (Colab@uwc.ac.za)



Poster 2 (DSFOne-UDS) provides more detail on the user digital skills stack in the core framework (to the left).
Developed in the CoLab for eInclusion and Social Innovation, University of the Western Cape (UWC) 2021. Version 1.0

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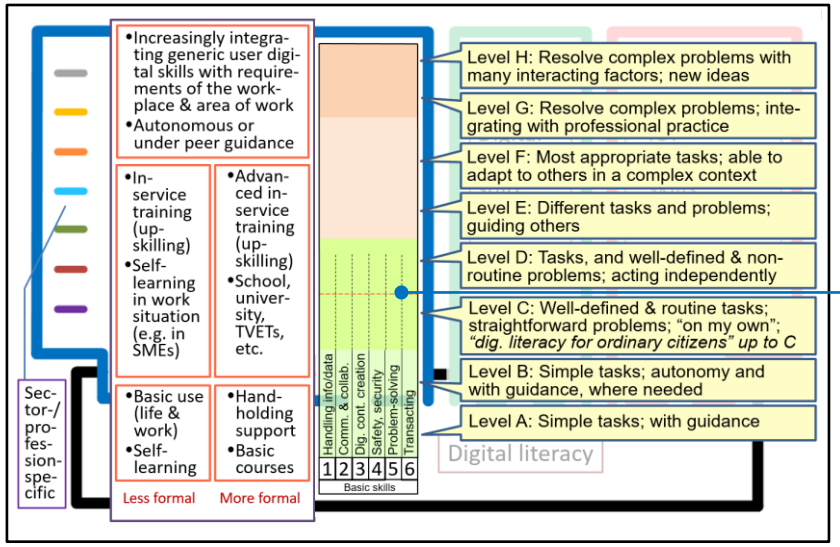
The graphic to the right is from the DigComp Guide (*The Digital Competence Framework for Citizens*. European Union. 2017). It indicates, as example, how the digital skill of "searching/browsing" manifests across the eight competence levels.

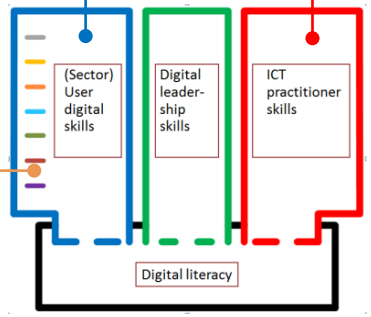
Digital Skills Framework One: Detail & Transformative digital technologies (TDTs)

DSFOne - Poster 3

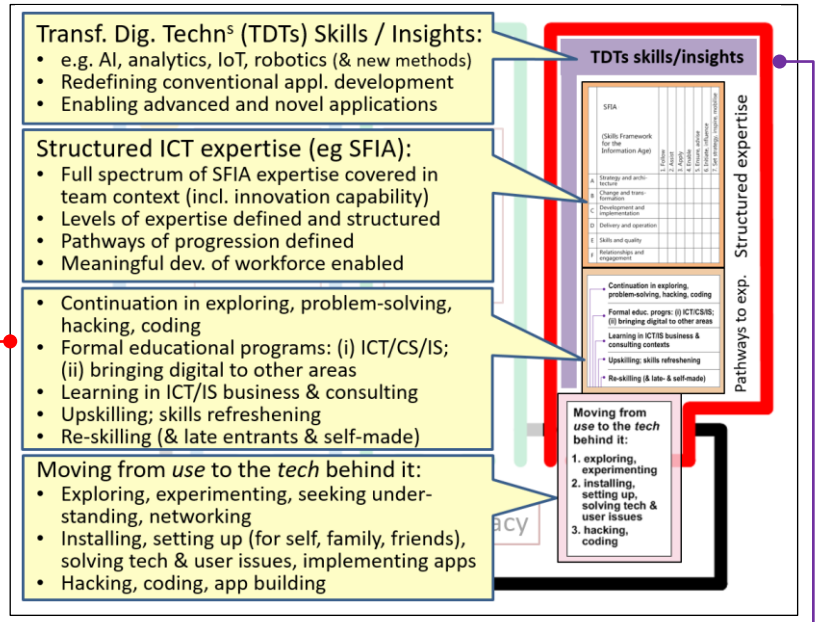
Learning pathways in user digital skills



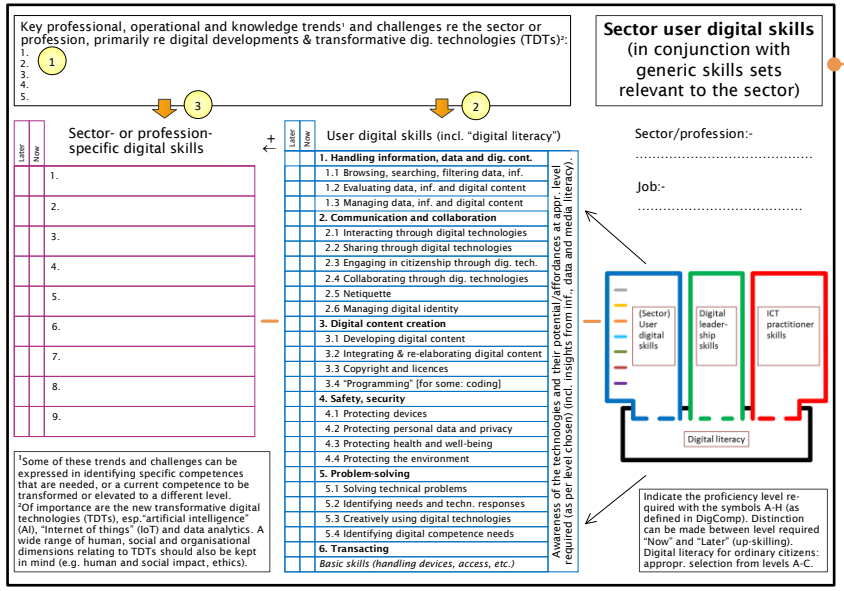
The "transformative digital technologies" (TDTs), also called "4IR technologies", comprise a wide range of technologies that can operate in their own right, but that often converge, thereby creating the opportunity for powerful and innovative applications, and for new business models. It is advisable to consider them in various ecosystems.



Learning pathways in practitioner skills



Determining digital skills sets in sectors



Some transformative digital technologies (TDTs):
1. Artificial Intelligence (AI)
2. Robotics
3. Internet of Things (IoT)
4. Data Analytics / "Big Data"
5. 3D Printing
6. Augmented Reality (AR)
7. Virtual Reality (VR)
8. Cloud Computing

This poster provides more detail on the basic poster developed in the Western Cape CoLab for eInclusion and Social Innovation, University of the Western Cape (UWC). Version 2.1 2021

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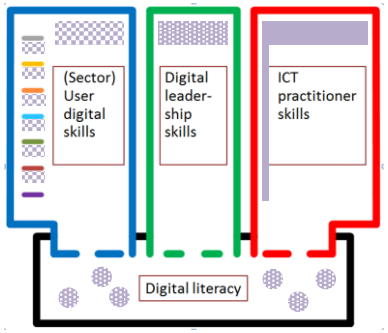
TDTs across the spectrum of digital skills

TDTs find a place across all components of DSFOne and hold the potential of transforming ICT / digital applications dramatically in terms of the ability to handle speed, connectedness, complexity, repetition, ubiquity, situation-/location-relatedness, alternative realities, rapid deployment (e.g. via cloud), sense-making of large data volumes, etc. AI, IoT and manifestations resulting from data analytics processes are particularly pervasive.



In the various components:

1. For digital literacy and (sector) user skills: embedded in many applications, sometimes without users even knowing it.
2. For ICT practitioners: used consciously and innovatively as part of their applications development toolbox.
3. In digital leadership: enabling the conceptualisation of new and innovative business models and applications.