TECHNOLOGY IN EDUCATION ROUNDTABLE

PREPARING SCHOOLS FOR THE 4IR

03-04- SEPTEMBER 2019

REQUIREMENTS OF PRESENTATION FOR CURRICULUM

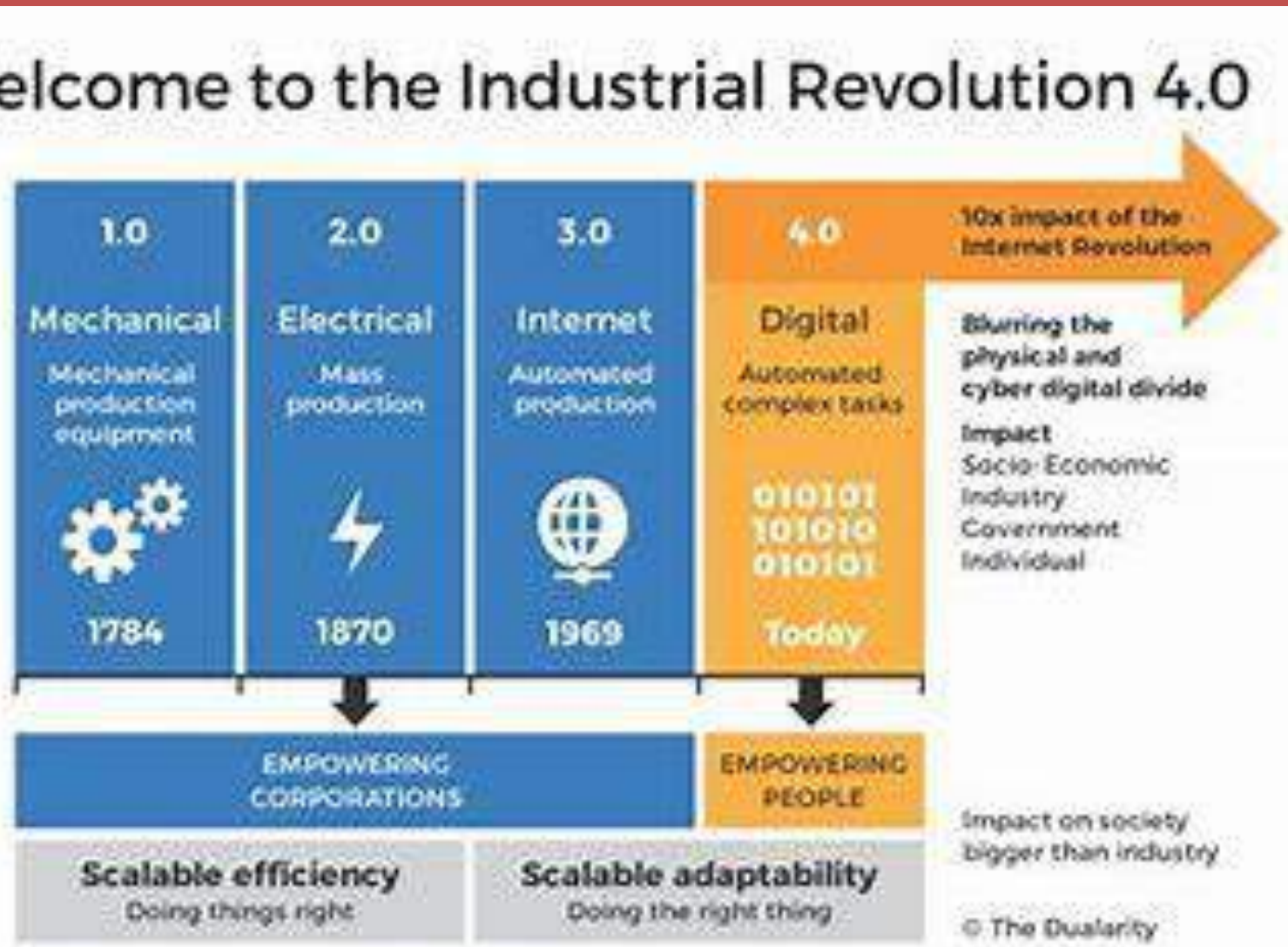
- How do we redo the new role of the Educator and the Subject Advisor in delivering the curriculum in an ICT enabled environment?
- How can ICT be utilised to transform the nature and process of learning?
- What is the level of readiness of the province in rolling out e-content provision an support?

WELCOME TO THE 4TH INDUSTRIAL REVOLUTION

- “We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society”.

Klaus Schwab, World Economic Forum

THE IMPACT OF THE 4IR ON SOCIETY



WHAT SCHOOLS NEED TO KNOW

Kerry J Kennedy, 2019.

- The Fourth Industrial Revolution (4IR) is not something that is being predicted – it is happening right now, here in South Africa and across the globe.
- There will be winners and losers from the 4IR. Now is the time both to understand exactly what 4IR is and prepare to master its influences rather than be mastered by them.
- Digital devices are now ever-present in modern societies and has changed people's lives in many ways but the devices themselves support and supplement basic human functions.

WHAT SCHOOLS NEED TO KNOW

- This so-called “digital revolution” is sometimes referred to as the Third Industrial Revolution (3IR) and it is basically over.
- Even though phone companies continue to upgrade and refine their products – better cameras, better wearable devices and larger processing capacity catering for what often seems like an infinite number of applications – it is product enhancement rather than innovation.
- The 4IR, on the other hand, is much more than the production of powerful devices.
- Like the digital revolution, 4IR relies on technologies, that have the capacity to perform what have until now been considered human tasks such as:

WHAT SCHOOLS NEED TO KNOW

- robots capable of giving directions at a railway station, or assisting with medical procedures or interacting with autistic children in classrooms.
- 3D printers capable of producing body parts, weapons or even houses.
- driverless cars.
- computers that do not need to be continuously programmed because they can re-programme themselves based on the data they collect and based on this data, they can make predictions about anything from identifying the optimal marketing strategy to who will win an election.
- artificial intelligence (AI) which relies on the data generated by a specific source is as is what drives social media such as Facebook, attracting advertisers but also to on-sell it to whoever is in the business of making use of such “big data”.

- What all of these examples have in common is that they demonstrate not just the development of new technologies, but the ways these technologies integrate human and technological capacities, often to perform tasks previously thought to be human.

WHAT SCHOOLS NEED TO KNOW

- The 4IR questions what it means to be human in the 21st century. It is a question that demands a firm response not just from economists and business leaders, but also from schools and education authorities.

- Learners in schools right now will graduate in the midst of 4IR and they need to be prepared.

- Schools can do three things when it comes to 4IR:
  - They can teach about 4IR in their Science, Technology, Engineering, Arts and Mathematics (STEAM) classes.
  - Learners need to understand what is happening in the world around them, how it is happening and why it is happening.
  - The 4IR is not a mystery and its basic processes can be the subject of investigation, questioning and interrogation.

- As shown in the collection of subjects above, this is not just about technology but about the arts as well, and this includes social sciences, philosophy and behavior (values attitudes, belief system).

WHAT SCHOOLS NEED TO KNOW

- The 4IR technologies have significant social implications related to job creation, employment opportunities, equality, racialisation and the ongoing development of a fair and just society.
- Learners should be taught to understand the scientific basis of these new technologies, but equally, they should also learn about their social impacts.
- Learners should be taught to be innovative and creative when it comes to new technologies, but they should also be able to question the underlying values and what is right and wrong in the use of such technologies.
- Gene editing, roboticised workforces, 3D-printed automatic weapons are not only technological advances, they also raise important questions about human values and how they might be preserved in this new world.

WHAT SCHOOLS NEED TO KNOW

- 4IR technologies that will impact learning are the following:
  - Social robots that have already been shown to be useful adjuncts in the teaching of learners with certain special needs.
  - Creation of databases of assessment items that can provide feedback to learners on their learning progress and based on learners' responses, computers can generate new items that respond to a learner's level of learning.
  - 3D printers are already in some school systems, requiring design skills of a very high order to create new and innovative products. It is not too much to say that 3D printing has turned design education on its head.
  - Virtual Reality has been shown to work throughout different levels of schooling, heightening subject engagement, enlivening teaching and facilitating learning. It can provide for independent and personalised learning even though the curriculum itself might be common since learners can dictate their own pace to move towards desired outcomes.

- Together, these 4IR technologies revolutionise what is meant by "school education" to make it not only engaging but relevant and linked to the real world.

WHAT SCHOOLS NEED TO KNOW

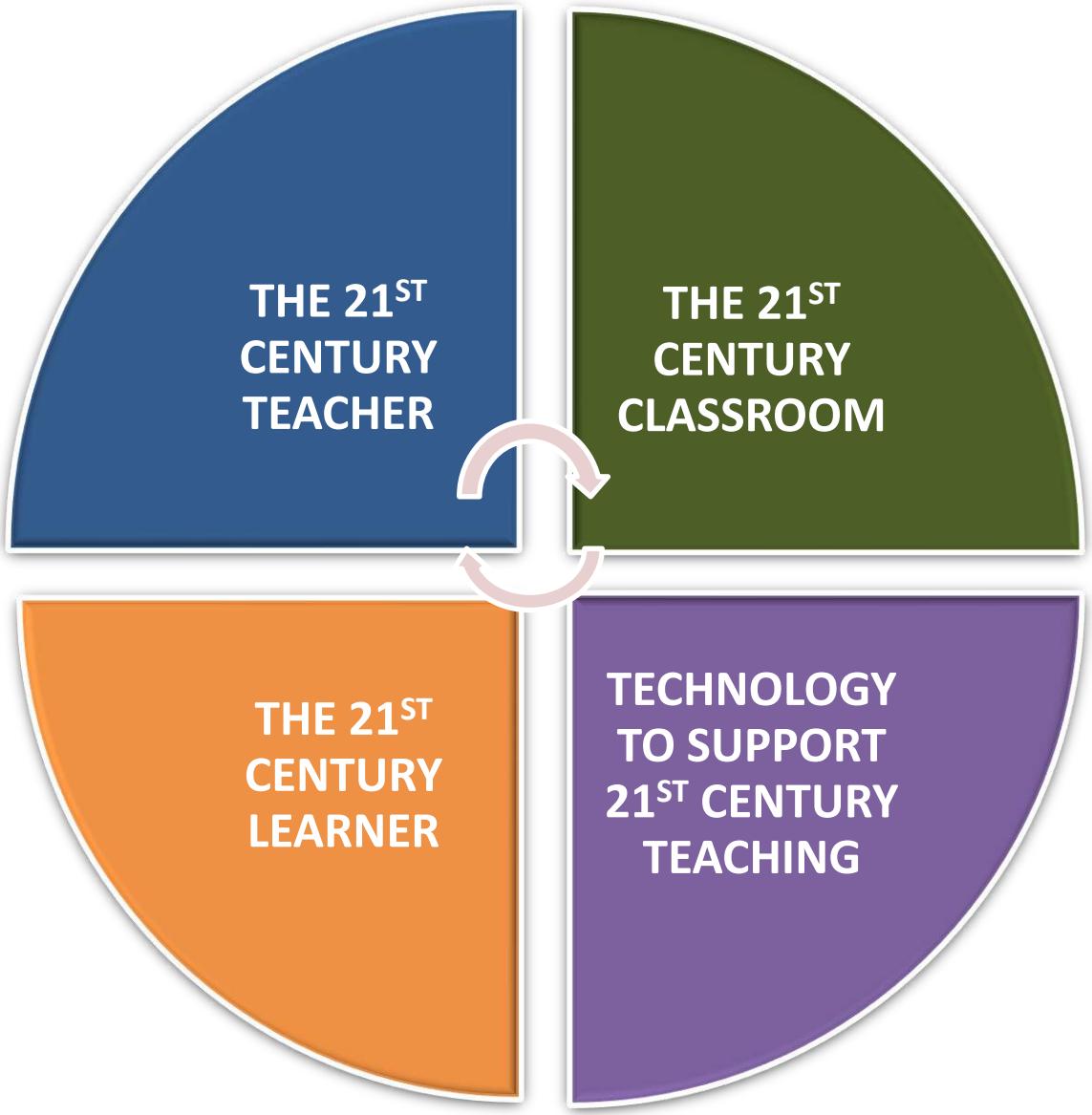
- Schools also have an important role to play in preparing learners for 4IR.
- Key skills and values for learners in the 4IR are **creativity, critical thinking** and **problem solving** – these have been widely endorsed and there should be nothing in the school curriculum that does not facilitate these skills and values.
- "Many people advocate that computer coding should form a component of the 4IR curriculum, but this misses the point. If computer coding leads to innovative, creative and critical thinking then it has a role to play, if it is about the routine application of rules then it does not. A robot can apply rules – **computer coding must contain elements that use human skills as well as technical skills**. This raises a key issue. Along with the skills and values referred to above, there must be one other key component: **the curriculum must teach learners what it means to be human.** Many commentators have made the point that if a robot can do it, it's not worth teaching. **What makes humans human** and how can they be more so: this **is an essential complement to being a creative, critical problem solver."** (Kerry J Kennedy 2019)

HOW DO WE BEGIN TO PREPARE SCHOOLS FOR THE 4IR ?

- The message here is for policymakers.
- Schools must be equipped for teaching with and about 4IR.
- Nineteenth-century schools do not prepare learners for the 21st century. Teachers must be prepared not with outdated teaching methods and approaches and a standardised curriculum that is not relevant to the 4IR.
- Resources are needed to transform education so it can meet the needs of 4IR. There is little to be gained form crying poor when it comes to resourcing this kind of education. Without such resources, the challenges will not be met and this will be to the detriment of the whole of society.
- In particular, however, it will affect the most vulnerable in society and those for whom schools are the only social safety net to making them 4IR-ready.

HOW DO WE BEGIN TO PREPARE SCHOOLS FOR THE 4IR ?

- If teachers do not actively integrate the use of technology in their teaching for authentic learning purposes, very little will change for learners (Lee, 2003).
- Contextual factors that could impede on the latter are:
  - knowledge and confidence levels of the teachers,
  - access learners and teachers have to ICT tools,
  - prevailing pedagogical thinking in the school,
  - leadership and technical support available,
  - social cohesion of the classroom, and
  - the extent to which learners have an audience for their work (Bennett & Lockyer, 2008; Kent, 2004).


THE 21ST CENTURY TEACHER
THE 21ST CENTURY CLASSROOM
THE 21ST CENTURY LEARNER
TECHNOLOGY TO SUPPORT 21ST CENTURY TEACHING

THE 21ST CENTURY TEACHER

- Is required to stay a step ahead to preserve their relevance in their careers.
- have to make use of desktop PCs, laptop PCs, and even mobile devices like tablets while carrying out their core duties.
- must be knowledgeable of computer related technologies. This, includes the world wide web, email, desktop conferencing, video conferencing, word processing skills, spreadsheets skills , data management, electronic presentation skills, networking, touch typing, internet navigating skills, coding, social media marketing, video design and editing, automation etc,
- Key areas for teachers to consider; 1. Digital Pedagogy, 2. Digital Content, 3. eLearning Spaces
  - Digital Pedagogy moves the focus from ICT tools and skills, to a way of working in the digital world.
  - Digital Literacy: access, manage, integrate, evaluate information.

THE 21ST CENTURY LEARNER

- It is essential for learners to exercise critical thinking, problem solving and creativity in their studies.
- Digital literacy is vital for learners to become confident, creative and productive in a digital world. It is also important for learners to understand the impact of ICT on society.
- Teachers must determine the level of each learner's competency and plan learning experiences to deepen digital proficiencies.
- Learners must be encouraged to continuously learn and upskill their knowledge to meet the ever-changing needs of the workforce.

THE 21ST CENTURY CLASSROOM

- Smart Classrooms represents a focus on re-orienting our school structures and business processes around individual learners and their learning needs.
- It is a transformative strategy to transition from traditional ways of working to a digital way of working that is meaningful, engaging and connected.
- The challenge lies in shifting from teaching and learning about ICT to teaching and learning with and through ICT.
- This means rather than using technology to do old things in new ways, we want to do new things in new ways and use technology to enable and transform teaching, learning and the curriculum.

TECHNOLOGY TO SUPPORT 21ST CENTURY TEACHING

- Finding the right tools for the right jobs increases performance and enhances your effectiveness.
- Teachers need technology that will ease their administrative and teaching load such as: apps to upload grades, monitor student performance, and administer tests input assignments and manage the curriculum.
- Learners need technology that can support their learning such as; having access to all the information their teachers add to their class page, check their grades, complete assignments, prepare them for the 4IR.

WILL TECHNOLOGY REPLACE TEACHERS?

- Introducing new technologies will not replace teachers.
- Experience from around the world shows us that, over time, teachers' roles become more central — and not peripheral — as a result of the introduction of new technologies.
- Introducing new technologies will, however, replace some of the things that teachers do — and require that teachers take on new, often times more sophisticated, duties and responsibilities.
- That said, teachers who don't use technology will be replaced by teachers who do.
- *And*: In places where there are currently *no* teachers, technology can help in some very useful ways to, *in part*, overcome this absence.

WILL TECHNOLOGY REPLACE TEACHERS?

- Technology can play a vital role in providing access to educational resources and opportunities for learners that are otherwise unattainable
- The role of the teacher is almost always more central, indeed fundamental, than it was before the introduction of technology.
- New technologies can, and no doubt eventually will, replace many of the routine administrative tasks typically handled by teachers, like taking attendance, entering marks into a grading book, etc.
- **The introduction of new technologies over time typically means that *more* is asked of teachers, not less.**

THANK YOU