Leading From The Future

The key to effective educational leadership in the 21st century

By Ted McCain and Ian Jukes © 2007

Education is a tough job

- Although not acknowledged by many being in education today is not easy

- We face rising costs at the same time we see shrinking funding

- We must deal with radically changing demographics and an explosion of ESL students

- We also see a significant number of students coming from broken

- Plus kids are coming to school without the support they once had

- Parents are struggling to make ends meet - most with both parents working - and they can't do it all

- So we are seeing new improvised ways to parent

- The pressure of modern life taking its toll on parents and consequently on kids

- Kids are feeling unimportant - acting out their fears, insecurities and abuse in increasingly disturbing behavior at school

- Against this backdrop we are being asked to do more

- Increased testing and accountability issues

- Technology programs - healthy schools programs

- Criminal record checks for staff and on and on

- It's a challenge just to manage the system each and every day

- But for administrators there's more - you are expected to be educational leaders - the ones who inspire your staff to seek excellence - who lead other educators into positive changes that will better serve the needs of students

- It seems impossible to meet these expectations doesn't it?

- It's easier to just manage what it is and not worry about fostering something new

- Leadership just seems like too much work

- But in my view, in these turbulent times of the 21st century, those who are just educational managers - while they may have short term success - will let their staff and their students down in the long run

- To be truly effective in the long term it will be critical for you perform a delicate balancing act between day to day management and visionary inspiration

- From your studies to become an administrator you know there are many aspects to leadership

- But I want to highlight an important new aspect of leadership that is not often addressed in the literature

- In my view, in the world of the 21st century, this aspect of leadership is more important

than all others

It is to lead from the future

- So what does this mean?
- As any book will tell you - leadership begins with a clear vision of where you want to go
- Effective leaders articulate that vision and inspire people to follow
- And there is the rub
- Developing a vision is getting harder
- And I have a shocking statement to make - one that will likely be an affront to most of you
- In the 21st century the past is becoming increasingly irrelevant
- Up until now we've been able to use the past as an effective guide to plan the future
- That's why we have placed so much value on the past experience a person has when hiring them for management/leadership positions
- But in the topsy-turvy world of today - experience is becoming a liability - some of the companies actually disqualify a person for a job if they have too much experience - because their experience indicates they are too married to the past
- To be effective today we must let go of much of what we have come to know about education
- And as we try to develop the vision of where we want our schools to be - dealing with change will be our greatest challenge
- Change has always been sneaky
- It always seems to happens when we are busy doing something else - it progresses until it reaches a point where we are astounded by the difference
- But now change is different
- While change has always been with us - life used to be much more predictable
- Now change seems to happen overnight
- Take the WWW - only a hand full of users at end of 1993
- It was so insignificant that there was little commerce on WWW in 1994
- And that prompted Bill Gates to say at COMDEX that year - "I see no commercial value on the Internet for at least 10 years"
- But then in 1995 a student at the University of Illinois writes a program called Mosaic and the WWW takes off
- Let's see if Bill had it right…
- From a handful of users of the Web in 1993, there are now over 1 billion users world wide in 170 countries
- Every day
  -144,000 new users
  - 3 million new Web pages
  -10 billion instant messages
  -19 billion emails, 9 billion SPAMS

- The number of web pages is tripling every year

- In 12 years - WWW now represents over $5 trillion of business - but as fantastic as this seems, what is truly astounding is that no one saw it coming - it just exploded onto the scene

- What's going on here? How could all this happen in just 12 years?

- What we are seeing is the result of change that is occurring exponentially

- Expert after expert are telling us that changes in life are now following an exponential pattern of development

- That this is the new nature of life that we must come to terms with

- Let's stop for a moment and consider what this kind of change looks like…

- And it will reveal a profound truth about the new nature of change that we must all deal with in 21st century life

- But before we look at the new kind of change - let's remind ourselves of how it's always been

- All through history we have dealt with linear change - change that adds a constant when we graph it

- For example - if you had a plant that had a linear growing pattern that would grow to fill a window in 30 days

- After 10 days you would see 1/3rd - after 15 days you would see 1/2 - after 20 days you would see 2/3rds and so on

- The growth would be easily predictable

The Power of Doubling

- But what if that plant grew to fill the window

- With an exponential 30 day growing pattern?

- One where it doubles in size daily

The Power of Doubling: Day 28

- This plant appears defective – only a quarter of the window is covered and there's only 2 days left

The Power of Doubling: Day 29

- Finally we begin to see some growth, but there's no time left

- It seems incomprehensible that the plant can grow to fill the window

The Power of Doubling: Day 30

- Bang - the plant explodes into view

- The entire window is covered and it seems like it happened all in one day!

- This is the power of doubling

- By time we notice something is happening - the exponential growth pattern is about to really kick in

- And developments explode onto the scene with dramatic effect
- It is critical that you understand that this kind growth will be behind most of the change we will see in the rest of our lives
- Our students will spend their entire lives in 21st century - a world unlike anything - we have ever seen in human history
- It is critical that we grasp that the kind of exponential change we just saw is the norm for this new world
- Where astounding new developments explode onto the scene shortly after you first notice them as they reach their Day 29 and 30 of growth
- This has huge implications for life – even greater for education
- Summed up in this quote - from the former US secretary of education…
- Students in school today will solve problems not dreamed of yet, using technology not invented yet, in jobs that do not yet exist – Richard Reilly
- We are about to be hit with change that is so momentous, so life changing it will be staggering
- And nothing in our past will prepare us for what is about to happen
- When you return to you schools in the fall - it will probably look like it always has
- But in times of radical change - your eyes can fool you - you think you are seeing the reality of today - but in fact, you are only seeing the past
- Because people are already busy inventing the future and with exponential change - it will arrive sooner than you think and with enormous effect
- Just like the Internet changed life radically in a short time - there will be other changes with even more impact coming soon
- It can't be business as usual
- So how do you create an effective vision for your schools in an exponentially changing world?
- How do you provide effective leadership when fundamental uncertainty is norm?
- The only way I would suggest to you is that you must lead from the future
- What does that mean?
- It means you cannot deal with what is because world is now a moving target
- That is why those who are only educational managers will let their students down
- A focus on the immediate needs of the school system means students will not be prepared when the world changes
- The only way you can prepare students for a moving world is to project where it will be when they arrive - to have a vision of the future
- In the same way a quarterback leads a receiver who is moving - educational leaders must think ahead to see what's coming
- Only then can you make effective decisions today that will ensure the future success of

students

- So how do you see the future? The only way is to think in terms of trends

- There are many trends that we could look at - but let's focus on 5 key areas that will radically change life much more quickly than you think

- It is critical to keep in mind that the exponential development behind these trends is at least doubling - in some cases tripling or more

- So here are some exponential trends to consider…

1. Awesome Technological Power

- The astounding changes we have seen in the modern world have been fueled by increasing technological power

- But there's much more coming than we have seen to date

- To get a sense of where things are headed we must understand that technological development is following Moore's Law

- In 1965 Gordon Moore (the co-founder of Intel) wrote a journal article in which he predicted that technological power would double every 18 months while costing half as much over the same period of time

- Is this true? And if so, what does it mean?

- I remember sitting with my friend Ian Jukes thinking about this a few years ago wrestling with the meaning of Moore's Law and I decided to create a spreadsheet that illustrated the math

- To our surprise we discovered that the math of Moore's Law matched perfectly with the reality of the development of computer power

- This graph shows you what we found…

- What does the future hold?

- Moore was interviewed recently and said he sees no diminishing for at least 15 years

- But - recent breakthroughs at IBM and HP in molecular electronics lead many to believe that Moore's Law will continue much longer

- The extrapolation of this trend is unbelievable!

- I want to see where we'll be in 10 years

- But before we look at that let's consider some new developments that are on the horizon…

- I want to talk about nanotechnology - this is the world of the incredibly small

- Not making things smaller but building things up one atom at a time

- This was first done by IBM several years ago when they used 35 precisely placed Xenon atoms to spell out IBM logo

- Nanotechnology will be used to greatly boost tech power

- In Ray Kurzweil's book The Age of Spiritual Machines - he talks about the Law of Accelerating Returns

- He says that as Moore's Law starts to diminish it will be superceded by 3 dimensional nanotechnology chip designs, nanotubes, silicon photonics
- This will increase technology speeds by a factor of many millions
- Consequently we can see a continuum of astounding technological development that extends at least 50 years perhaps as much as 100 years into the future
- In his new book, The Singularity is Near, Kurzweil tells us that due to nanotechnology Moore's Law will be adjusted again by the year 2010 to doubling in power every 6 months
- Here's what that does to our graph looking just 10 years into the future…
- What you must see is that raw technological power is the foundation of the astounding developments we will see in the future
- This explosion in power will soon make possible many new features of technology that seem only in the realm of science fiction today
- Now this is conceptual dynamite just by itself!
- But it's not just about exponential growth in raw computing power
- To see where things really going you must combine this with…

2. Bio-embedded technology

- Technology is going to become much more personal - not just portable - but embedded
- Let's look at just a few of the projects that are being worked on to embed technology into the human body…
- Nanotechnology is being developed for medicine - nanobots - microscopic computers and machines – so small that you can't see them – that will be swallowed or injected
- Example - for high cholesterol microscopic technology injected to Roto Rooter arteries
- They are already projecting non-invasive surgeries of our neurological system
- To inspect, repair and even rebuild replace dysfunctional nerves
- To create brain pacemakers that silence neurons that malfunction in neurological disorders such as epilepsy
- They hope to cure paralysis and brain damage
- And there's more…
- Looking at the tooth phone – it transmits sound from tooth to jaw to ear – the sound clarity is exceptional – and it's completely discrete - no one knows you're listening to someone talk
- This is the Virtual Retinal Display
- They have been doing cornea replacements for years - gives patient 20/20 vision
- But now a new replacement that has a wireless receiver
- Provides a connection to computer or TV
- Close your eyes and watch movie or surf the Net
- Or have computer display superimposed over reality
- How many of you know the story of the singer Stevie Wonder

- Wanted to be a Guinea Pig for new electronic eye - it sounds unbelievable doesn't it?
- Well believe it - it has arrived
- You are looking at the first truly portable and effective electronic eye just implanted in a blind man
- All of the electronic equipment is in the belt around his waist
- It is based on the development of neuro-electronic circuits
- Connecting the brain to electronic technology
- This is an actual picture of the man's head
- It may make you feel uneasy, but for this man it was liberating
- The day the electronic eye became operational - this is what he did…
- He went out in the parking lot behind the doctor's office and drove his car
- But there's more…
- This is a snail's brain connecting to a computer
- You may scoff but they are actually working on the human/machine interface
- They are working on the natural control of artificial limbs
- But also on interfacing the brain to non-biological memory and processing
- Remember that exponential development of tech power underlies this trend
- Technology is going to become very personal indeed and it's going to happen faster than you think

3. Transparency

- How many of you have difficulty with computers because of the frigging keyboard?
- The problem is that the interface between you and the computer is getting in the way
- The interface problem has been with us for a long time and people have been working hard on the ease of use issue
- An over-riding trend in computing is to make computer use more natural
- The goal is the Captain Picard model for computer use - natural interaction - personal attention - intelligent response
- Let's see how close we are getting by following the progression of the human/computer interface…

The first computers

- Had to be rewired to change the program
- But changing programs got a whole lot easier with the development of card reader computers
- But it still wasn't natural
- Not only did you have to type - you then had to feed the cards through a reader and wait for the output
- Not very user-friendly

Command line computers

- Computers with TV monitors and a prompt for entering commands
- CPM - PC DOS - MS DOS and others
- It was easier but computer use was still painful

Mouse controlled computers

- In 1984 Apple introduced the Macintosh and an entirely new way of communicating with a computer
- The GUI interface and mouse control
- It was a such a huge conceptual breakthrough that it is still in use today
- And because it persists many people think interface development has stopped here
- Not so

Hand-held computers

- They are cell phones but so much more
- Also recognizes hand writing
- But more devices coming onto market
- More natural use is coming…

Embedded devices

- Technology is now being embedded into everyday devices with remarkable effect
- Devices like the Anoto Chatpen and Quillwriter
- Takes hand writing and coverts it to text using sensors, gyros and accelerometers
- You can draft out a message and then press a button to send an e-mail
- or beam it to your computer for publishing

Voice activated computers

- Voice recognition just now taking off
- Via Voice and others
- 15 years before they expected
- This is the Mentis computer
- It features voice activation for hands-free use in the workplace
- But this technology is now moving into consumer products
- Samsung SGH-P207
- A cell phone with a difference - it has CVR voice recognition software that converts voice to text
- Dictate an e-mail, letter or essay
- Projected cost - $100

Eye monitoring computers

- One of the next big areas of development
- Menus appear in peripheral vision

- Computer monitors your eyes - look at something and speak - computer responds
- Already a reality in military use
- A while ago I sat dumfounded as I watched a man place a strap (Mindlink) around his forehead and navigated through a 3D maze on a computer screen by thinking
- Now the interface was crude and imperfect, but in age of exponential development, if they are working on it, look out!

The Missing Piece?

- Captain Picard use will only come with artificial intelligence programming to process high level communication
- Already happening - must remember the trickle down effect - much work done that we don't see yet - but we can see the signs
- Amazon.com has intelligent software that tells you if you bought a certain book, here are other books that people also bought when they bought that book
- Machines with automatic functions - have you seen the new cars that will parallel park themselves?
- Then there's Vic - an AI tutor from University of Florida that responds to medical students' oral questions and provides assistance from its growing database of medical knowledge
- Remember that exponential development of tech power is behind this trend
- Sooner than you think we will see completely natural and transparent communication with electronic tools

4. Universal Connectivity

- We are just beginning to develop universal connectivity
- Real speed is just coming into view
  - 2006 - Alcatel/NEC - crystal dark fiber
  - 10 trillion bps down single glass fiber
- George Gilder in his new book Telecosm talks about Law of the Photon - what he says is that since 1983, when the first fiber line was installed between NY and Washington, DC that
- Bandwidth speed and capacity per dollar tripling every 12 months
- He projects this will continue for the next 20 years
- But amazing as this is - it's only a part of the story...
- True universal connectivity can only come from cables and wireless access
- Did you realize that as of today there is already more wireless Internet access than from desktop?
- And think of the power of universal access to network resources - just beginning to see it
- Here's an example - it's a vending machine in Tokyo - you use your cell phone to buy your drinks
- This is the power of networks
- And remember that exponential development of tech power is behind this trend

- Sooner than you think we will have universal access to the networked world

5. Hyper Information

- Exponential growth in technological power has had an incredible impact on the shear volume of information available in the modern world

- How many of you have a "to be read" pile?
  How many of you are reading it?
  It's getting harder to keep up isn't it?

- You are experiencing the effects of a powerful 21st century trend

- We're drowning in data - the amount of data in the world has gone crazy!

- According to research from U of California Berkeley the world produced 5 billion gigabytes of digital information in 2003

- That's like a stack of books that reaches one third of the way from earth to the sun

- Remember we said we are dealing with exponential trends?

- Here's what happened last year…

- According to the Expanding Digital Universe IDC Whitepaper the world generated 161 billion gigabytes of digital information in 2006

- That's 161 exabytes - that's like 12 stacks of books that reach from earth to the sun

- Or think of it as 3 million times more information than in all the books ever written

- And all that in just 1 year!

- By 2010 estimates are that the world will generate 988 exabytes of digital information

- And it just keeps growing exponentially into the future

- Here's another way to see what is happening to information in the world

- George Gilder estimates that the amount of unique new technical information is now doubling every year

- Gilder estimates - it will be doubling every 2 weeks within 2 years

- By 2012 it will be doubling every 72 hours

- We are in a world of disposable information – data that has shelf-life that is getting shorter each day

- But it's much more than just the amount of information - it's the kind of information and how it's interconnected

- There is a profound shift in information taking place even as we speak

- It involves the creation of a digital library of great literary works

- Google started this shift when it announced in December 2004 it would digitize all of the books in 5 major research libraries (Stanford U, Harvard U, Oxford U, U of Michigan and New York Public Library)

- Google is now partnering with several major publishing companies to digitize vast numbers of out of print books and excerpts from books currently in print

- Also in 2004, Raj Reddy, professor at Carnegie Mellon U began scanning books from his

U's library - Called the Million Book Project - goal a million books by 2008

- Superstar, a company based in Bejing, has scanned every book from 200 libraries in China - half of all the books published in the Chinese language since 1949
- There is a rapidly growing digital library of digital books being created
- Just think of what will be available when people do searches
- But it is much more than just access…
- The magic is in how the information in each book is linked to the information in every other book
- Just imagine being able to jump to each book in a bibliography to see the context of quotes
- Or being able to assemble all of the passages from all digital books on a specific term or concept
- Or accessing all of the works with an opinion on a particular issue
- And we are only talking about print here - what happens when recordings and film is linked to the books in the same way?
- This leads to an important aspect of the modern world that you simply must grasp
- The very nature of information is changing
- The very way information is communicated is changing
- This has been missed by many educators
- Many teachers still think that it is a text-based world and they use textbooks and continue to use paper-based textual information in the classroom – it hasn't been a text-based world for many years
- Since we are in a communication business it is critical we catch up with the rest of the world
- You must get your head around the fact that the world has already made the transition from reading to the viewing and listening of information
- TV, computers, X-Box, the Internet and cell phones - these have had a profound effect on how information is received
- Educators must catch up quickly because next big transition is just around the corner
- We are on the cusp of moving from viewing and listening of information to experiencing information
- The indications are already here…
- CAD systems are adding 3D features that let you walk around a virtual building
- But if you really want to see the rapid emergence of 3D virtual worlds then you need to look at game development - a realm that few of us enter which is why we miss this
- But just play World of Warcraft or Halo and it will give you an idea of where we're headed
- Right now the Internet is a 2D experience
- But sooner than you think - people will put on a headset and walk around on the 3D Internet

- This will be another profound shift in the way information is received and processed

Putting it into perspective

- This will impact on every aspect of our lives

- Changing forever the way we do things

- This is more significant than the printing press, electricity, the telephone or the automobile

- We are talking about a world-wide network of telephones, TV, cable, satellites and computers

- Using personal pocket and embedded technology

- Connecting everyone to everything

- We are seeing the convergence of all major knowledge, information and communication industries around the networked digital PDA

- With information presented in an engaging graphical 3D format

It's affecting our kids

- Electronic technology affects those who use it - and I don't mean you - you dabble with technology - kids live with it

- What you need to know is that digital technology and online experiences have already profoundly affected the minds of young people today

- A phenomenon immediately recognized by parents but not widely considered by most educators

- Kids live in fast forward - research now confirming that the visual and auditory presentation of information is actually rewiring kids brains

- Bradsford (How we learn)
  DeSousa (How the Brain Learns)
  Center for Media Education (New Digital Landscape www.cme.org)

- In these publications we find that kids are actually using different parts of their brains than older generations

- Most educators are oblivious to this change and continue to teach as if its 1975

- Digital kids are than we were growing up - not just a little, but fundamentally different

- They crave access to tools that let them network with their peers or anyone or anything else they choose to interact with

- And it's second nature for them to multitask

- They use technology transparently, without thinking about it, without marveling at it, without wondering about how it works

- This is the 1st generation that has ever mastered innovative technological tools central to society before the older generations

- Digital is their native language - they're what Marc Prensky calls digital natives

- Research is confirming that they aren't like us

- Neuroinformatics has emerged in the last 10 years

- This involves the analysis of brain processes by means of neural scanning and imaging
- Using the incredible number-crunching power of computers and our growing understanding of the chemistry and biology of the brain
- Combined with powerful scanners called FMRI's that allow us to examine living brains non-invasively while they're in the process of thinking
- Using this technology, researchers can view in real time and in 3D what parts of the brain and what specific neural circuitry are being used during specific mental processes
- These techniques allow researchers to pinpoint to within a few mm the parts of the brain that "light up" when people move a finger, feel sad, add 2 plus 2, or do specific tasks
- This technology is helping scientists understand how different areas of the brain interact to handle thinking and information processing
- Although this research is still early on
- Researchers like Johnson, Restak, Rushkoff, Erik Jensen and others are telling us if you were to take an electronic scan of our parents' brains and compare it to a scan of our brains, we would quickly discover that we use slightly different neural pathways to process the same information than our parents do
- In the same manner, if we were to take an electronic scan of our brains and compare them to scans of our kids' brains
- We would find that they use fundamentally different neural pathways to take in, process and store the same information we do
- We see this particularly in the area of the visual cortex
- According to Eric Jensen at least 87% of students in any given classroom are not auditory or text-based learners
- They're either visual or visual kinesthetic learners
- There is a huge gap of understanding exists between us (the over 30 crowd) and them

Consider the possibilities…

- Students walking into classrooms with portable and/or embedded technology - technology that will increasingly bring those with disabilities into the mainstream
- Technology that has a natural interface for incredible ease of use - features accessed by voice or eye movement
- With devices connected wirelessly to a global digital network with instantaneous access to the latest information
- Devices that will let them leave the classroom and enter virtual worlds to experience the latest breaking news - to wonder around the Pyramids - to ride the space shuttle
- Plus these kids will process the information they encounter differently than their teachers

Some critical questions…

- What will it mean to be educated in this environment?
- Will low level information recall skills help students deal with the power of the new technologies?
- And will the emphasis on information recall we currently have be relevant in a world of

instantaneous access to a world-wide digital network - where students can access data when needed?

- And how do you memorize in a world where information is growing exponentially?
- Of course students must know a certain body of information to be educated
- And of course some of the great works in human history won't change
- And of course we need to deal with the management issues surrounding the accountability items in current legislation
- But these must be balanced with what will be required to prepare students for the advanced technological world of the 21st century
- The information I have presented compels us to do more to prepare our students
- I believe strongly that educational leadership must be based on a vision of what students will need in the future addition to what we now give them
- We must see that education of our students is much more than the current focus
- We must realize that the system will not react quickly enough to the exponential changes occurring
- So it is up to us as leaders to supplement what we have to teach with what we need to teach and to challenge and inspire our colleagues to do the same
- As the front line administrators in schools - I appeal to you to be the educational leaders the system so desperately needs
- I know you already have a difficult job - but your students need you to step up
- To look for the creative ways to ensure that kids get the kind of education that will prepare them for life in the 21st century
- So just exactly what do we need to do to help students thrive in this new world?
- The first thing we must do is help teachers understand that kids today think differently than we do - that they have different learning preferences
- Then we need to look at the skills students will need for the modern life
- In addition to the 3 R's we currently focus on - we must also teach the 8 I's
- These 8 I's are the basic literacy skills all students need for success in the 21st century
- This is a key point - these are skills are not optional in the modern world
- Here are 8 mental skill areas that need to be addressed…

Teaching the 8 I's

- Information technology skills
  - it is important that all students have the skills required to use the technology that is driving the economy
  - but the technology skills cannot be the focus because what you do with it is far for important than just being able to use it

- Information processing skills
  - These are the higher level thinking skills required to process, sort, rank, compare, contrast, analyze, synthesize, and evaluate the information retrieved with information

technology skills

- Information presentation skills
  - We must convince teachers that it's already a graphical world - photos, web, videos, games
  - In this multimedia world it's not enough to be able to get and process information
  - you also have to be able to communicate your ideas effectively in the graphical environment of 21st century life

- Independent problem solving skills
  - those skills that empower students to operate independently in the real world
  - we must teach our students the structured process to follow to solve problems on their own

- Interdependent team-working skills
  - many still view this as cheating in school
  - But co-operative group skills are already a must in a networked world

- Initiative skills
  - skills that enable students to take control of their lives and their careers
  - The reality is that many of our students will become entrepreneurs in the age of down-sizing and contracting out in modern business
  - time management
  - stress management
  - goal setting
  - self assessment

- Idea creation skills
  - those skills that empower people to be creative
  - teaching students the value of productive failure
  - that virtually all advances in human history have come from trial and error learning – learning that came from mistakes

- Integrated content skills
  - teaching the content from traditional subjects in an integrated, holistic approach that reflects the reality of the world outside school

- To do this - vision is required…

- With the huge changes we have discussed on the horizon it is easy to throw up your hands and give up on looking at what is coming and simply focus on managing what exists today
  - just focusing on short term demands of our job
  - just getting kids ready for the test
  - just dealing with getting through the day

- But the future is too important to ignore because our students will live the rest of their lives in the future

- They need us to be forward-thinking to get them ready for success when they leave us

- They need us to be people of vision - Vision is the key to effective leadership

- This is beautifully summed up in the following quote from Helen Keller – The only thing

worse than not being able to see, is being able to see and having no vision

- But there's more…
- We must also acknowledge our ignorance of this new age
- It's time for us to let go of our pride in being highly trained experts
- Because that training was based on 20th century thinking
- In the 21st century we are all facing a new world with new ways of doing things
- It is critical that we all become learners in this new environment
- I think this quote from Eric Hoffer captures this best…
- In times of radical change, the learners inherit the earth, while the learned find themselves perfectly equipped for a world that no longer exists