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African Advanced Institute for Information & Communications Technology

Are Scientists, Engineers and Technologists born or can we nurture them?

Project Director – YESA Programme

Uluwazi Project Connected we Learn

YESA Young Engineers of South Africa

AFRICAN SCIENCE COMMUNICATION CONFERENCE

SCIENCE IN SOCIETY | SOCIETY IN SCIENCE

Key Concepts

- Need for sustained skills development in key areas
- Forced to continue importing professionals
- Poor quality teaching in the areas of Science, Mathematics and Technology
- Education system promotes mediocrity through a sausage factory
- Young Engineers of South Africa (YESA)
  - aimed at generating a pipeline
  - stimulating interventions starting at preschool level through to grade 12
  - hands on challenges which promote the use of real-world tools, with a strong ICT foundation
  - encourages creativity and innovation leading to knowledge generation
  - group work, communication, research, application, construction and fun learning
- More career changing interventions
- Career guidance and entrepreneurial opportunities

THERE ARE NO FAILURES

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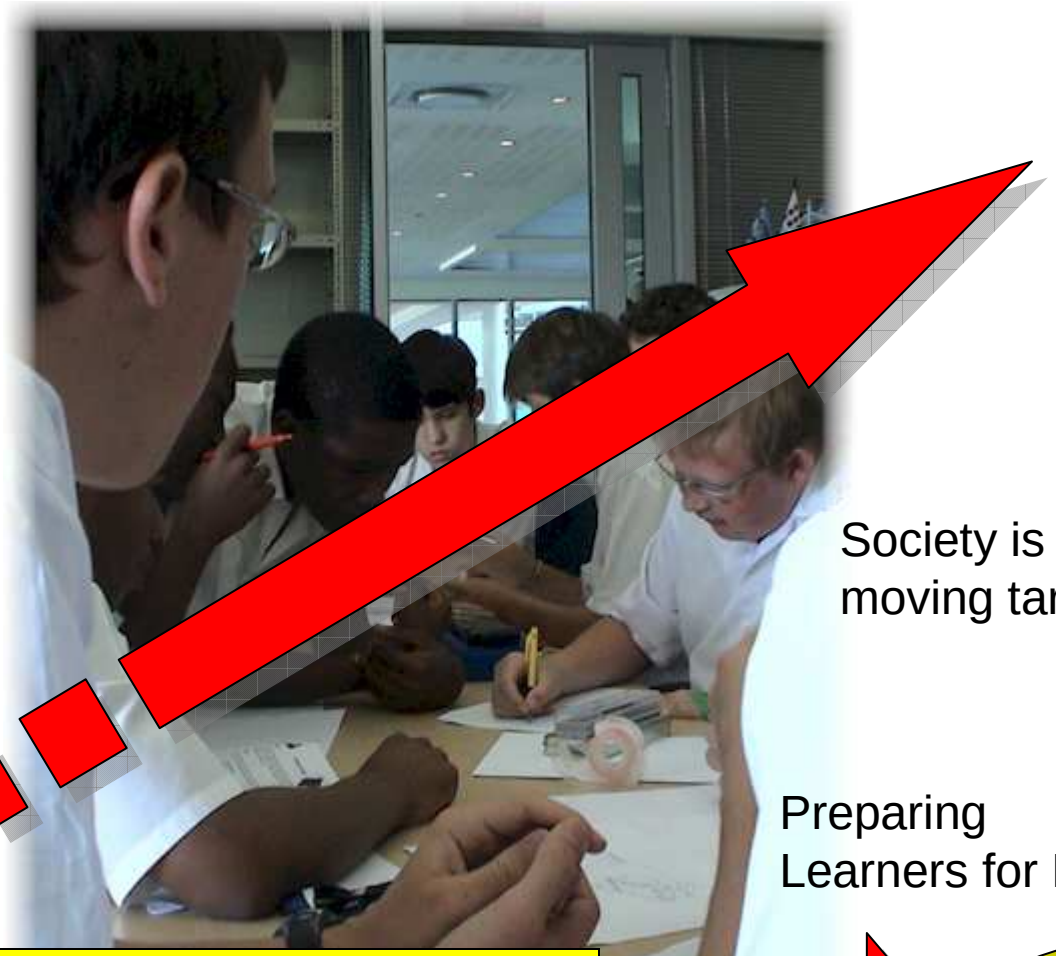
Teaching for a society that no longer exists

There is a need to shift the focus of education



Society is a moving target

Preparing Learners for Life

12 years of education

Society

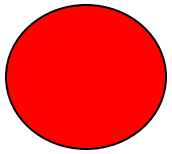
The Zeitgeist
Nature / Nurture debate

The intellectual and culture "flavor" of a time and place

Ridley 1999

Nature

Nurture



Western psychological world
is somewhere in between
The modern view
is “Interactionist".

Late 1800's - UK
Darwinism took off
The role of genetically determined capability was considered very important.

1960's – USA "tabula rasa" (blank state) view of human intelligence
All people are capable of much more, if given conducive environmental conditions in which to reach their potential

Constructionism
Constructavism

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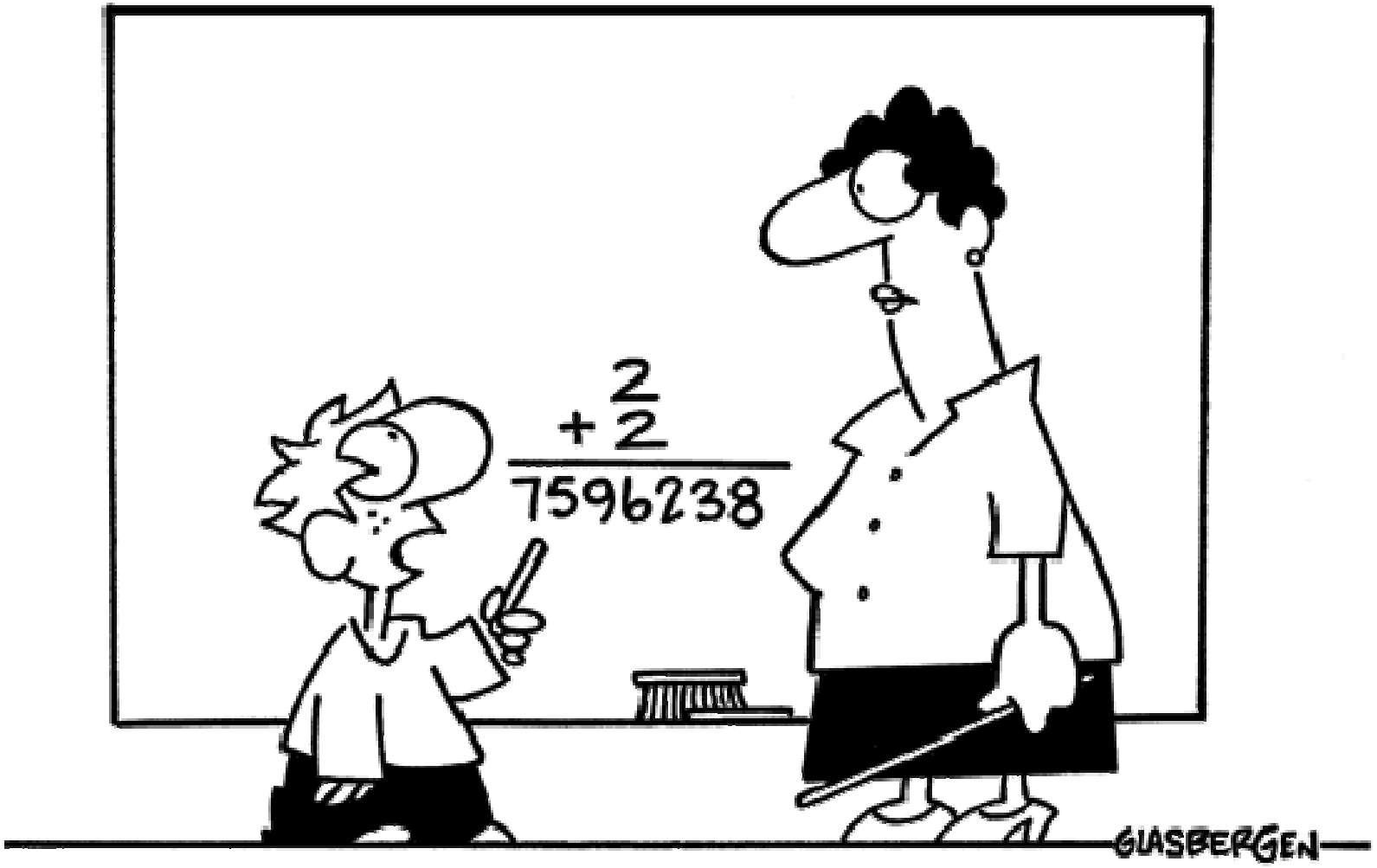

"In an increasingly complex world, sometimes old questions require new answers."

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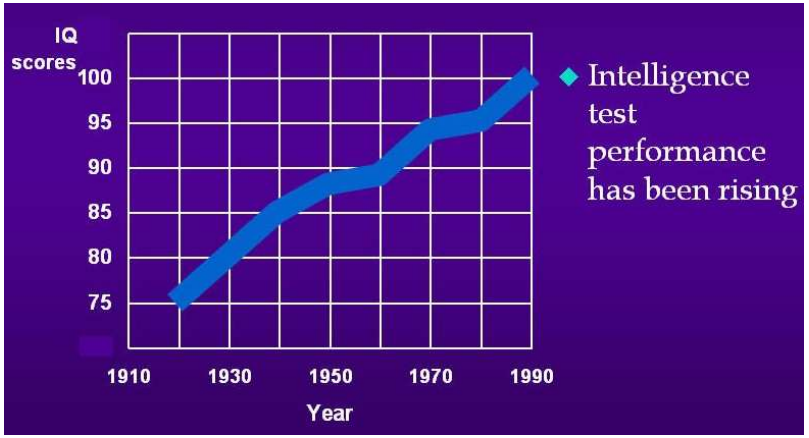
The Flynn effect:

Are we getting smarter?

- Average IQ improving by 3 IQ Points per decade since WWII

- Causes
  - Diet
  - Schooling
  - Modern visual stimulus
  - Other



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Intelligence varies with at least 21 factors

- Infant malnutrition (-ve)
- Birth weight
- Birth order
- Height
- Number of siblings (-ve)
- Number of years in school
- Social group of parental home
- Father's profession
- Father's economic status
- Degree of parental rigidity (-ve)
- Parental ambition
- Mother's education
- Average TV viewing (-ve)
- Average book-reading
- Self-confidence according to attitude scale measurement
- Age (negative relationship, applies only in adulthood)
- Degree of authority in parental home (-ve)
- Criminality (-ve)
- Alcoholism (-ve)
- Mental disease (-ve)
- Emotional adaptation

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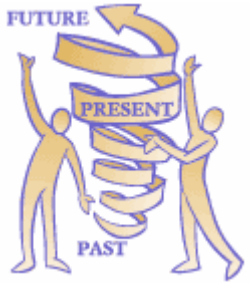
Constructivism



- theory about how people learn
  - people construct their own understanding and knowledge of the world
  - we are active creators of our own knowledge
- In the classroom
  - encourage students to use active techniques (experiments, real-world problem solving) to create more knowledge
  - to reflect on and talk about what they are doing
  - Teacher has to understand pre-existing conceptions to guide the activity

- Objectives vs Outcomes
  - What are you going to teach
  - What can the learners do not that you have taught them

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Constructionism, Seymour Papert

- Children learn best when they are in the active role of the designer and constructor
- Papert “It is the idea that happens especially felicitously in a context where the learner is consciously engaged in constructing a pubic entity”
- The creation process and the end product

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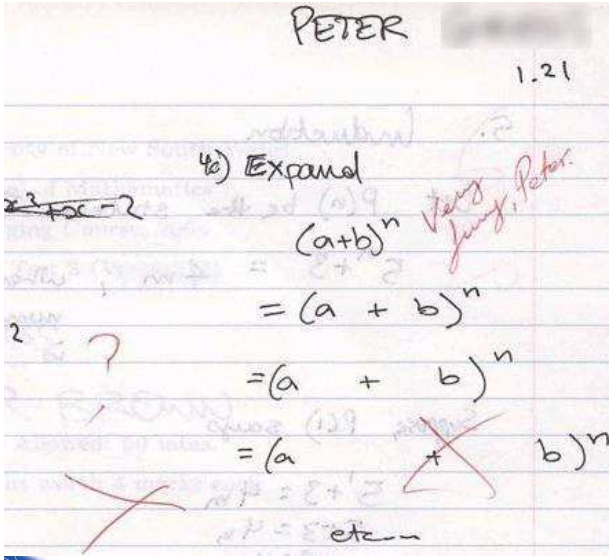
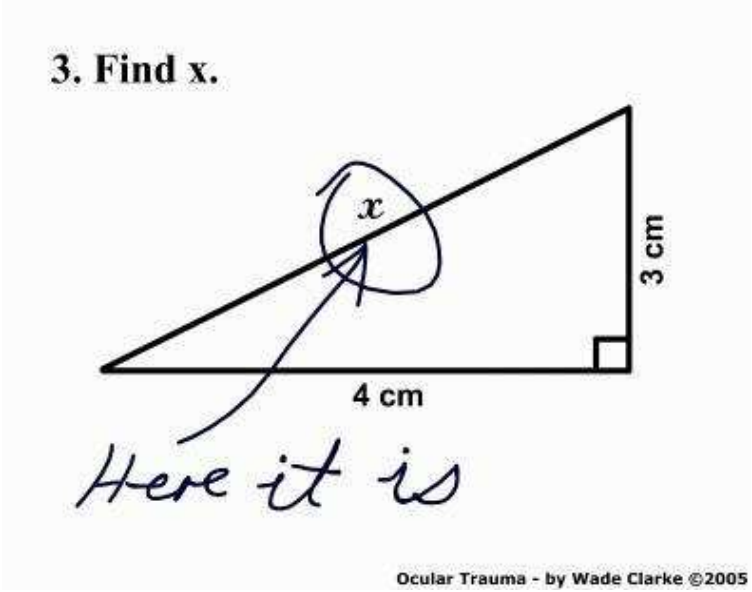
‘If you think education is expensive,
try ignorance!’

Dasgupta





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Technological Ladder

- Digital Chasm syndrome
- Moving beyond the digital divide
- Rungs of the technological ladder

Admin

Replacement

Repairs

Training

Connectivity

Acquisition

Fund Raising

Tool for creativity & innovation

Knowledge Workers

Research

Email and Internet

Word Processing

Computer Literacy

Learners

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Real world learning

- Young Engineers of South Africa
  - 3-18
  - Hands on experiences
  - Strong emphasis on group work
  - Use of real world tools
  - Moving beyond word processing
  - Having fun

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Broader Picture

ICTs in Education – National Impact

Knowledge Society, Global Competitiveness, SME coupled to key sectors of Automotive and Transport, Metals and Minerals, Chemical. Clothing and Textiles, Craft and Aerospace

Ultimate Goal

Successful and innovative Scientists, Engineers and Technologists

Curriculum Support

Input from Industry

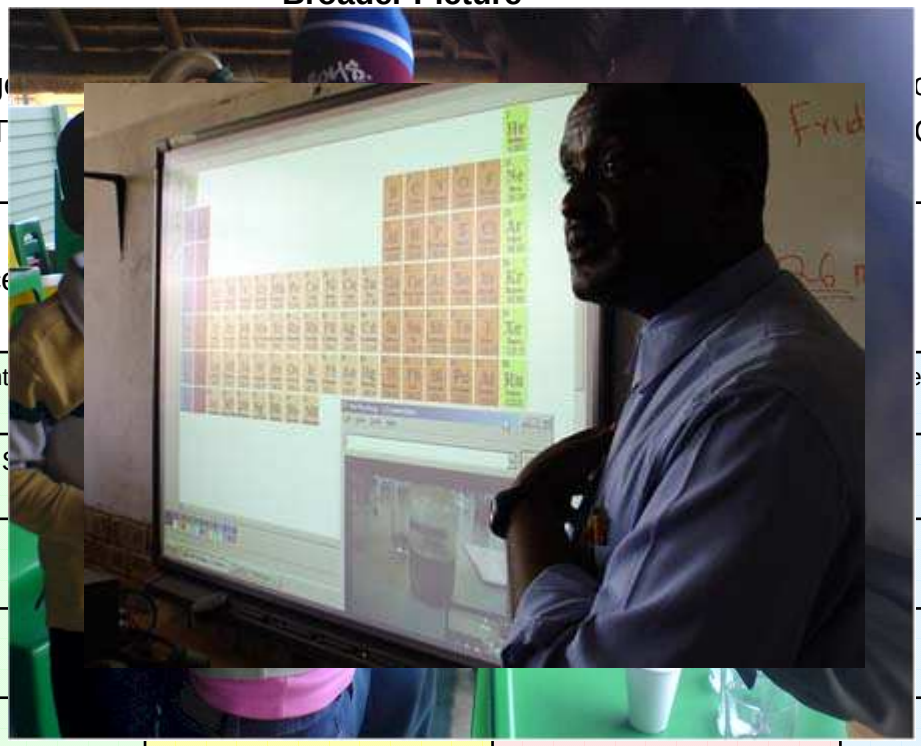
	Scientists	Engineers	ICTs Specialists	Technologists and Innovators
	Skill Set	Skill Set	Skill Set	Skill Set
Post Grad				
Under Grad				
FET				
GET				
Grade 0				

Research opportunities

Entrepreneurial Opportunities

Career Guidance

Broader Picture



Knowledg… of
Automotive and T… Craft and
Succe…
Scient… echnologists and Innovators
Skill S… Skill Set

Curriculum Support

Input from Industry

Post Grad
Under Grad
FET
GET
Grade …

Research opportunities
Entrepreneurial Opportunities
Career Guidance

TEKKI TOT Programme – Preschool Intervention

Community Networking – Mesh and Ulwazi

Teacher Training and other support programmes

Broader Picture

Knowled ctors of
Automotive and tiles, Craft and

Suc sts

Sci Technologists and Innovators

Sk Skill Set

Curriculum Support

Input from Industry

Post Grad

Under Grad

FET

GET

Grade

Research opportunities

Entrepreneurial Opportunities

Career Guidance

CAME/CASE/ CATE

Science Weeks

Science Expos

ICDL

EDN

Intel Teach to the Future

Think Quest

F1 in Schools

4X4 Challenge

Greenpower

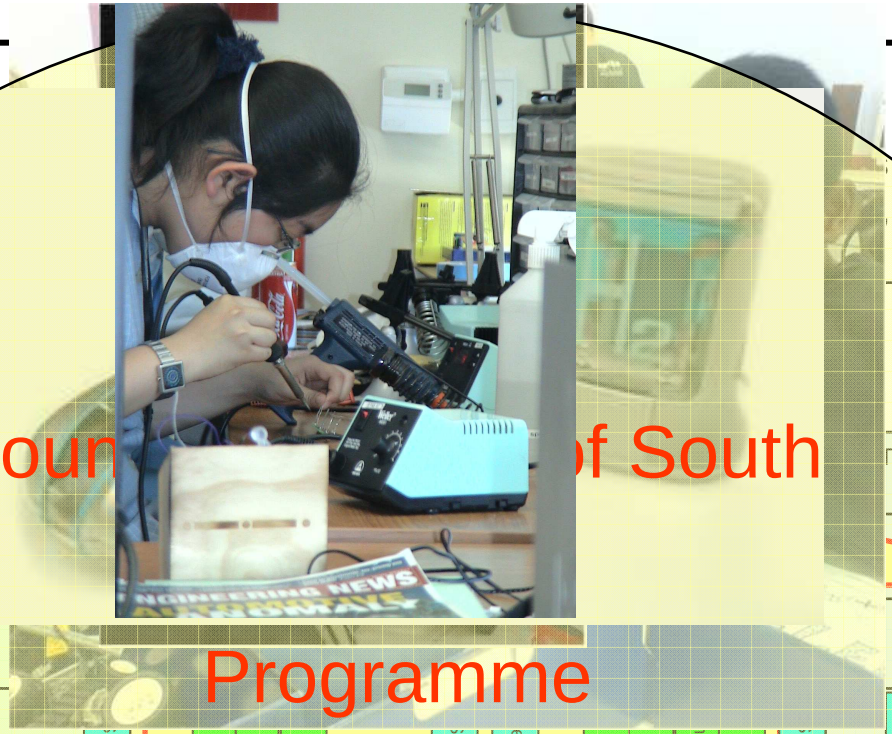
TEKKI TOT Programme – Preschool Intervention

Community Networking – Mesh and Ulwazi

Teacher Training and other support programmes

Existing Interventions

Think Quest



Young Engineers of South Africa Programme

Curriculum Support

Input from Industry

Post Grad

Under Grad

FET

GET

Grade

Research opportunities

Entrepreneurial Opportunities

Career Guidance

Science Expos

Science Weeks

CAME/CASE/ CATE

Space Clubs/Camps

F1 in Schools

4X4 Challenge

Greenpower

Kids Club

Meraka Innovate Conf

ICDL

EDN

Intel Teach to the Future

Think Quest

Fab Kids

TEKKI TOT Programme – Preschool Intervention

Community Networking – Mesh and Ulwazi

Teacher Training and other support programmes

Existing Interventions

Hydrogen Fuel Cell Technology Challenge

New Interventions

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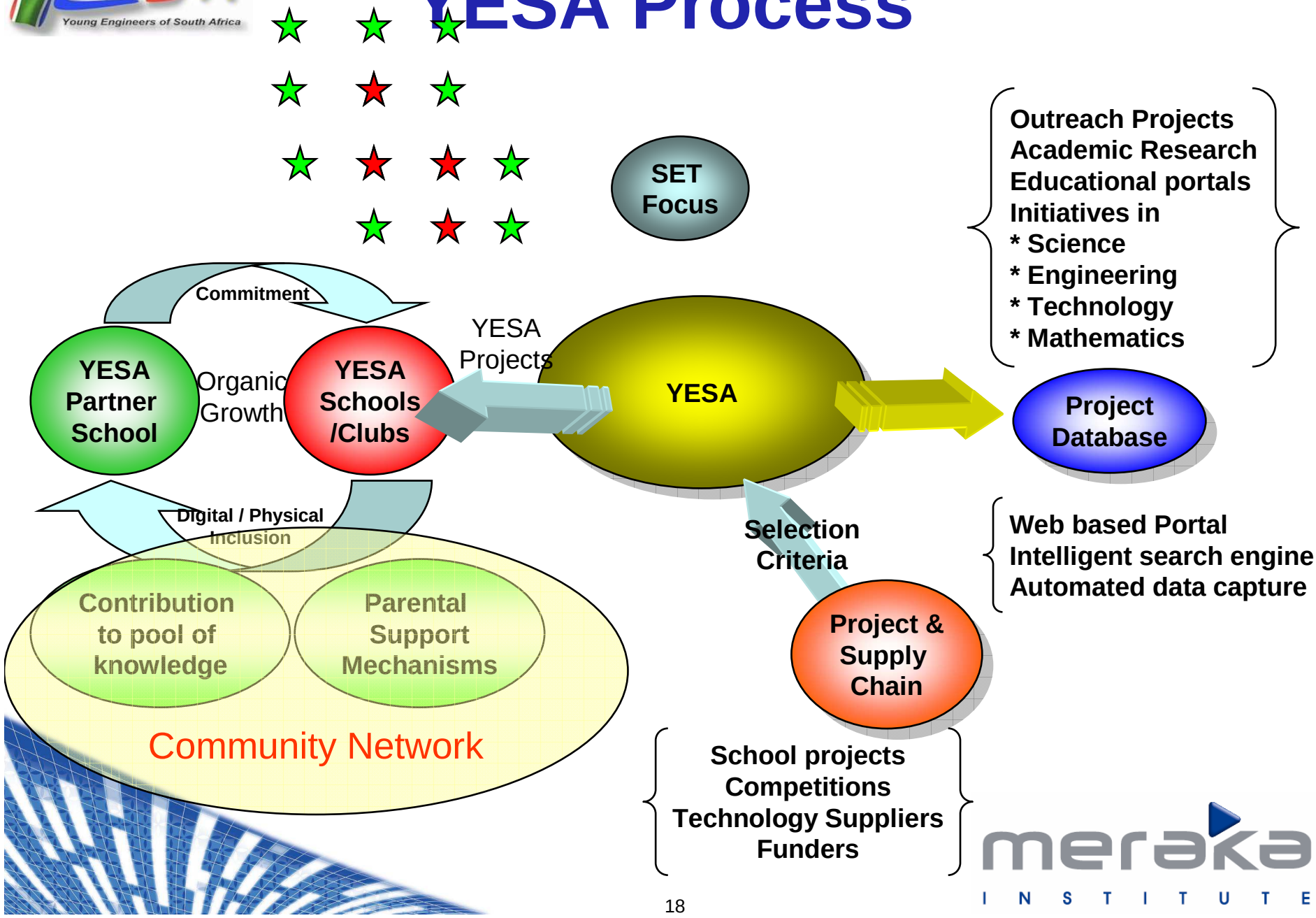
YESA Process



Digital Inclusion

- Digital inclusion is not about computers, the internet or even technology.
- It is about
  - using technology as a channel to improve skills,
  - to enhance quality of life,
  - to drive education, and
  - to promote economic well-being
- It is about social inclusion, and because of this, the potential for technology to radically improve society and the way we live our lives should not be underestimated. (Pinder)

Modiri High
Mamelodi High
Tshwane North College
Galang High
Ulwazi Network
+/-12 km
Future network
+100 km
CSIR
CSIR Link
+- 3 km
Lynnwood Ridge
St Alban's College
Image © 2006 TerraMetrics
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We need to start today for …

- South Africa to produce more people like…
  - Dr Barnard (Heart Surgeon)
  - Mark Shuttleworth (IT Entrepreneur)
  - Trevor Wadley (Electronic Engineering)
  - Phillip Tobias (Palaeontology)
  - George Ellis (Cosmology)
  - …

Thank – you!

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Meraka Institute

(African Advanced Institute for ICT)

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