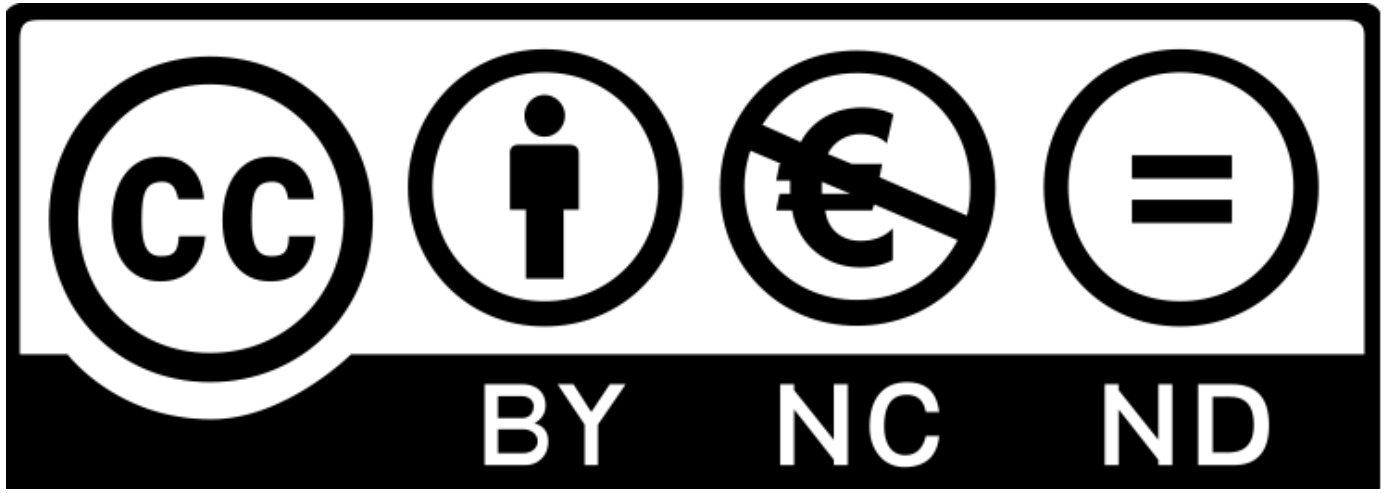


Seeding energy sustainability through transformative teaching: any way forward for sub-Sahara Africa?

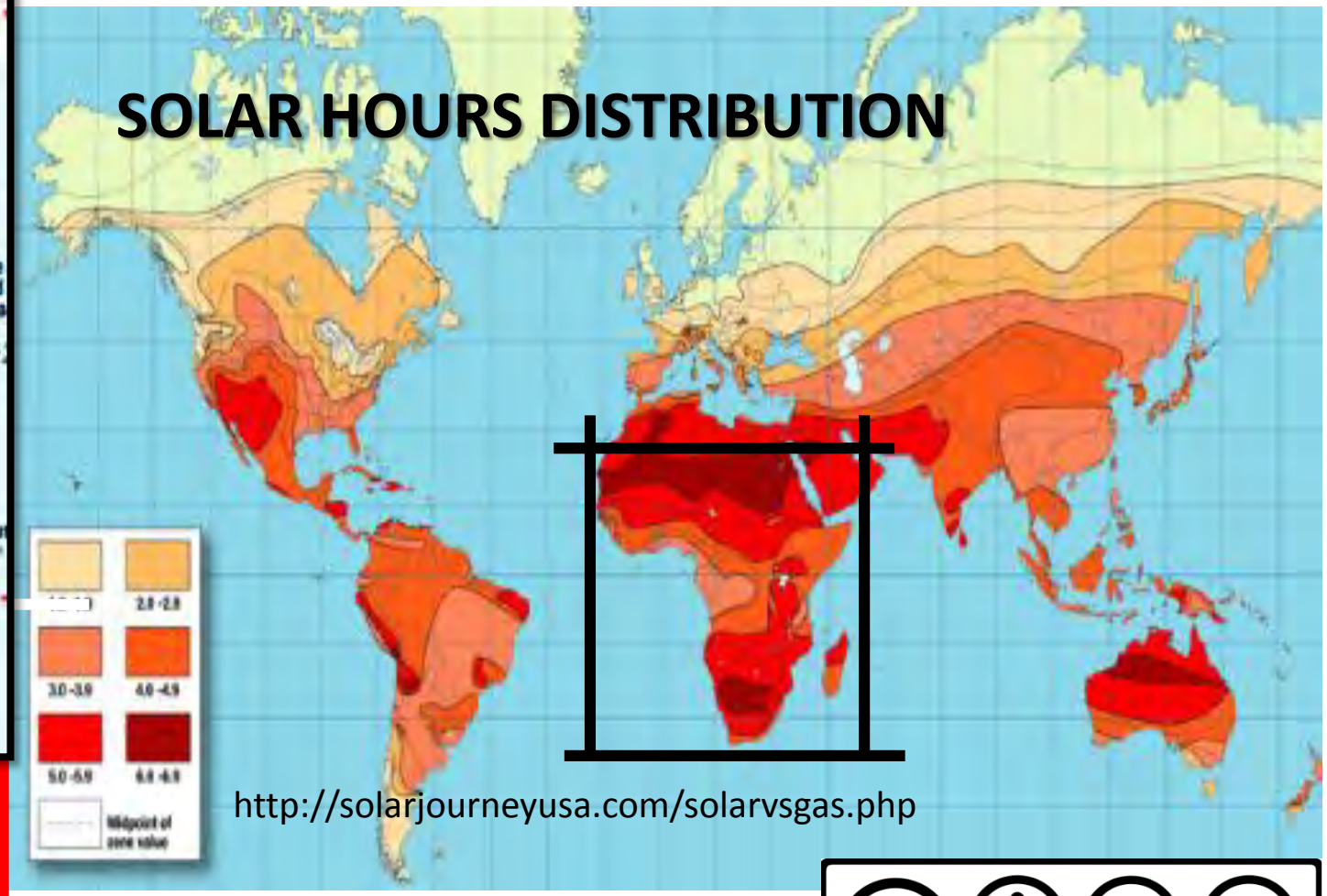
Kant E Kanyarusoke

Cape Peninsula University of Technology, Cape Town – South Africa

HIGHLIGHTS

- MEETING SOME SSA HOME ENERGY NEEDS SUSTAINABLY
- SEEDING SUSTAINABILITY THROUGH PRACADEMIA
- TRANSFORMATIVE TEACHING
- PrBL EXAMPLES TO MEET SSA ENERGY & EE CHALLENGES

SUB-SAHARAN AFRICA – ENERGY PROBLEM



http://solarjourneyusa.com/solarvsgas.php

(≅ 4781 - SA; 150 - others cf. 10 000 for DEVELOPED WORLD)

ENERGY CHALLENGES

- **ENGINEERING**
  - ***GENERATION & TRANSMISSION***
  - ***MAINTENANCE***
- **ECONOMICS**
  - ***FINANCING***
  - ***DISTRIBUTION***
  - ***LOW INDUSTRIALISATION***

ENG. EDUC. CHALLENGES

FROM LITERATURE

- *FUNDING (Owolabi & Rafiu 2010, etc.)*
- *CURRICULA (Falade 2007, etc.)*
- *STUDENT COHORTS (Oryem-Origa 2010, etc.)*
- *SOCIETY EXPECTATIONS (Akintola 2002)*

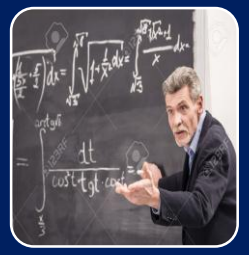
ADD

- *PREVAILING SOCIETY BELIEFS*
- *ATTITUDINAL ISSUES*

THE PROBLEM

Within limitations of an engineering academic, what can be done to sensitize and activate students' actions on SSA's Energy problems?

METHODOLGY(1) – THE PRACADEMIC MODEL



TEACHING & LEARNING (T)

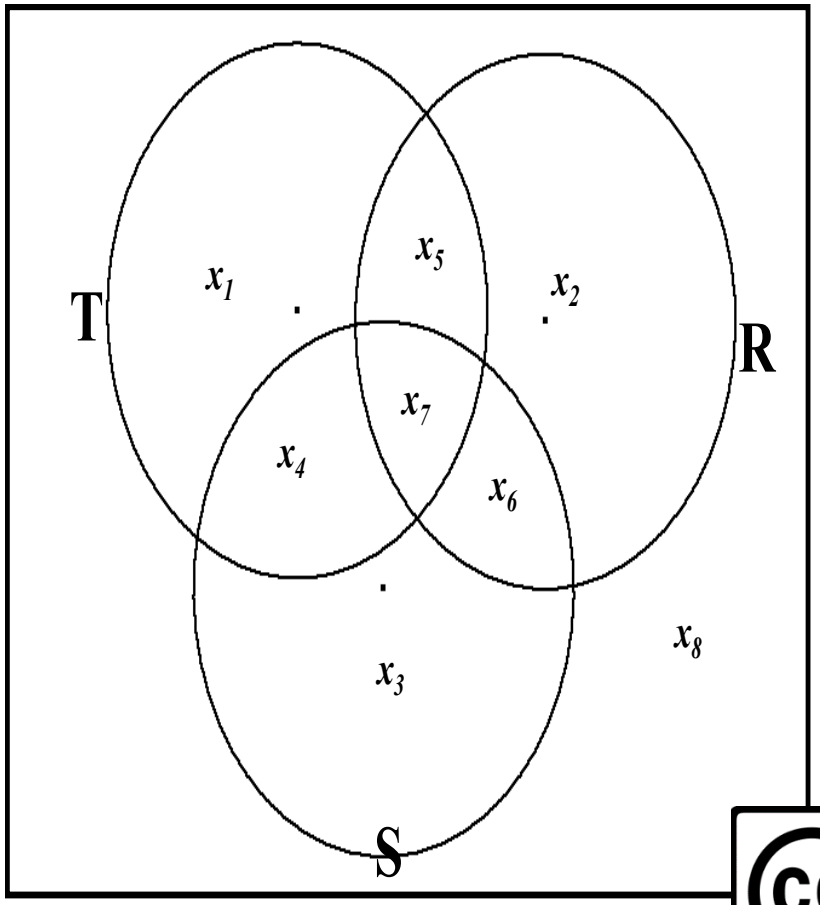
- *CURRICULUM DELIVERY*
- *ASSESSMENTS*

RESEARCH (R)

- *PUBLICATIONS*
- *PG SUPERVISION*

SERVICE (S)

- *MANAGEMENT/ADMINISTRATION*
- *COMMUNITY INVOLVEMENT*



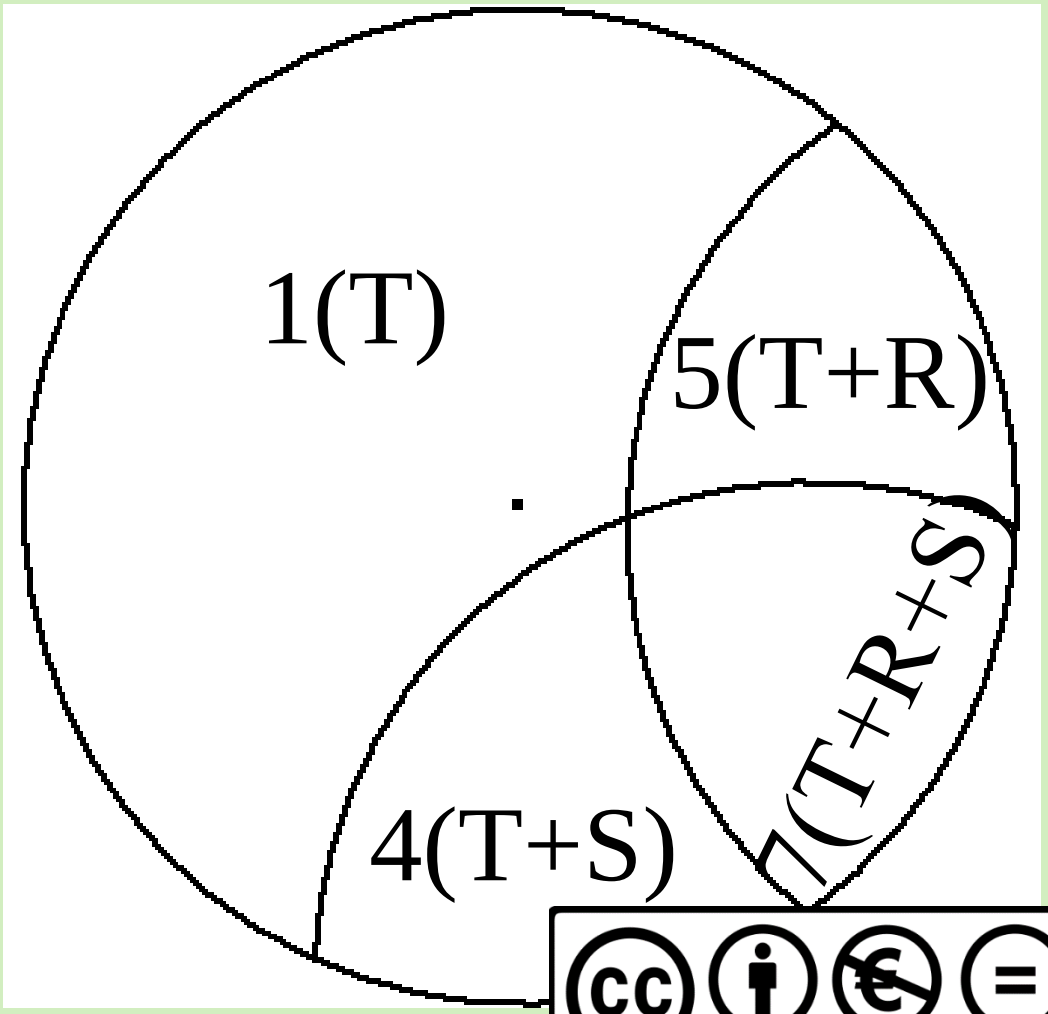
x_1 – Teaching alone
x_2 – Research alone
x_3 – Service alone
x_4 – Teaching students using outside work
x_5 – Teaching students using Research
x_6 – Research for society outside campus
x_7 – Teaching students through Research for society outside campus
x_8 – Personal non academic or professional work

THE PRACADEMIC FOCUSES HIS/HER TEACHING (T) AND RESEARCH (R) ON SOLVING SOCIETY'S PROBLEMS (S)

METHODOLGY– Transformative Teaching

Finley (2015)

- Constructivist Learning Experiences
- Arts and Science in teaching
- Symphonic teaching
- Facilitating Productive struggle

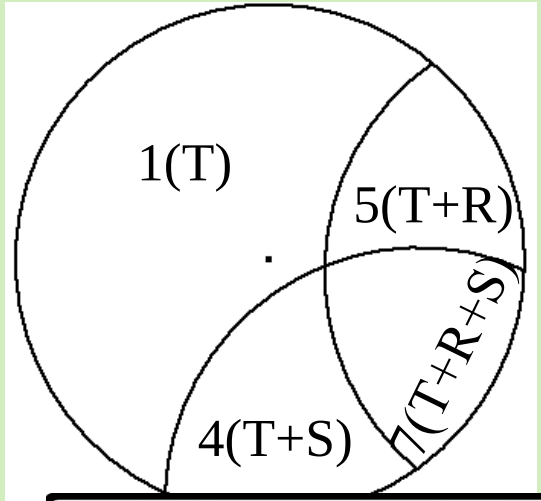


METHODOLGY– Transformative Teaching using PrBL

PrBL PEDAGOGY (Baş, 2011, Uziak, 2016 etc)

- Most Energy Eng. Work is Project based
- Transition from Eng. Sc. to Eng. Design (Savage, 2007)

USED IN EACH OF 4 JOB ELEMENTS OF TEACHING 'T'



TRANSFORMATIVE TEACHING FOR SUSTAINABLE ENERGY - EXAMPLE 1: WATER HEATING

INITIAL DESIGN: 2012; 100 L; C = ZAR 1000; T_{max} = 40.1°C

MAINTAINED, REDESIGNED 2013-15; 30 L; C = ZAR 1200-1700; T_{max} = 52-67°C

TRANSFORMATIVE TEACHING FOR SUSTAINABLE ENERGY - EXAMPLE 2: RURAL WATER PURIFICATION

MODEL WATER PURIFIER: DIPLOMA STUDENTS 2014

PROTOTYPE WATER PURIFIER: MASTERS STUDENT 2014-15

TRANSFORMATIVE TEACHING FOR SUSTAINABLE ENERGY - EXAMPLE 3: RURAL CROP DRYING

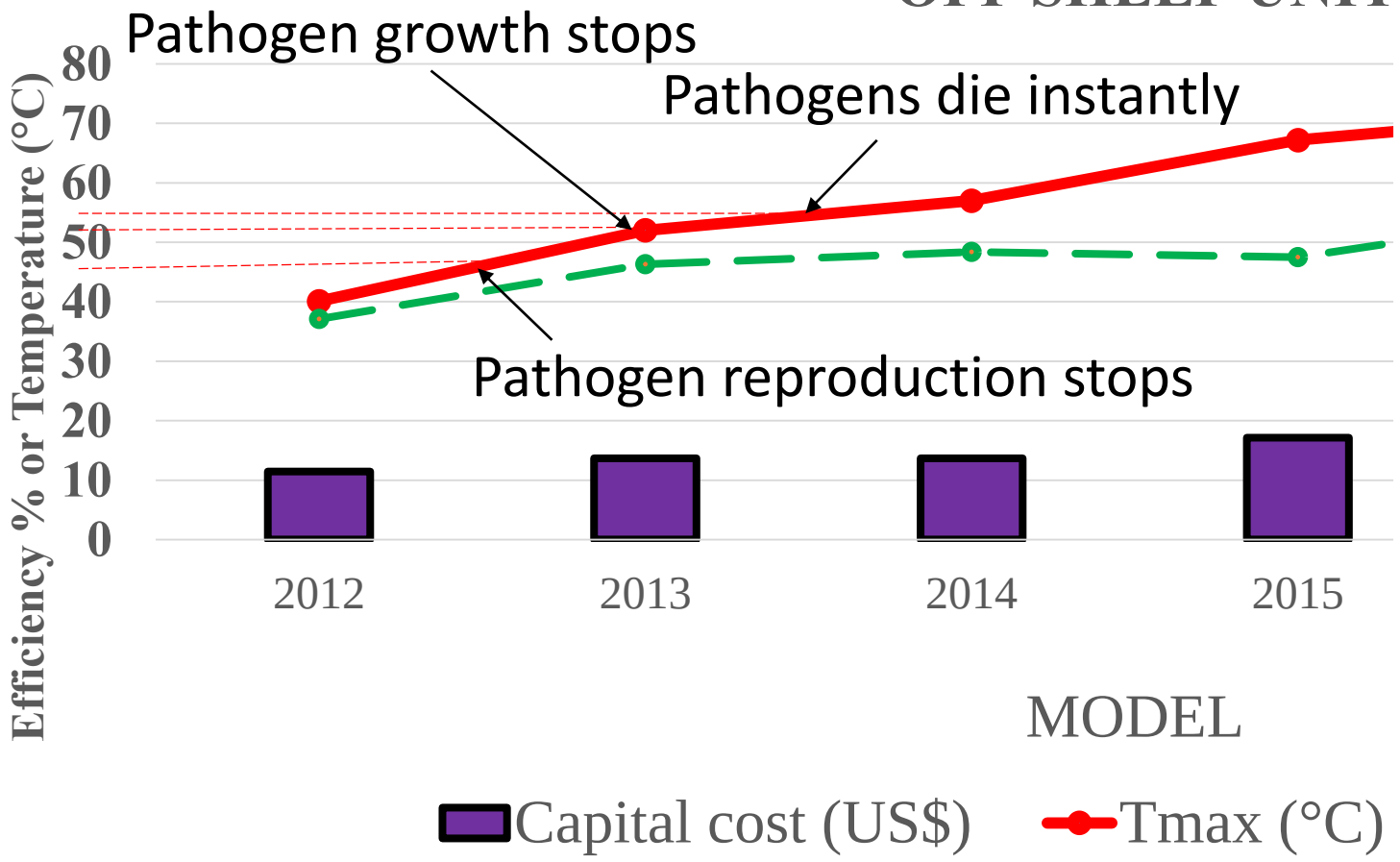
INITIAL CONCEPT FROM LECTURER'S R&D REJECTED COMPONENTS - 2013

IMPROVED CONCEPT TO EXTRACT WATER AS WELL – 2014

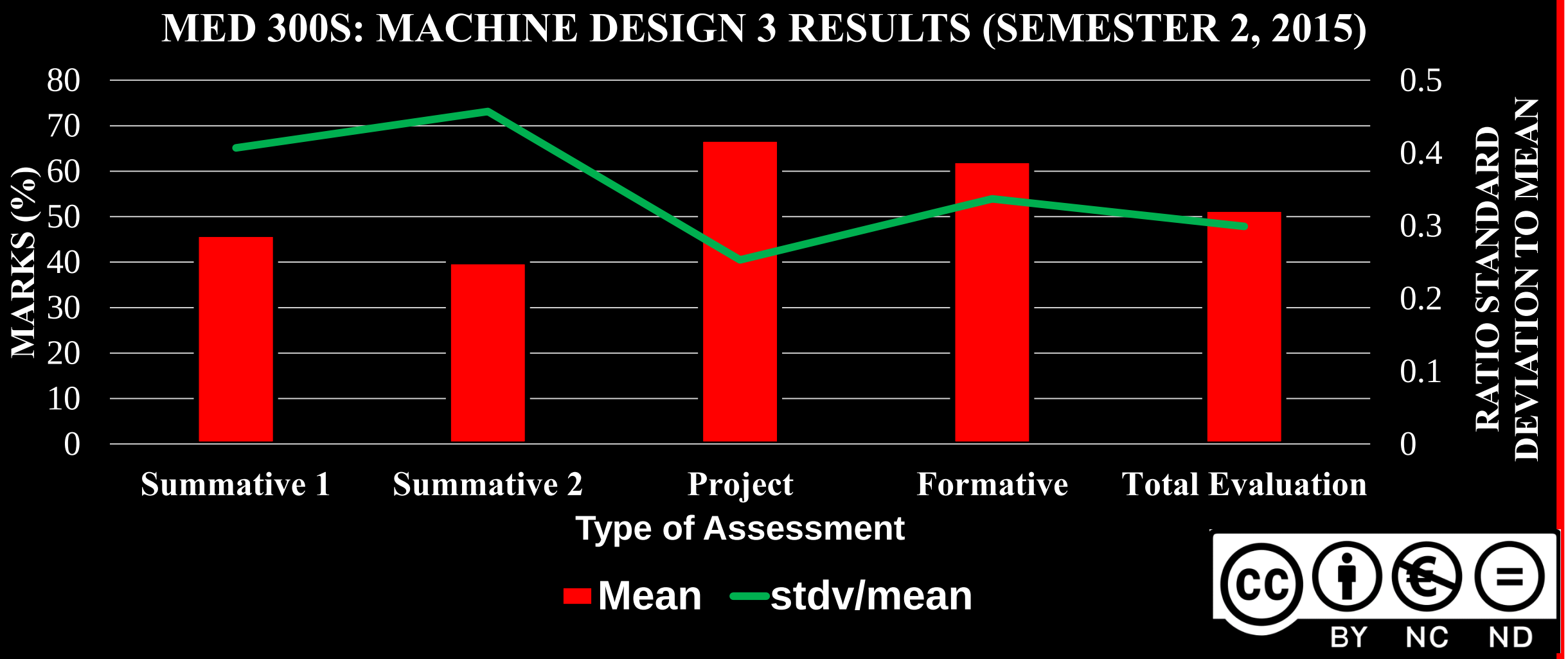
FURTHER IMPROVED TO REDUCE DRYING TIME – 2015

TRANSFORMATIVE TEACHING FOR SUSTAINABLE ENERGY – CONTINUOUS IMPROVEMENT: EVIDENCE

COSTS & PERFORMANCE OF STUDENT SOLAR SYPHONS AND OFF SHELF UNITS



TRANSFORMATIVE TEACHING FOR SUSTAINABLE ENERGY – DID STUDENTS LEARN BETTER? - EVIDENCE



CONCLUSIONS

- DISTRIBUTED SOLAR ENERGY HARNESSING HAS POTENTIAL TO OVERCOME MANY ENERGY CHALLENGES AT HOME LEVEL IN SSA
- MAKING A START IN HOME SOLAR ENERGY HARNESSING NEEDS *NEITHER* 'LOTS' OF MONEY *NOR* IMPORTED TECHNOLOGIES
- PrBL COULD BE USED AS A TRANSFORMATIVE TEACHING TOOL

If China can, SSA should do it better – but probably through her young generation: This is the beauty of Transformative university teaching in SSA today!!

ASANTENI SANA; DANKIE; ENKOSI; ESE GAN; KE A LEBOGA; NA GODE; THANK YOU;

kanyarusokek@cput.ac.za