

PROBLEM SOLVING THROUGH TIME TRAVEL METHOD

LESSONS FROM MATHEMATICS IN A HISTORIC
ENVIRONMENT, KU-LU PROJECT 2011-2016

THE BRIDGING AGES CONFERENCE
Lets Do it


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12TH to 17TH SEPTEMBER 2016
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KENYA : AFRICA.



Kenya Land of Contrasts



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- The presentation is based on an exploratory study ,a collaboration of Linnaeus University, Kalmar museum , Kenya Nationals museums and Kenyatta and Maseno University from 2011- 2016
 - Aim is to provide alternative ways to resolve issues (social, political, intellectual and spiritual) through collaboration of the most unlikely components.
 - The article posits that the only way to solve a problem is to consider bringing to the same working table the most unlikely central players in the conflict such as History and Mathematics in the project,

Mathematics Education and society

Mathematics Education can help in shaping a better World!!!!!! Ubiratan D'Amboise (1988),

“As educators we influence the new generations that, in two decades, will be in charge of World affairs.

We believe it is our responsibility...in preparing them to shape a new civilization, in which social justice and Peace with dignity for all prevail.”

Mathematics Education and society

A universal ethics synthesized as

1. respect for the other/the different;
2. solidarity with the other/the different;
3. cooperation with the other/the different

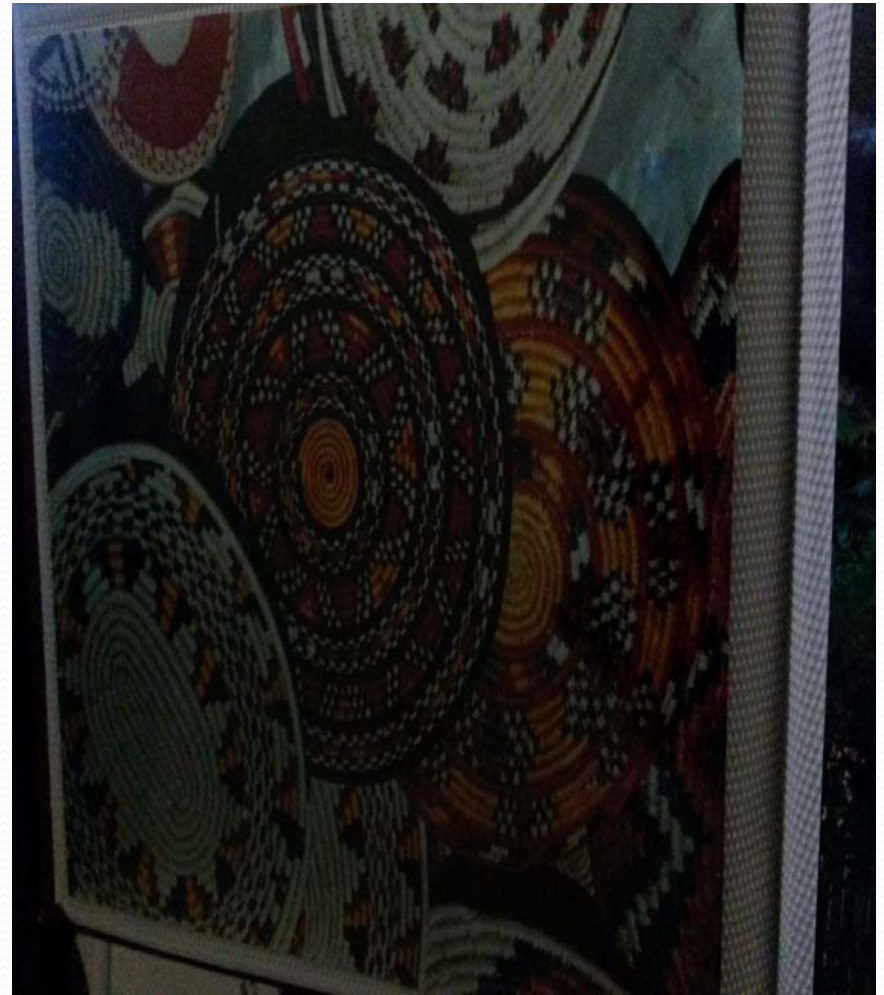
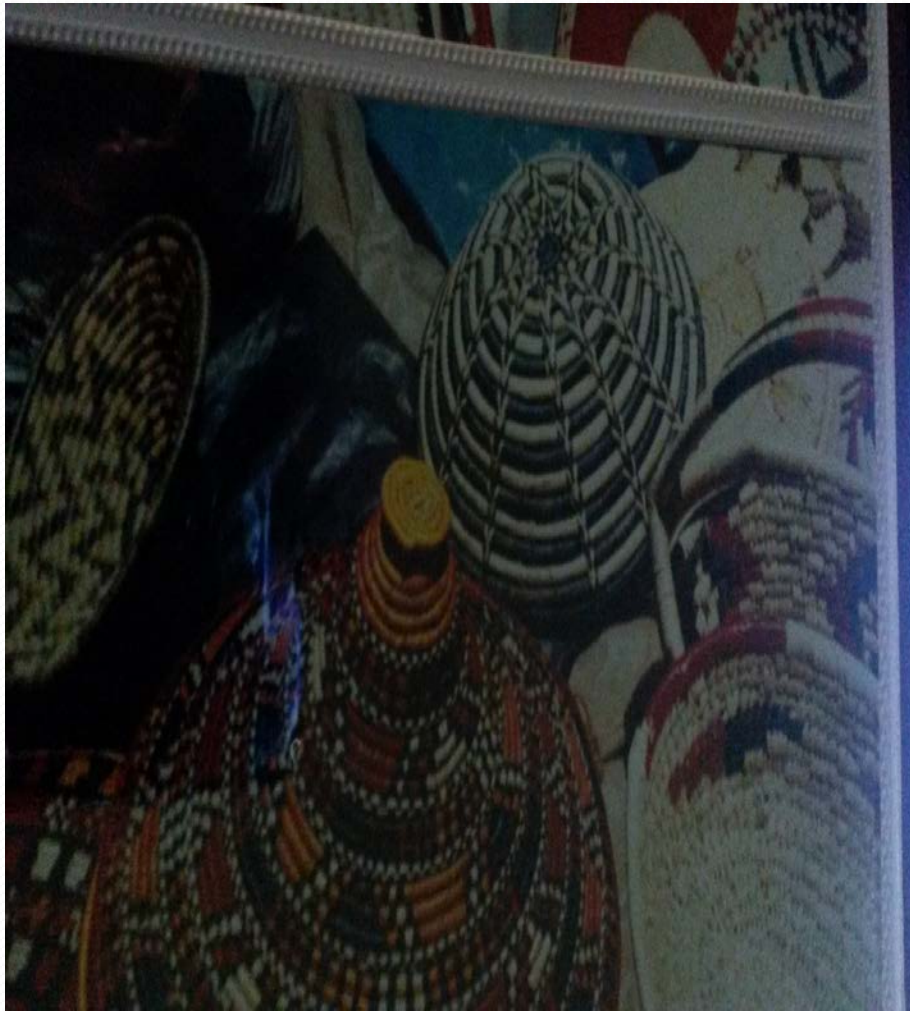
History tells us that **Mathematics** is the dorsal spine of Modern Civilization. Hence Mathematics and Mathematics Education have everything to do with the State of the World.

Mathematics Education

- Increased globalization era in all sectors of society, demands the ethics of respect, solidarity and cooperation as absolutely necessary and is intrinsic to the MIHE an off root of Ethnomathematics.
- **Ethnomathematics** effectively supports social justice and peace with dignity for ALL

MIHE is a tool for meaning making towards proficiency in problem solving habits

Mathematics is everywhere;
History, culture, Heritage?? 1,2,5!!



Mathematics in Historic Environment (MIHE) is

Not Ethnomathematics. The study of the relationship between mathematics and culture(Paul Gerdes, D'Ambrosio,1988)

Not Mathematical Enculturation: A Cultural Perspective on Mathematics Education (Alan J. Bishop 1988)

Not History of Mathematics. Evolution of mathematical structures and thought

MIHE uses the Time Travel method which acts as a throwback mirror that adds meaningful learning of Mathematics for ALL students.

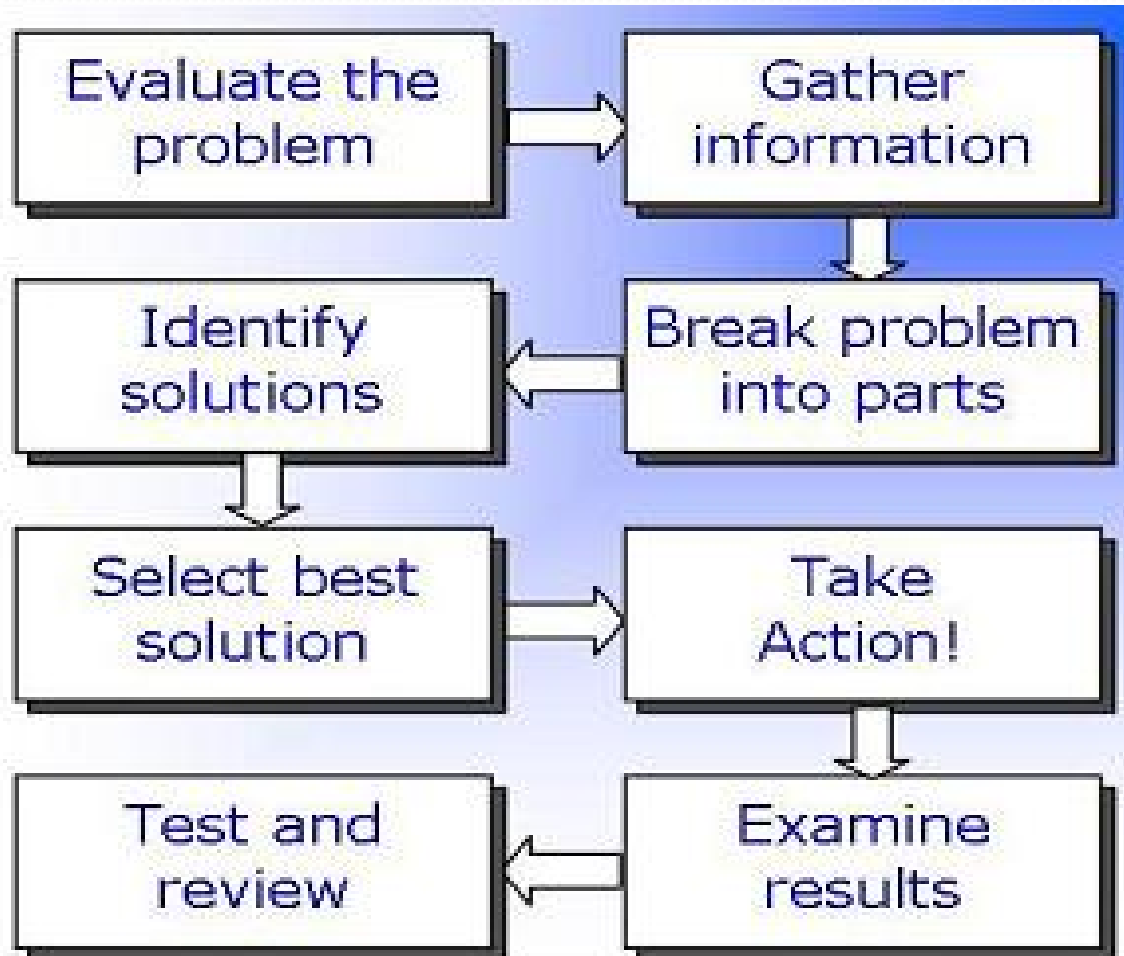


PS through TT

PROBLEM SOLVING. G POLYA

- UNDERSTAND THE PROBLEM
- PLAN
- CARRY OUT THE PLAN
- LOOKING BACK

PROBLEM SOLVING



MIHE problem solving TT sites

- During the enactment of TIME TRAVEL activities
- PLAN
- DO
- SEE

Later

REFLECT AND CONNECT TO CURRICULUM

- APPLY

PROBLEM SOLVING AND ANALYTICAL SKILLS

- **Decision-making**
 - **deciding between the possible options** for what action to take
 - **deciding on further information** to be gathered before taking action
 - **deciding on resources** (time, funding, staff etc) to be allocated to this problem

Ps Analytical skills

- **Resolving the problem**
- **Implementing action**
- **Providing information** to other stakeholders;
delegating tasks
- **Reviewing progress**

How much oil per seed measure?



Why TT method? What we found out

- Time Travel method can promote reflective thinking and metacognition among learners and teachers
- Enables participation for ALL learners
- Enables the transmission of desirable cultural values through enacting lived experiences
- Mathematics is a great cultural heritage of mankind
- Promotes collaborative and team teaching habits

MIHE through TT

- Promotes mathematical process skills such as problem solving,
- communication,
- connections,
- representations,
- reasoning and proof
- Promote actual collaborative and team work
- Relates real life activity to actual classroom mathematics

Fungabo ; what area?



Mathematics Focused on Time

Travel process

- Time travel event.
- Participants work in groups on **TT Mathematical tasks** that are related to the curriculum
- Participants report on group tasks
- **Reflection on relevance of tasks to learning mathematics**
- **Mapping the activities to curriculum demands by reflecting on the event from a mathematical focus(teachers)**
- Evaluation of the TT event

TT and PS connect

- SET THE HISTORIC SCENE: (understand the situation)
- ENACT TIME TRAVEL EVENT (plan and strategize)
- REPORT and REFLECT on activity and relate to mathematics concepts (execute)
- TRANSFER AND SYNTHESIZE FOR LEARNING (looking back)

How many in the next diagonal?



Kisumu Western Kenya



What size? What shape? How many, how much?



WHAT PARTICIPANTS SAID ABOUT TT

- Fun way of learning. Get a better insight when you experience yourself, not just books
- Fun, lots of thinking and exciting
- Experience the reality instead of the book
- We were able to calculate and measure

Evaluation feedback

- To see the differences between the tools of that time and today
- To experience working with your body
- Mathematics in everyday life – using different methods and concepts
- Connection between theory and reality, to use Mathematics' concepts and methods

Evaluation cont.

- It was good to work practically with Mathematics and use techniques and concepts in real life
- Use Mathematics in everyday life (without a calculator)
- Clear connection to Mathematics, History and Social Sciences

Kenyatta University TT and tt



Reflections of participants

- I have used my Mathematics knowledge and learnt a lot more of Mathematics
- Fun to have a break from school, and to see and do things that I have never experienced
- Innovative learning

WE worked together towards a solution

WAY FORWARD

- Scaling up TT sites
- Teachers to contextualize the time travel for learning mathematics
- Mainstreaming of TT in the Teacher training programmes (incorporate TT as a teaching method)
- Collaboration with stakeholders in education sector and museums for policy and monitoring
- Documentation of mathematical tasks for specified TT events
- Promote TT across the curriculum

Why PS

- It is also widely recognized that mathematics (PS) is the most universal mode of thought and that survival with dignity is the most universal problem facing mankind
- Time travel will support this

PROBLEM SOLVE FOR COHESION



Asante sana

