Preparing future spatial decision makers:
using GIS to improve map skills in the classroom

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Why are map skills a sustainable development issue?

- The environment
  - “It’s mine
  - It’s precious
  - I’m looking after it”
- Sustaining environments
- Topographic maps

Overview

- Fostering spatial competence at school level in South Africa
- Outlining a hierarchy of map skills
- Building a map analysis self-instruction programme
- Evaluating self-instruction materials for spatial analysis
- Effects of test population characteristics on spatial competence
- Conclusion

SPATIAL COMPETENCE is the ability to

- orientate oneself (with and/or without maps)
- recognise a map as a generalised representation of the world with a location reference system
- read and understand spatial information about natural and constructed environments
- analyse spatial information
- interpret spatial information and explain spatial patterns in a geographic context
- visualise landscape
- draw simple maps

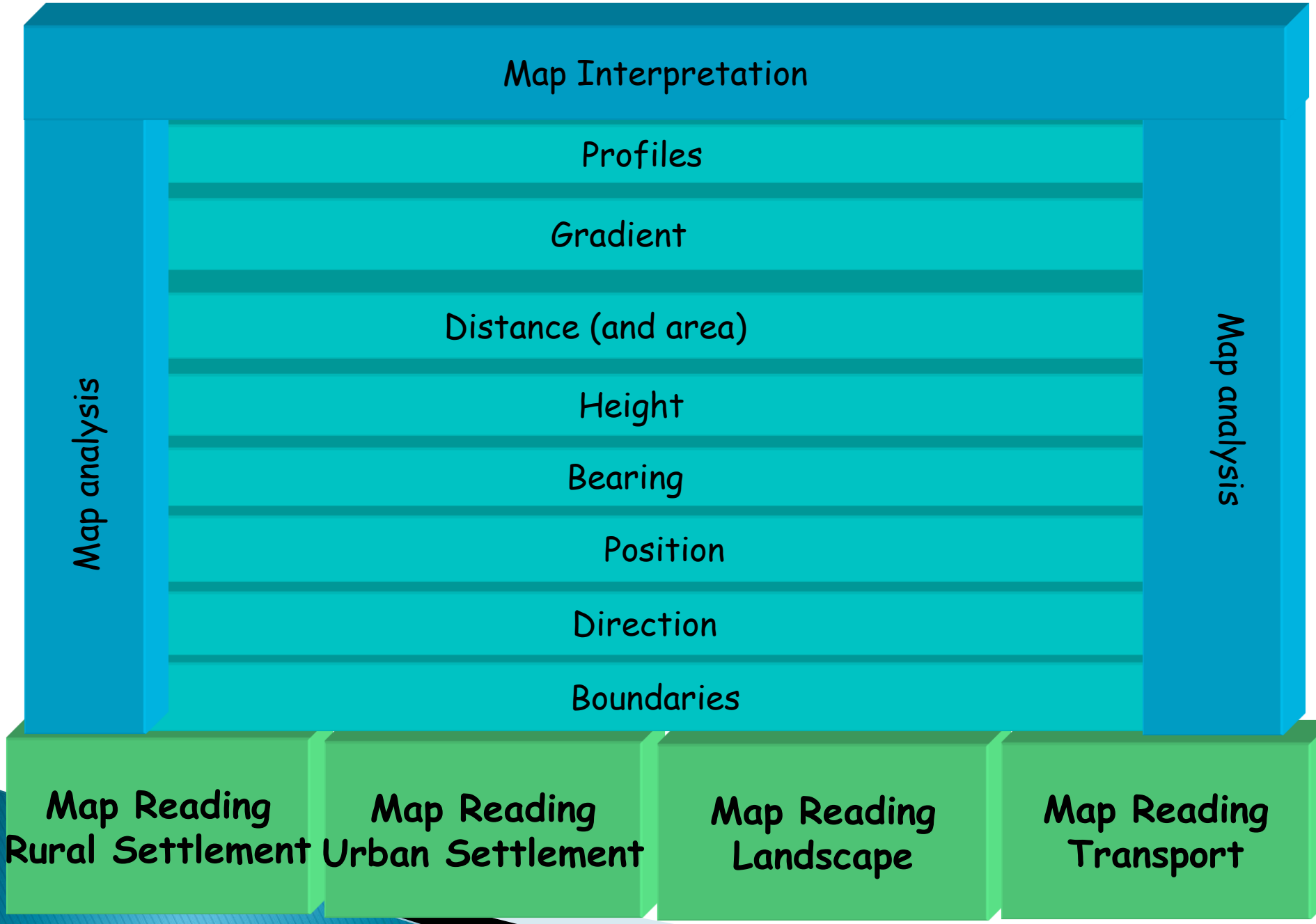
(Innes, 2005)

Fostering spatial competence at school level in South Africa

- Department of Land Affairs
  - Chief Directorate: Surveys and Mapping
  - MapAware Project (1997 – 2002)
  - On-going teacher training
  - MapPacks
- Department of Education
  - Teaching geography at GET and FET
  - GIS in the curriculum
  - Geography teacher shortage

Outlining a hierarchy of map skills

- Map reading
- Map analysis
- Map interpretation


Map Interpretation
Profiles
Gradient
Distance (and area)
Height
Bearing
Position
Direction
Boundaries
Map analysis
Map analysis
Map Reading Rural Settlement
Map Reading Urban Settlement
Map Reading Landscape
Map Reading Transport

Building a map analysis self-instruction programme

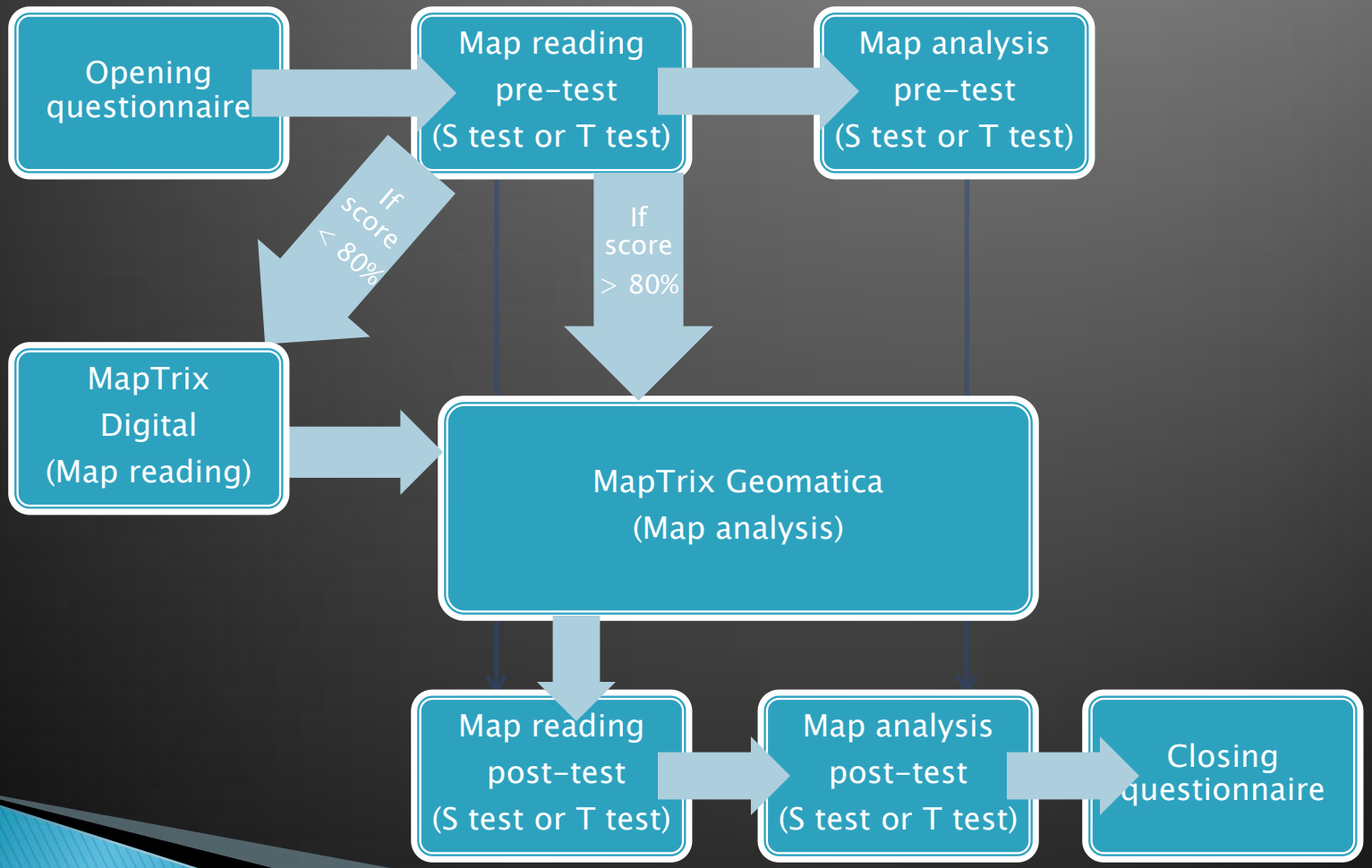
- Lesson Title
- Why learn about (the title)?
- Before you start, make sure you understand the following terms:
- What you need to know NEXT about (the title)
- Mathematics lesson
- RULE or key concept
- What do you need to be able to DO:
  - to show real world understanding in your environment
  - with maps
- GIS lesson and GIS practice
- Demonstrate your ability to perform the analysis task by:
  - answering the questions on one of 2 exercises (represented by playing cards)
  - marking your answers.
- If you get less that 8 out of 10 complete the other one
- What next?

A GIS enabled, computer-assisted, self-instruction programme for topographic map analysis

Evaluating self-instruction materials for spatial analysis

- Draft data collection instruments
- Set up trial venue
- Find volunteers
- Run a pilot study
- Finalise data collection instruments
- Run the trial
- Find more volunteers etc

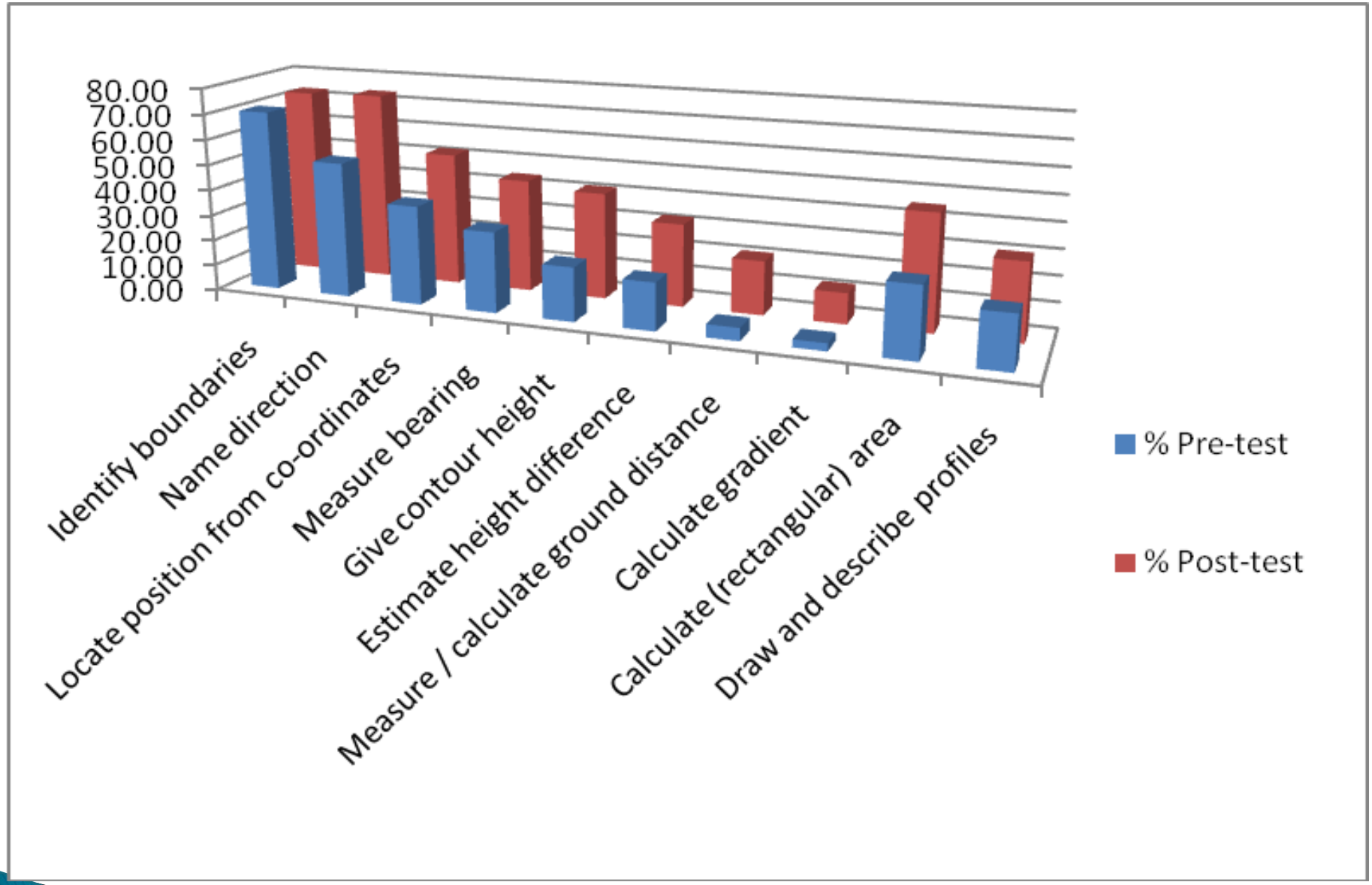
Administration of the trials



- **Map analysis scores:**

	Pre-test	**Post-test**	**Pooled**
Number of observations	61	50	111
Mean score (/30) ± SD	8.36 ± 6.13	12.38 ± 7.13	

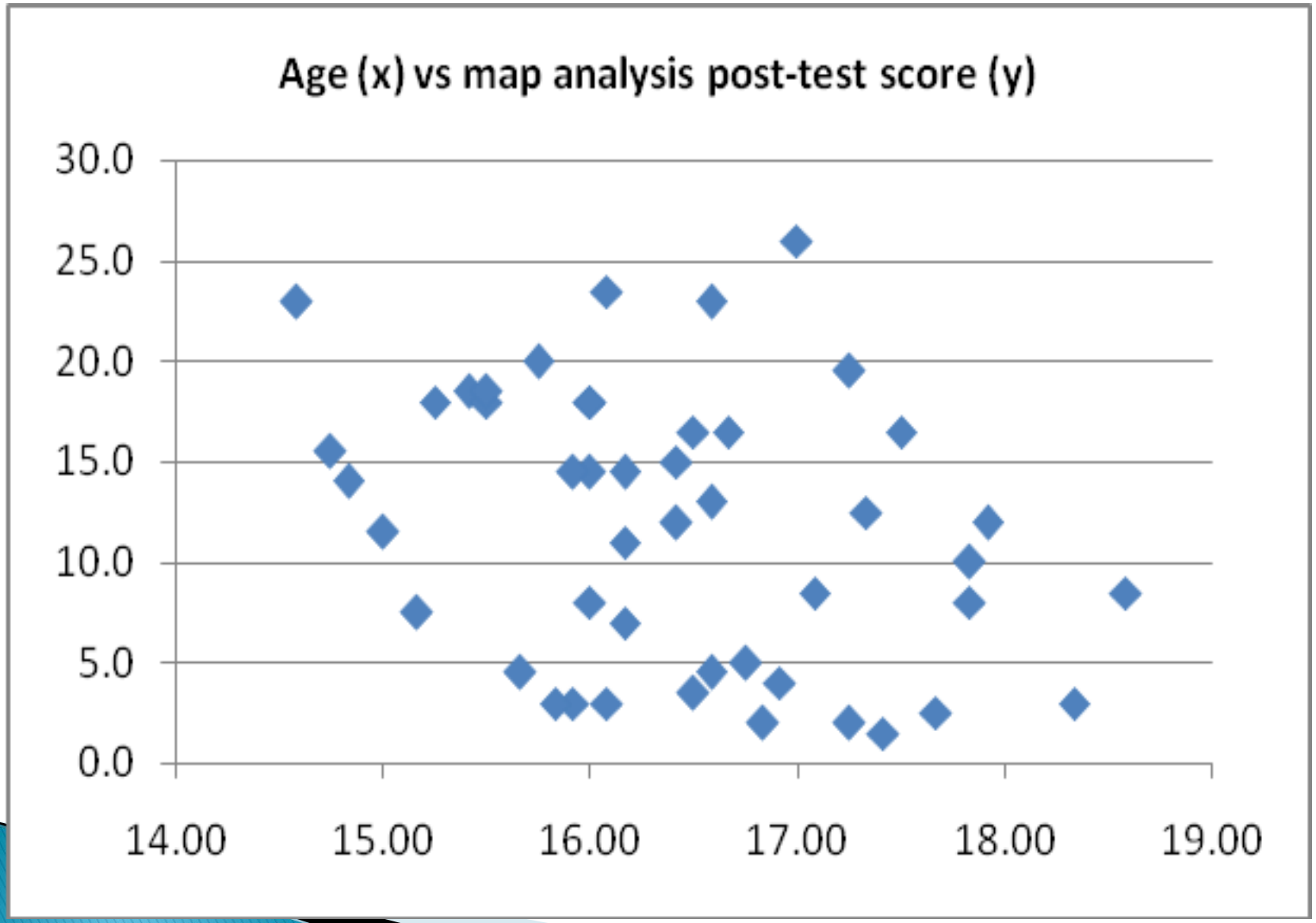
Difference between mean scores:	4.02
Student t value:	-3.19
Significance level:	0.00185
Result:	Reject null hypothesis


80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Identify boundaries
Name direction
Locate position from co-ordinates
Measure bearing
Give contour height
Estimate height difference
Measure / calculate ground distance
Calculate gradient
Calculate (rectangular) area
Draw and describe profiles
% Pre-test
% Post-test

Effect of different characteristics on spatial competence

- Gender
  - Significant difference between male and female scores on map analysis pre-tests
  - No significant difference between post-test scores
  - No significant difference between improvement in performance
- Home language
  - Other European language group, mean = 18/30
  - English plus other language, mean = 9/30
  - English only = 6/30
  - Afrikaans = 3/30
  - isiXhosa = 2/30

Characteristics cont:- Age



Characteristics cont:- Computer venues

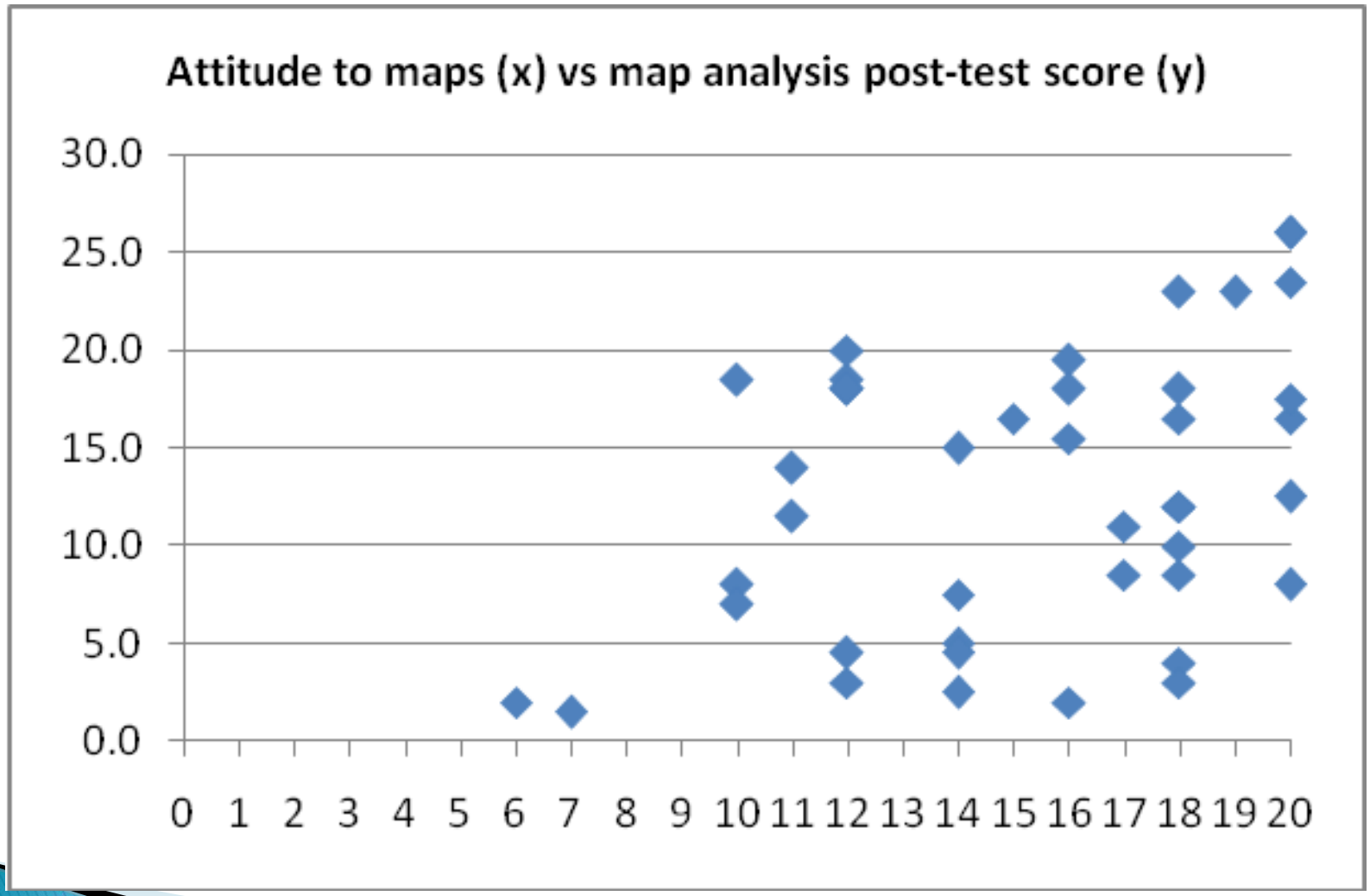
	Mean map analysis post-test score ± SE		
Home, school and elsewhere	18.75 ± 0.75	2	1
Home and school	13.29 ± 1.46	24	2
Home only	12.92 ± 2.56	13	3
Home and elsewhere	8.00 ± 4.00	2	4
School only	6.25 ± 1.75	2	5

Characteristics cont:- School subject(s) combinations

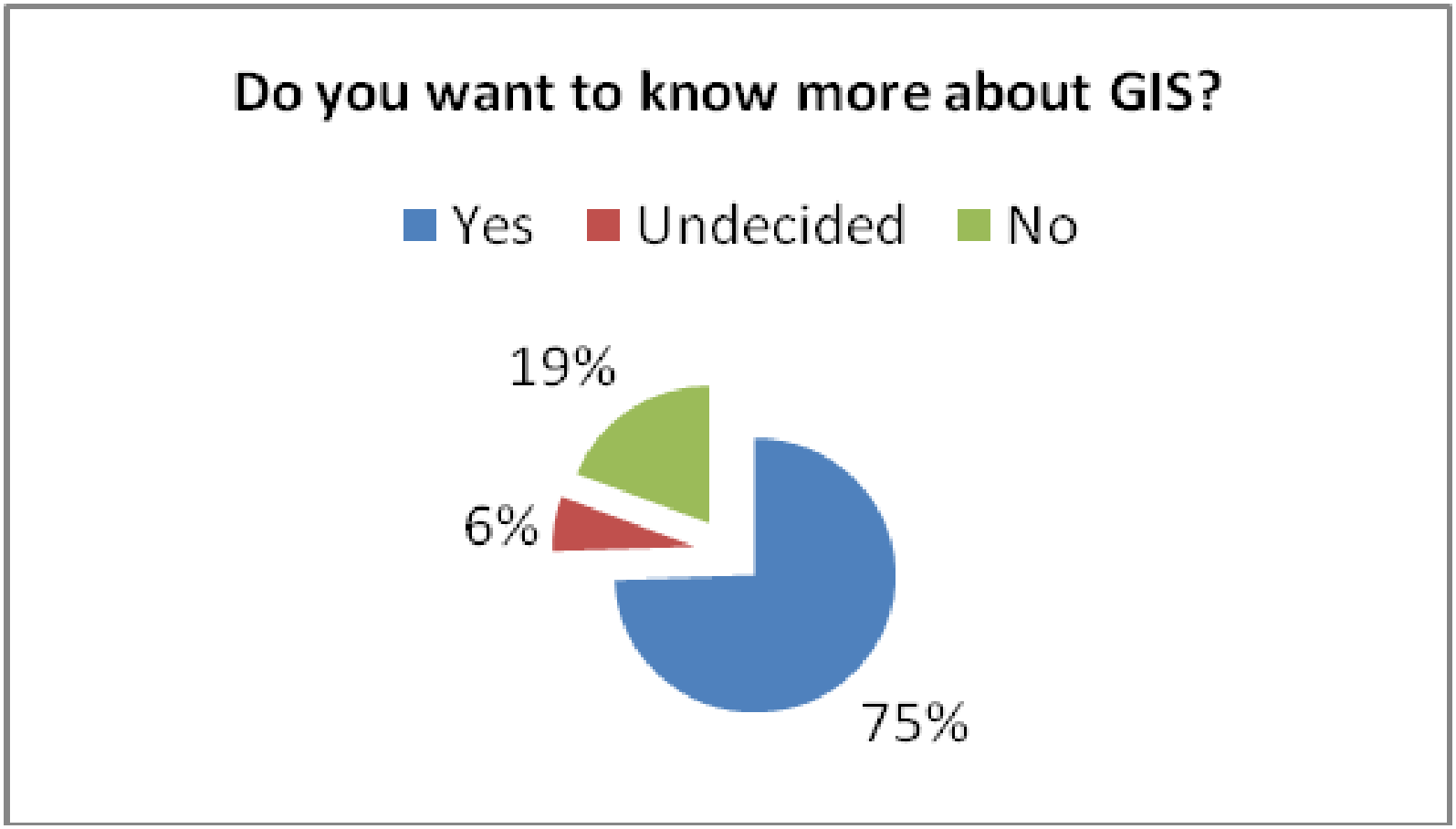
Mean map analysis post-test score ± SE

Geography, maths and science	15.68 ± 1.31
Geography	12.25 ± 5.75
Maths and science (no geography)	11.50 ± 3.57
Geography and maths	09.90 ± 1.80

Characteristics cont:- Attitude to maps



Characteristics cont:- Attitude to GIS



Conclusion

- Plenty of capability, lack of capacity
- Foster spatial competence and spatial decision making at school level
- Make more hands available, sooner
- “For harnessing the flow of geospatial information to address the challenges of sustainable development in Africa”

Thank you

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Research, development and delivery of products and services that encourage map use and improve spatial competence