TAO Lightning Talk:
Assessing 21st Century Skills by Leveraging Open Standards

Mark Molenaar – Open Assessment Technologies

Downloads
from over
160 Countries
Open Source, Open Standards,
Open Possibilities
OECD
PISA
PIAAC
icfes
mejor saber
ncsc
National Center and State Collaborative
CENEVAL
eon
CONSULTING
Questar
UNISA
university of south africa
NBCE
NATIONAL BOARD OF CHIROPRACTIC EXAMINERS
PARCC
MINISTÈRE DE L'ÉDUCATION NATIONALE, DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE
INVALSI
UNIVERSITY OF ALBERTA
CDIP
CDPE
CDEP
NYC
Department of Education
Carmen Fariña, Chancellor
Europäisches Patentamt
European Patent Office
Office européen des brevets
ACT
LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
LTI
Language Testing International
UMASS AMHERST
nccer
NBCOT
FLORIDA DEPARTMENT OF EDUCATION
measured progress

Student Assessment in France

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

MINISTÈRE
DE L'ÉDUCATION
NATIONALE

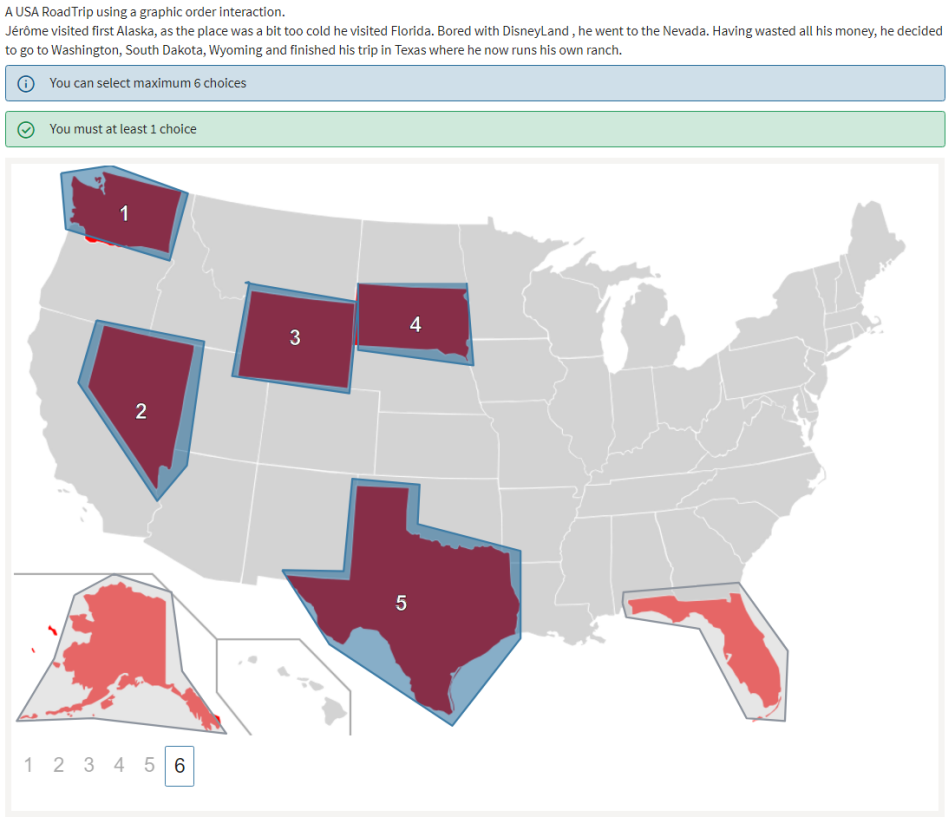
MINISTÈRE
DE L'ENSEIGNEMENT SUPÉRIEUR,
DE LA RECHERCHE
ET DE L'INNOVATION

- Evolution of student assessment programmes
  - 2015-2020: from paper-based assessment (PBA) to 100% e-assessment (eA)
  - In secondary schools: online testing with TAO

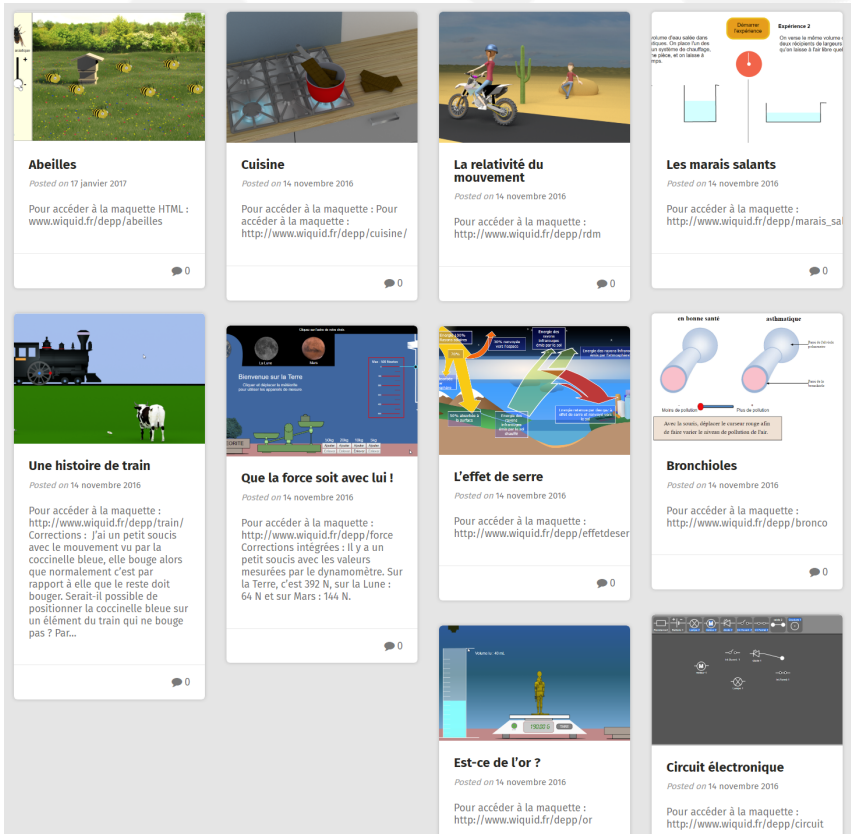
- Transition from PBA to eA:
  - New opportunities: cost reduction, potential easiness to implement, in line with digital school, more engaging…
  - New features: multimedia, interactivity, simulated situations, **Technology Enhanced Items (TEIs)**, adaptive testing (CAT), log-data, ...
  - New challenges: comparability PBA/eA, usability, equipment, security, confidentiality, …

Supported by IMS Open Standards

QTI: Question & Test Interoperability



PCI: Portable Custom Interaction



Lac

Mesure :

Notion de périmètre

Amorce :

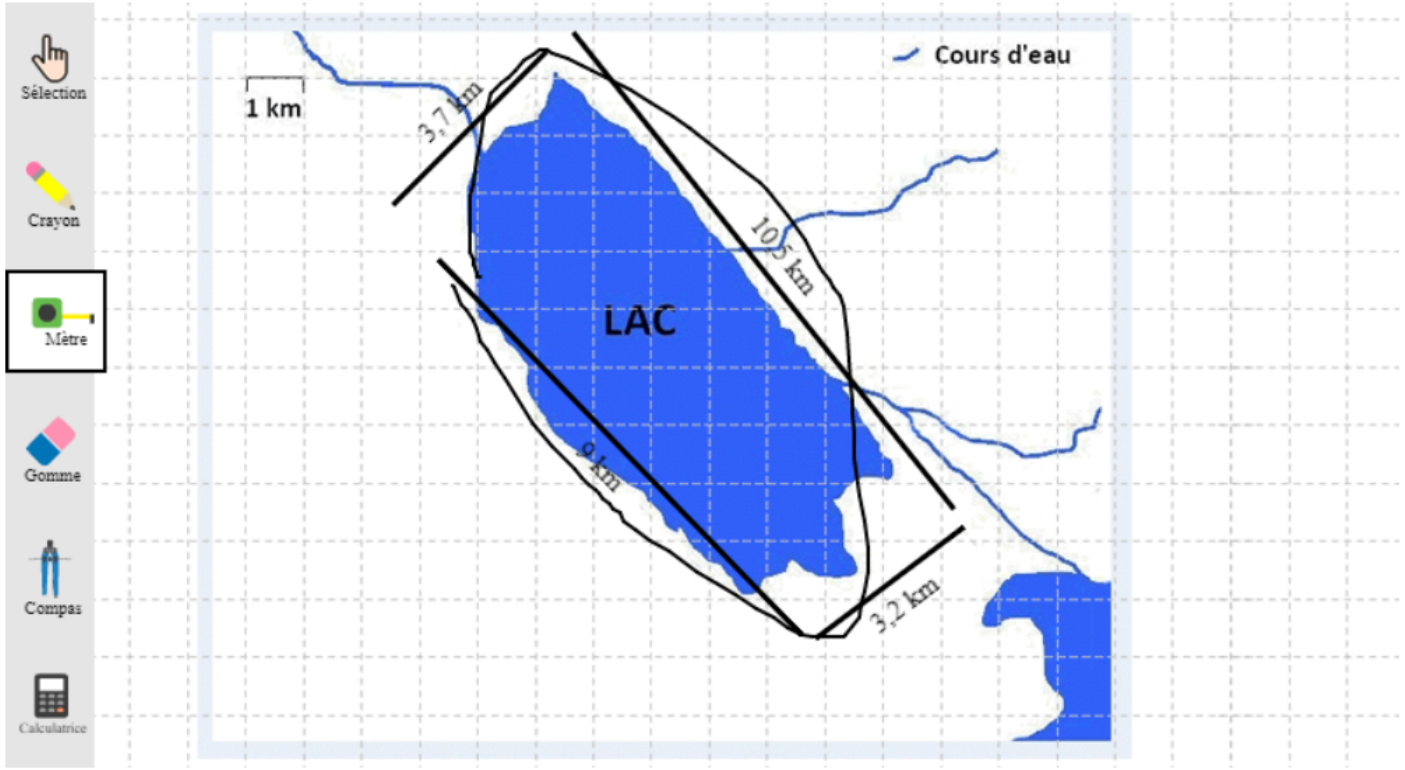
Un randonneur souhaite faire le tour du lac à vélo.

Question :

Estimer en kilomètre la longueur de son parcours.

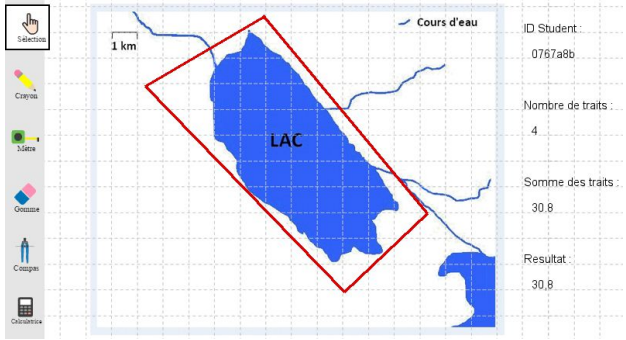
Format de réponse :

champ libre numérique



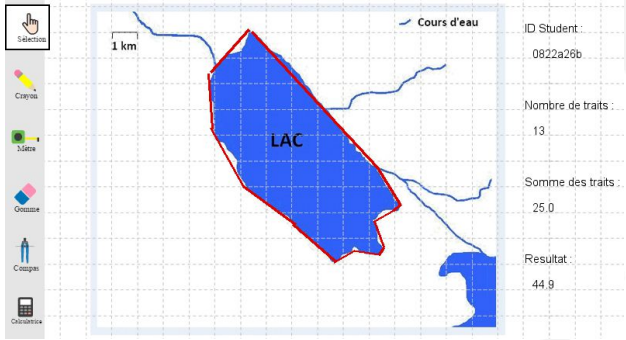
```
{"score":0,"data":{"globale_toolbar_selection_option":[{"tool_id":"hand","tool_name":"hand"},  {"tool_id":"pen","tool_name":"pen"},
{"tool_id":"tape","tool_name":"tape"},  {"tool_id":"eraser","tool_name":"eraser"},  {"tool_id":"radius","tool_name":"radius"},
{"tool_id":"calculator","tool_name":"calculator"},  {"tool_id":"notepad","tool_name":"notepad"}],"item_vrt_2_6_sliders_snapshotfinal":
[{"limonade_ML":null,"limonade_CM":null,"limonade_scroll":null,"grenadine_ML":null,"grenadine_CM":null,"grenadine_scroll":null},
{"limonade_ML":null,"limonade_CM":null,"limonade_scroll":null,"grenadine_ML":null,"grenadine_CM":null,"grenadine_scroll":null},  {"limonade_ML":336.5,"limonade_CM"
11.9,"limonade_scroll":0.9917146590429032,"grenadine_ML":0,"grenadine_CM":0,"grenadine_scroll":0}],"item_vrt_2_6_slider_limonade_historique":
[{"timestamp_start":"1460100015554","timestamp_end":"1460100015554","valueInCM":0.2,"valueInML":6.8,"scroll":0.02},
{"timestamp_start":"1460100015653","timestamp_end":"1460100015653","valueInCM":0.7,"valueInML":20.4,"scroll":0.06},
{"timestamp_start":"1460100015669","timestamp_end":"1460100015669","valueInCM":1.1,"valueInML":31.7,"scroll":0.09333333333333334},
{"timestamp_start":"1460100015692","timestamp_end":"1460100015692","valueInCM":1.3,"valueInML":36.2,"scroll":0.10666666666666667},
{"timestamp_start":"1460100015703","timestamp_end":"1460100015703","valueInCM":1.8,"valueInML":49.8,"scroll":0.14666666666666667},
{"timestamp_start":"1460100015741","timestamp_end":"1460100015741","valueInCM":2.1,"valueInML":58.8,"scroll":0.17333333333333334},
{"timestamp_start":"1460100015752","timestamp_end":"1460100015752","valueInCM":2.5,"valueInML":70.1,"scroll":0.20666666666666667},
{"timestamp_start":"1460100015768","timestamp_end":"1460100015768","valueInCM":2.9,"valueInML":81.4,"scroll":0.24},
{"timestamp_start":"1460100015790","timestamp_end":"1460100015790","valueInCM":3.1,"valueInML":88.2,"scroll":0.26},
{"timestamp_start":"1460100015801","timestamp_end":"1460100015801","valueInCM":4,"valueInML":113.1,"scroll":0.3333333333333333},
{"timestamp_start":"1460100015818","timestamp_end":"1460100015818","valueInCM":4.7,"valueInML":133.5,"scroll":0.3933333333333333},
{"timestamp_start":"1460100015840","timestamp_end":"1460100015840","valueInCM":5,"valueInML":140.2,"scroll":0.41333333333333333},
{"timestamp_start":"1460100015851","timestamp_end":"1460100015851","valueInCM":5.8,"valueInML":165.1,"scroll":0.4866666666666667},
{"timestamp_start":"1460100015867","timestamp_end":"1460100015867","valueInCM":6.7,"valueInML":190,"scroll":0.56},
{"timestamp_start":"1460100015889","timestamp_end":"1460100015889","valueInCM":7,"valueInML":199.1,"scroll":0.5866666666666667},
{"timestamp_start":"1460100015900","timestamp_end":"1460100015900","valueInCM":8.1,"valueInML":228.5,"scroll":0.6733333333333333},
{"timestamp_start":"1460100015917","timestamp_end":"1460100015917","valueInCM":8.7,"valueInML":246.6,"scroll":0.7266666666666667},
{"timestamp_start":"1460100015939","timestamp_end":"1460100015939","valueInCM":9.1,"valueInML":257.9,"scroll":0.76},
{"timestamp_start":"1460100015950","timestamp_end":"1460100015950","valueInCM":9.9,"valueInML":280.5,"scroll":0.8266666666666667},
{"timestamp_start":"1460100015966","timestamp_end":"1460100015966","valueInCM":10.4,"valueInML":294.1,"scroll":0.8666666666666667},
{"timestamp_start":"1460100015988","timestamp_end":"1460100015988","valueInCM":10.6,"valueInML":298.6,"scroll":0.8799999999999998},
{{"timestamp_start":"1460100018344","timestamp_end":"1460100018344","valueInCM":1.2,"valueInML":34.2,"scroll":1},
{"timestamp_start":"1460100018361","timestamp_end":"1460100018361","valueInCM":0.8,"valueInML":23,"scroll":1},
{"timestamp_start":"1460100018378","timestamp_end":"1460100018378","valueInCM":0.6,"valueInML":16.3,"scroll":1},
{"timestamp_start":"1460100018394","timestamp_end":"1460100018394","valueInCM":0.3,"valueInML":9.6,"scroll":1},
{"timestamp_start":"1460100018427","timestamp_end":"1460100018427","valueInCM":0.1,"valueInML":2.8,"scroll":1},
{"timestamp_start":"1460100027628","timestamp_end":"1460100027628","valueInCM":0.8,"valueInML":22.4,"scroll":0.8887149982845517},
{"timestamp_start":"1460100027644","timestamp_end":"1460100027644","valueInCM":1.6,"valueInML":44.9,"scroll":0.9410556774815821},
{"timestamp_start":"1460100027661","timestamp_end":"1460100027661","valueInCM":2.4,"valueInML":67.3,"scroll":0.959910220910216},
{"timestamp_start":"1460100027677","timestamp_end":"1460100027677","valueInCM":2.9,"valueInML":83,"scroll":0.9672451668230595},
{"timestamp_start":"1460100027694","timestamp_end":"1460100027694","valueInCM":3.4,"valueInML":96.5,"scroll":0.9716853295801577},
{"timestamp_start":"1460100027718","timestamp_end":"1460100027718","valueInCM":3.6,"valueInML":101,"scroll":0.9729094390049594},
{"timestamp_start":"1460100027727","timestamp_end":"1460100027727","valueInCM":4.2,"valueInML":118.9,"scroll":0.9769035015840601},
{"timestamp_start":"1460100027744","timestamp_end":"1460100027744","valueInCM":4.5,"valueInML":127.9,"scroll":0.9784892096607},
{"timestamp_start":"1460100027760","timestamp_end":"1460100027760","valueInCM":4.9,"valueInML":139.1,"scroll":0.98018935382724453},
{"timestamp_start":"1460100027783","timestamp_end":"1460100027783","valueInCM":5.2,"valueInML":145.8,"scroll":0.9810862817568538},
{"timestamp_start":"1460100027793","timestamp_end":"1460100027793","valueInCM":5.9,"valueInML":166,"scroll":0.9833480369662758},
{"timestamp_start":"1460100027826","timestamp_end":"1460100027826","valueInCM":6.9,"valueInML":195.2,"scroll":0.9858006931451897},
{"timestamp_start":"1460100027843","timestamp_end":"1460100027843","valueInCM":7.4,"valueInML":208.6,"scroll":0.9867045159304912},
{"timestamp_start":"1460100027876","timestamp_end":"1460100027876","valueInCM":8.3,"valueInML":233.3,"scroll":0.9880939137132744},
{"timestamp_start":"1460100027908","timestamp_end":"1460100027908","valueInCM":8.7,"valueInML":246.8,"scroll":0.9887359723895489},
{"timestamp_start":"1460100027925","timestamp_end":"1460100027925","valueInCM":9,"valueInML":255.7,"scroll":0.9891268752124112},
{"timestamp_start":"1460100027942","timestamp_end":"1460100027942","valueInCM":9.3,"valueInML":262.5,"scroll":0.9894026989478849},
{"timestamp_start":"1460100027975","timestamp_end":"1460100027975","valueInCM":9.8,"valueInML":278.2,"scroll":0.9899949081207645},
{"timestamp_start":"1460100027991","timestamp_end":"1460100027991","valueInCM":10.3,"valueInML":291.6,"scroll":0.9904522431013281},
{"timestamp_start":"1460100028008","timestamp_end":"1460100028008","valueInCM":10.7,"valueInML":302.8,"scroll":0.9908025895050013},
{"timestamp_start":"1460100028024","timestamp_end":"1460100028024","valueInCM":11.1,"valueInML":314,"scroll":0.9911281346717472},
{"timestamp_start":"1460100028047","timestamp_end":"1460100028047","valueInCM":11.3,"valueInML":318.5,"scroll":0.9912519900700845},
{"timestamp_start":"1460100028057","timestamp_end":"1460100028057","valueInCM":11.7,"valueInML":332,"scroll":0.991603641375707},
{"timestamp_start":"1460100028074","timestamp_end":"1460100028074","valueInCM":11.9,"valueInML":336.5,"scroll":
0.991714659042903 2}],"item_vrt_2_6_slider_grenadine_historique":[{"timestamp_start":"1460100017988","timestamp_end":"1460100017988","valueInCM":0.2,"valueInML":
4.49,"scroll":0.013333333333333334},  {"timestamp_start":"1460100017998","timestamp_end":"1460100017998","valueInCM":0.5,"valueInML":13.46,"scroll":0.04},
{"timestamp_start":"1460100018014","timestamp_end":"1460100018014","valueInCM":0.9,"valueInML":24.67,"scroll":0.07333333333333333},
{"timestamp_start":"1460100018038","timestamp_end":"1460100018038","valueInCM":1.1,"valueInML":31.4,"scroll":0.09333333333333334},
{"timestamp_start":"1460100018047","timestamp_end":"1460100018047","valueInCM":2,"valueInML":56.08,"scroll":0.16666666666666666},
estamp_start":"1460100027908","timestamp_end":"1460100027908","valueInCM":3.2,"valueInML":89.72,"scroll":0.26666666666666666},
{"timestamp_start":"1460100027925","timestamp_end":"1460100027925","valueInCM":2.9,"valueInML":80.75,"scroll":0.24},
{"timestamp_start":"1460100027942","timestamp_end":"1460100027942","valueInCM":2.6,"valueInML":74.02,"scroll":0.22},
{"timestamp_start":"1460100027965","timestamp_end":"1460100027965","valueInCM":2.5,"valueInML":71.78,"scroll":0.21333333333333335},
{"timestamp_start":"1460100027975","timestamp_end":"1460100027975","valueInCM":2.1,"valueInML":58.32,"scroll":0.17333333333333334},
{"timestamp_start":"1460100027991","timestamp_end":"1460100027991","valueInCM":1.6,"valueInML":44.86,"scroll":0.13333333333333333},
{"timestamp_start":"1460100028008","timestamp_end":"1460100028008","valueInCM":1.2,"valueInML":33.65,"scroll":0.1},
{"timestamp_start":"1460100028024","timestamp_end":"1460100028024","valueInCM":0.8,"valueInML":22.43,"scroll":0.06666666666666667},
{"timestamp_start":"1460100028047","timestamp_end":"1460100028047","valueInCM":0.6,"valueInML":17.94,"scroll":0.05333333333333334},
{"timestamp_start":"1460100028057","timestamp_end":"1460100028057","valueInCM":0.2,"valueInML":4.49,"scroll":0.013333333333333334},
{"timestamp_start":"1460100028074","timestamp_end":"1460100028074","valueInCM":0,"valueInML":0,"scroll":0}],"globale_toolbar_calculatrice_input_historique":
[{"timestamp_start":"1460100027481","timestamp_end":"1460100027481","input":"CLEAR_LAST_INPUT","error_type":""},
{"timestamp_start":"1460100031135","timestamp_end":"1460100031135","input":"1","error_type":""},
```

Classification of Mistakes



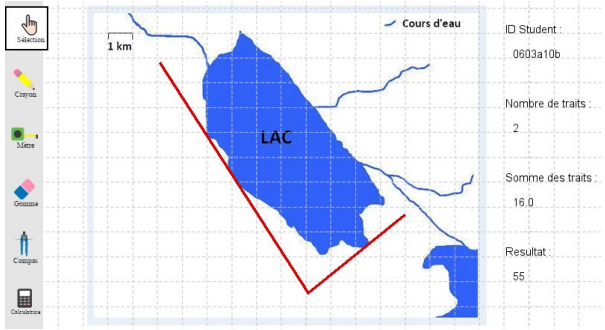
Class 1

- Polygon drawing, but too big
- Estimation is too large



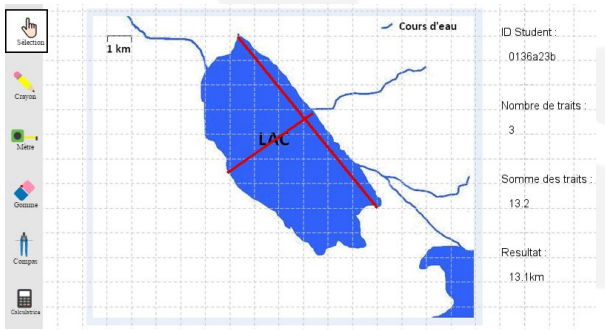
Class 3

- Polygon drawing, too precise
- Too many traits, error in calculation



Class 4

- 2 segments, result close to the product
- Confusion between aera and perimeter



Class 5

- 2 segments, result close to the sum
- Confusion + misconception

Recommendations & Challenges

- Use Open Standards for TEIs
  - Vendors: use QTI & PCI for creating TEIs
  - End-users: require standards when commissioning TEIs
  - Allow separation of concerns; subject matter experts, developers, multimedia specialists, psychometricians
  - Portable, shareable, protecting your investment
- Lessons for Data
  - Opportunity of using data science for log-data is highly related to considered items; must be related to a strong theoretical background
  - Amount of data should be larger
  - Share Research, Results & Experiences!
- Challenges
  - Standardize structure for log-data; use of Caliper?
  - Ensuring Accessibility for TEIs; leverage PNP?

http://flip-initiative.org

Merci!

markm@taotesting.com