

FIG

FIG WORKING WEEK 2017

Helsinki Finland

29 May - 2 June 2017

Presented at the FIG Working Week 2017,
May 29 - June 2, 2017 in Helsinki, Finland

Development of inverse pedagogy through the implementation of a wireless response system: lessons learned from the Geomatics course

Daniel PAEZ and Luis RUBIO, Colombia

Surveying the world of tomorrow -
From digitalisation to augmented reality

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UN-GGIM
UNITED NATIONS INITIATIVE ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT

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UN-GGIM academic network



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Objectives of Academic Network

Helsinki Finland

29 May - 2 June 2017

- The **UN-GGIM Academic Network** will be a coalition of recognized universities, research and education centers or equivalent involved in the research, development and training on geospatial and land information and related matters.
 - The **Academic Network** will be a platform for the academic community to provide input and to support UN-GGIM in achieving its vision and goals by generating a platform for academic community to input to the UN-GGIM process in the form of strategic knowledge, research, education and training, and will be a strategic arm to empower UN-GGIM to achieve their vision and goals.
 - The **Academic Network** will provide both research and education capabilities for UN-GGIM and affiliated members to identify and response to challenges and opportunities in which UN-GGIM and related UN offices can achieve their visions.
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Team Members Helsinki Finland

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- Prof Abbas Rajabifard, The University of Melbourne, Australia (**Chair**)
 - Prof Daniel Páez, University of Los Andes, Colombia (**Secretary**)
 - Prof Huayi Wu, Wuhan University, China
 - Prof Joep Crompvoets, KU Leuven, Belgium
 - Prof David Coleman, University of New Brunswick, Canada
 - Prof Harlan Onsrud, University of Maine, USA
 - Prof Menno-Jan Kraak, University of Twente, Netherlands
 - Prof Josef Strobl, University of Salzburg, Austria
 - Prof Maria Antonia Brovelli, Politecnico di Milano, Italy
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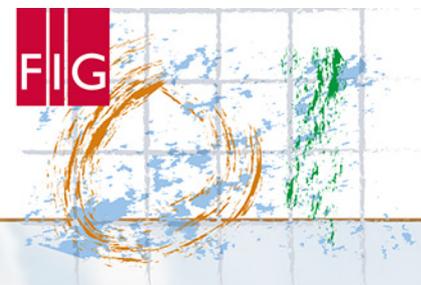


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Have you seen this?



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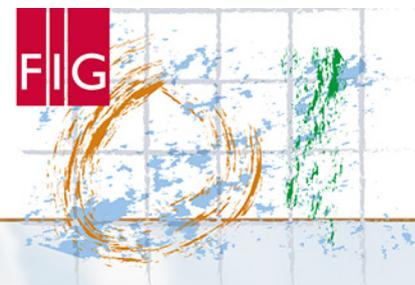


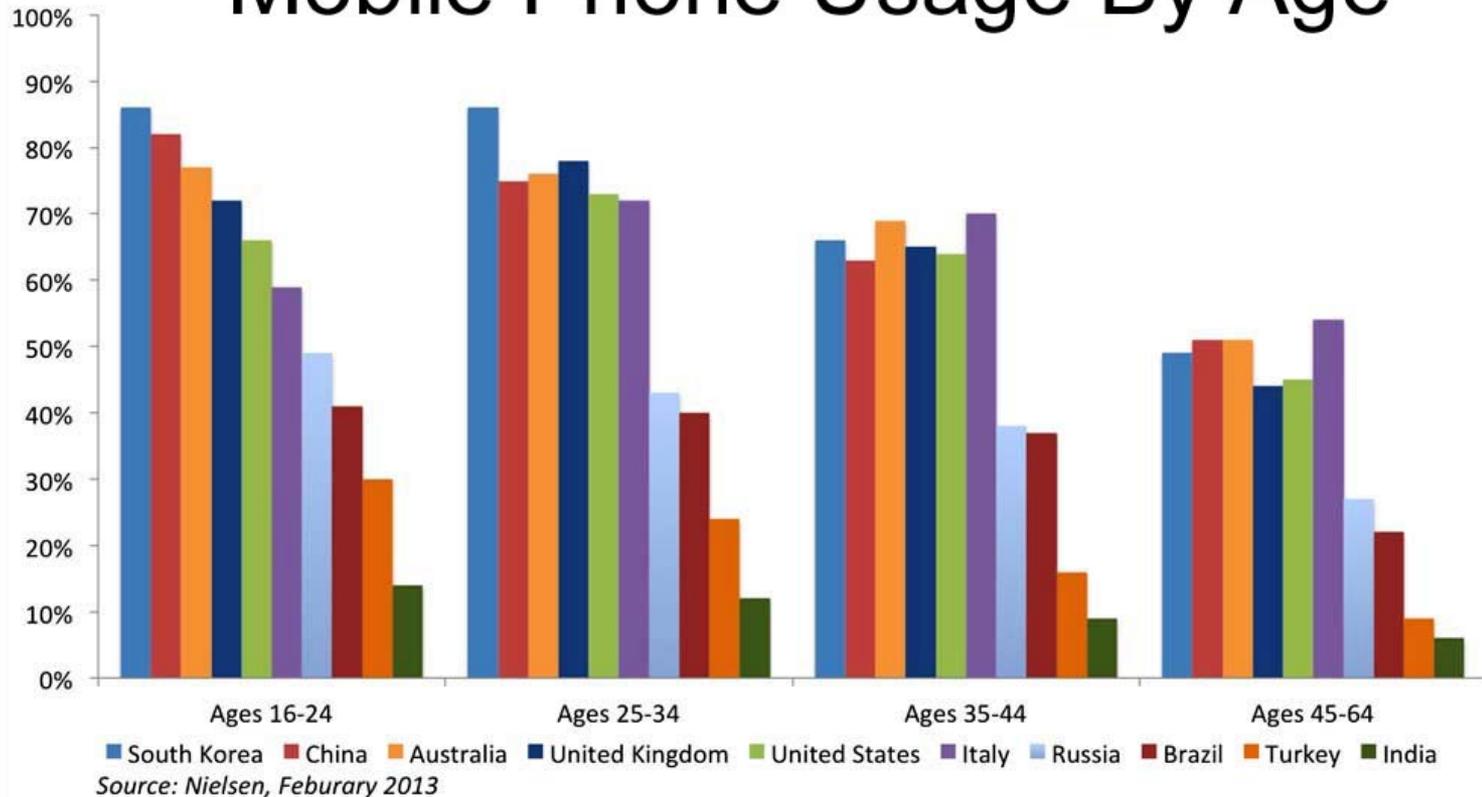
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Mobile Phone Usage By Age



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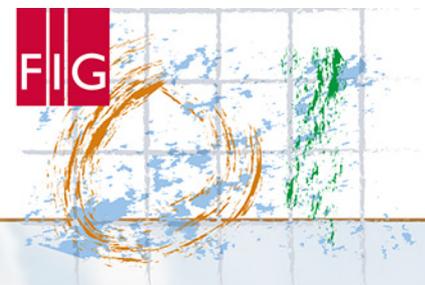


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INTRODUCTION

This article describes and evaluates **INVERSE PEDAGOGY** in two undergraduate student classes taking the Geomatics course at Universidad de los Andes.

In the case of Universidad de los Andes:

- the Geomatics course is mandatory in the Civil Engineering and Environmental Engineering curriculums
- Covers basis surveying and spatial analysis
- an average semester has 90 students in each class
- 3 lecture hours and 3 practice hours per week, for 15 weeks.



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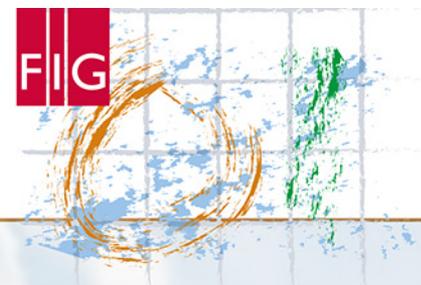


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METHODOLOGY

Ensure that courses are comparable

- Size, content, instructor

Choose the tools:

- Videos, clickers, forum

Apply a survey

- Satisfaction, interactive class, commitment, learning perception



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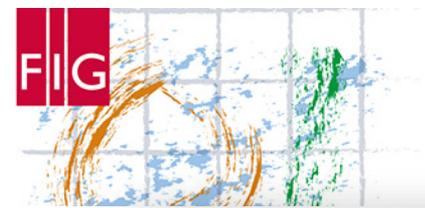


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learning catalytics

https://learningcatalytics.com/courses/11/lectures/203

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learning | catalytics

Courses Participate Review Classrooms Account About

current session: 766079 | 69 students

Stop session Review results Seat map Show floating session ID Edit PDF Delete

Jump to 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

enters horizontally into the combination of two perpendicular

Stop delivery Deliver again Assign groups Show all results

Round 1 57 responses, 58% correct

Round 2 51 responses, 73% correct

8 get it now 0 still don't get it

feedback & support

Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after it reflects off of both mirrors.

the incident light after it reflects off of both mirrors.

Carrier 1:50 PM

Leave session 766079 Logout

Submit response

Switch to text response

Current seat: A2 Change seats

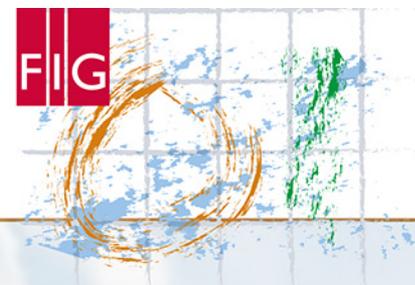


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Tool used

The screenshot displays the Learning Catalytics interface. The desktop view shows a physics problem: "Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after off of both mirrors." Below the text is a diagram of two perpendicular mirrors forming a right angle. A blue arrow points horizontally from the left towards the mirrors. The interface includes a "Submit response" button and a "Switch to text response" option. The "Round 1" results summary shows "57 responses, 58% correct". The desktop also features a navigation bar with "Courses", "Participate", "Review", "Classrooms", "Account", and "About", and a "current session: 766079 | 69 students" indicator.

The smartphone view shows the same problem and a "Submit response" button. The status bar at the top of the phone indicates "Carrier" and "1:50 PM".



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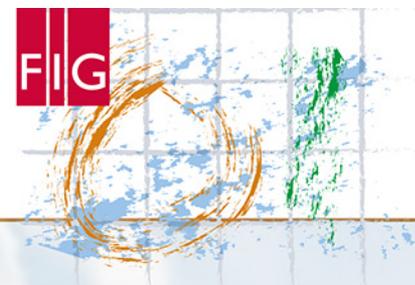


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Tool used

The tools displayed are:

- Composite sketch**: A grid of blue scribbles.
- Confidence**: A bar chart showing percentages for categories A (33%), B (8%), and C (77%).
- Data collection**: A list of numerical ranges with associated percentages: Mean: 3.03, SD: 1.06, Range: 0.00-7.00; 0.00-1.00: 10%; 1.00-2.00: 20%; 2.00-3.00: 33%; 3.00-4.00: 33%; 4.00-5.00: 10%; 5.00-6.00: 10%; 6.00-7.00: 10%.
- Direction**: A diagram showing green arrows pointing right and red arrows pointing left.
- Expression**: A list of mathematical expressions with percentages: 1/2 > 1/3: 20%; 1/2 < 1/3: 34%; 1/2 = 1/3: 46%.
- Highlighting**: A text snippet: "For thou art so pot murderous hate That 'gainst thyself not to conspire. Seeking that beaut ruinate".
- Image upload**: A 2x3 grid of small images showing triangles and arrows.
- Long answer**: A list of physics-related questions: "The E field effort to push an electron across the distance of the wire.", "resistance of wires", "The internal resistance in the battery", "Internal resistance of the battery".
- Many choice**: A bar chart showing percentages for categories A (8%), B (66%), C (66%), and D (33%).
- Matching**: A 5x5 grid with letters A-E on the left and numbers 1-5 on top, with some cells highlighted in green.
- Multiple choice**: A bar chart showing percentages for categories A (33%), B (8%), and C (77%).
- Priority**: A horizontal bar chart showing relative strength of preference for categories: programs, cats, dogs, hamsters.
- Ranking**: A list of mathematical equations with percentages: (a) + (b) = (c): 100%; (a) + (b) = (d): 100%; (a) + (c) = (b): 2%.
- Region**: A map showing red dots scattered across a white area.
- Short answer**: A list of physics-related questions: "The E field effort to push an electron across the distance of the wire.", "resistance of wires", "The internal resistance in the battery", "Internal resistance of the battery".
- Sketch**: A 3x3 grid of small diagrams showing curves and lines.
- Word cloud**: A collection of words including "observing", "works", "experience", "practice", "learning", "others", "people", "through", "time", "watching".
- Slide**: An image of a computer monitor displaying a blue abstract graphic.



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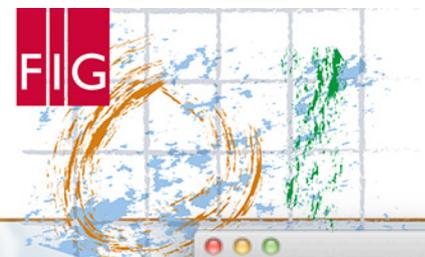


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learning catalytics

https://learningcatalytics.com/courses/11/lectures/189

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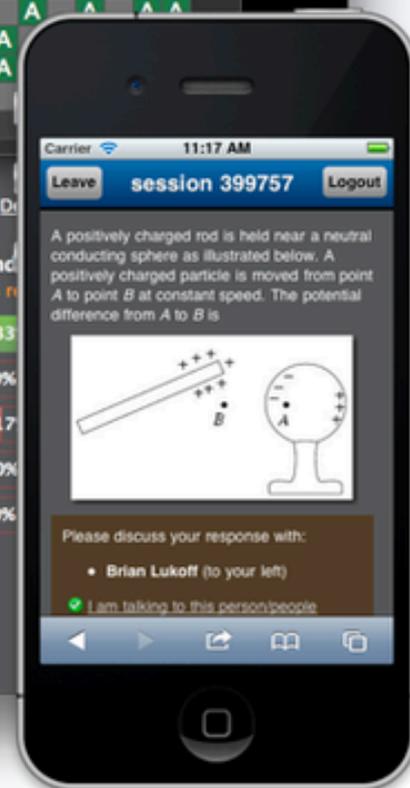
learning catalytics

2. multiple choice A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B at constant speed. The potential difference from A to B is

A. positive
B. zero
C. negative
D. depends on the path taken from A to B
E. cannot be determined without knowing more about the polarization induced in the sphere

Round 1
74 responses, 61% correct

A. 61%	Round 2 75 responses, 83% correct
B. 4%	B. 0%
C. 35%	C. 17%
D. 0%	D. 0%
E. 0%	E. 0%



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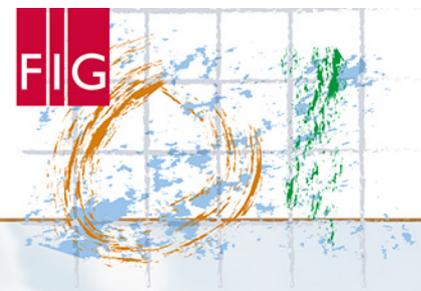


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SURVEY

The survey given to the students asked about specific learning activities. These were based on prior experiences from literature (Conole, 2007; Marcelo, Yot & al., 2014), and covered aspects such as: satisfaction, interactive class, commitment and learning perception.

As strategies to isolate the effects of the use of virtualization and clickers, the following was considered:

- The contents or class themes to be covered should be exactly the same in both sections.
- Tests, as well as their weight in the students' final scores also had to be exactly the same.
- Tests were administered at the same time and under the same conditions for both groups.
- Students in each section were not aware of the differences in the pedagogies used.



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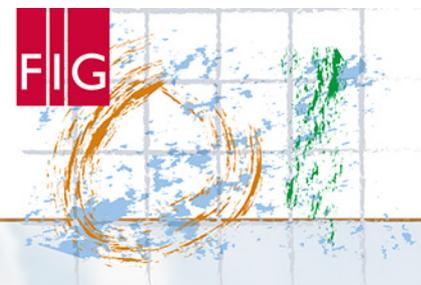


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RESULTS

Exam #	Section A	Section B
Exam 1	3.12	3.07
Exam 2	3.67	3.65
Exam 3	3.08	3.50

Take-outs: not direct correlation with exam results

However, the performance of those students who used the Learning Catalytics tool throughout the semester displayed a

15% improvement

when compared to those who did not use it.



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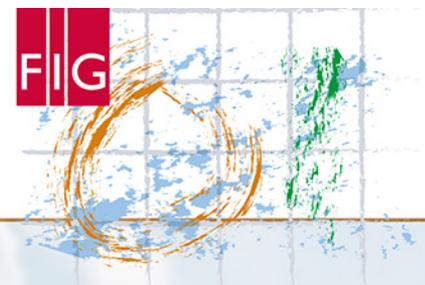


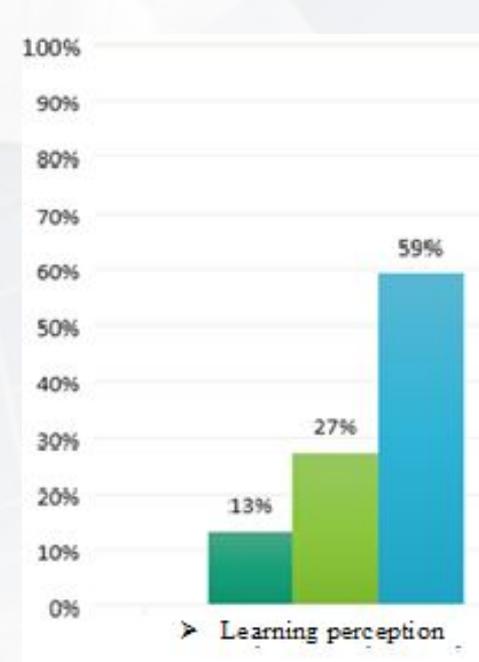
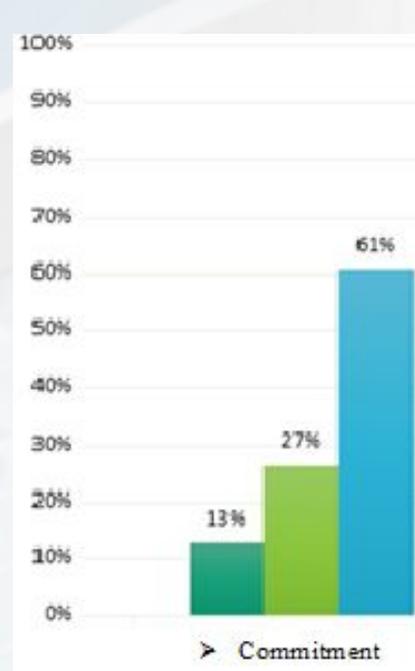
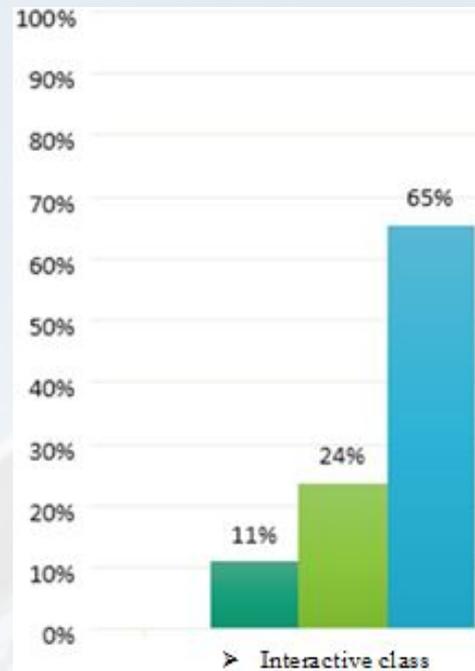
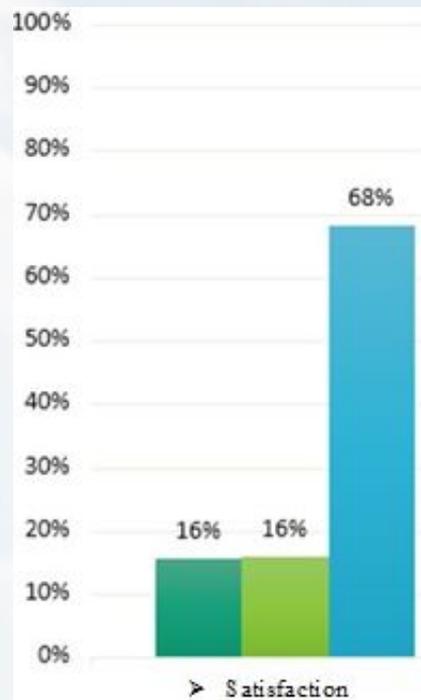
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Results from the surveys (only those using tools)



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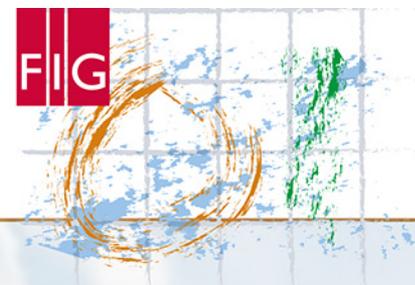


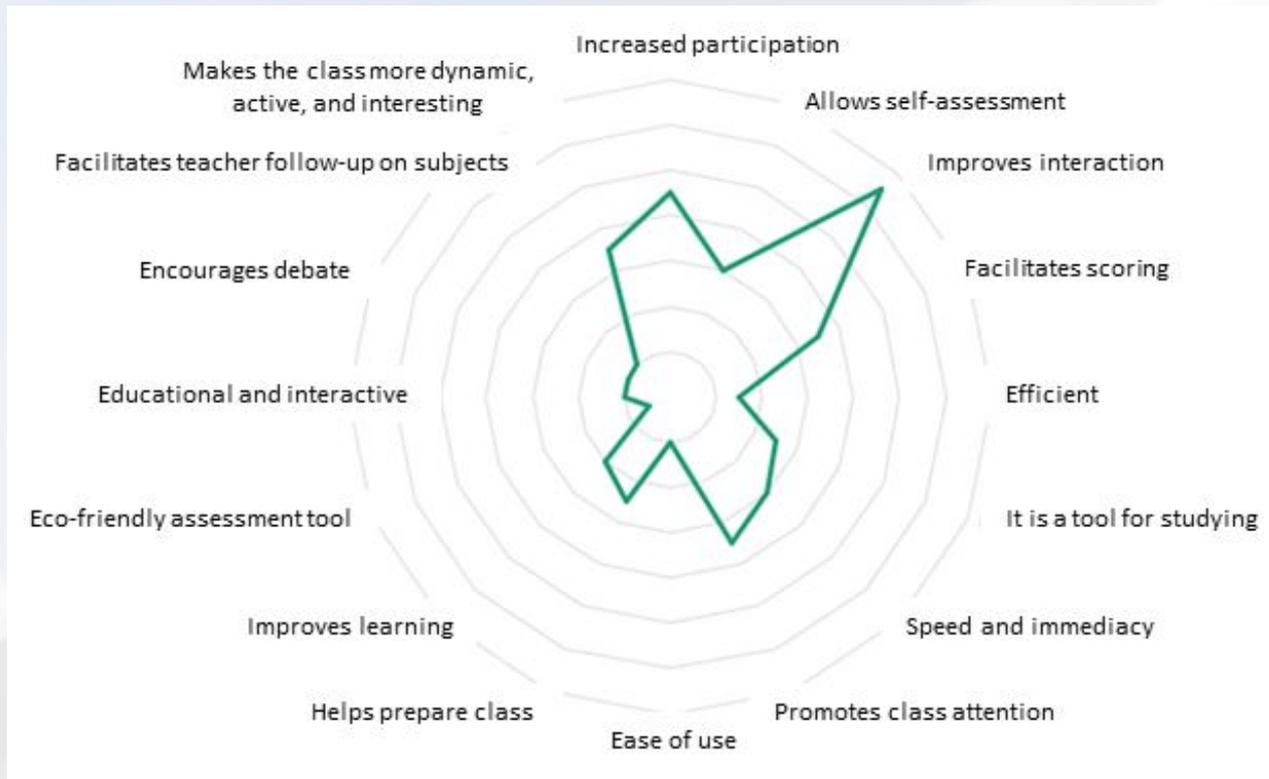
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RESULTS



Perceived strengths



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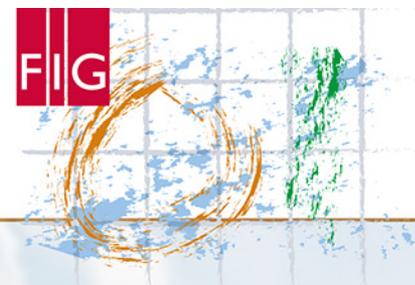


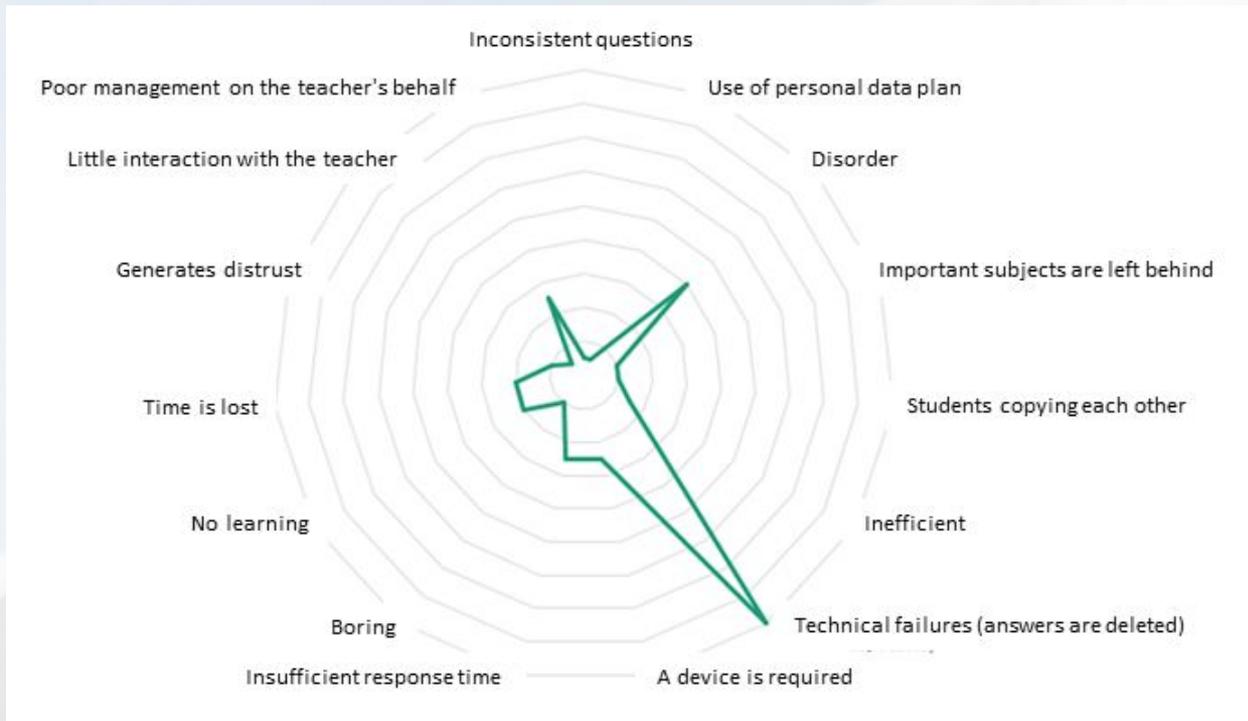
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RESULTS



Disadvantages



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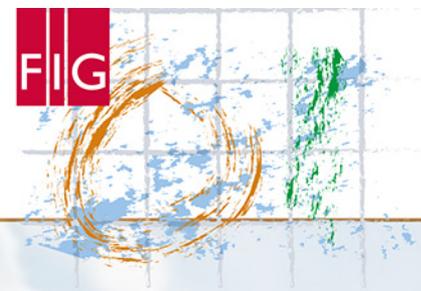


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CONCLUSIONS

The study shows that the use of TC tools enables self-learning and promotes interactivity with the teacher in large sized classes. Likewise, Learning Catalytics is a user friendly tool that enables variety and a wealth of learning activities that few tools offer.

In order to use the Learning Catalytics, preparation is required regarding the questions that may contribute, to a larger extent, to a learning environment, in the short time that they are applied. Logistical challenges are inevitable when performing trials; however, once they are solved, it contributes to a reverse pedagogy.

Even though the tool does not generate a significant increase in test scores, it has many other positive effects such as: interaction with the teacher, increase in class engagement, and greater participation.



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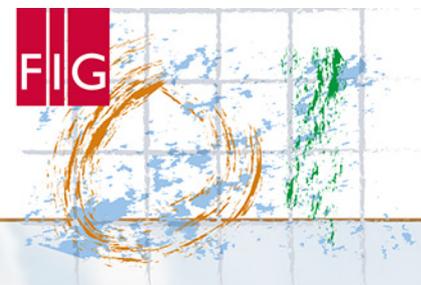


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THANKS



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