

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. Surveying the world of tomorrow - From digitalisation to augmented reality



- 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
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 - Prof Harlan Onsrud, University of Maine, USA
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 - Prof Maria Antonia Brovelli, Politecnico di Milano, Italy
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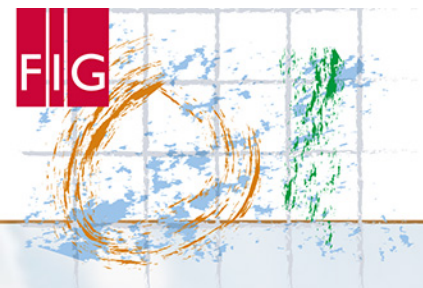


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Have you seen this?



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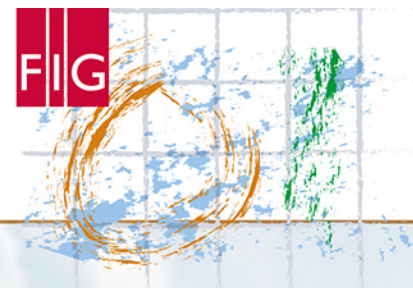


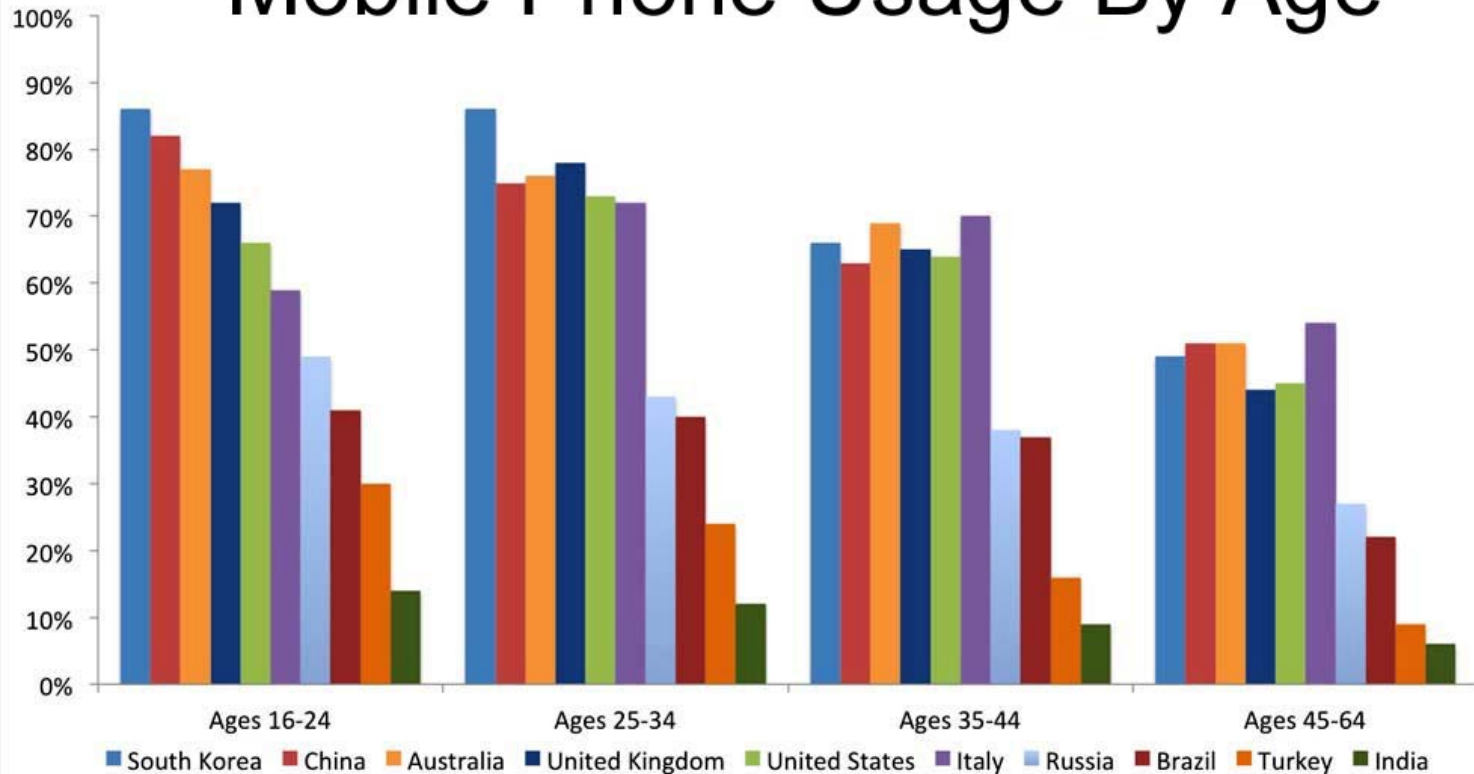
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Mobile Phone Usage By Age



Source: Nielsen, February 2013



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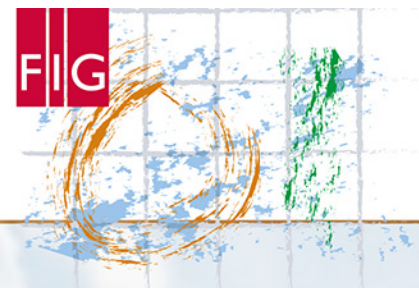


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INTRODUCTION

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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esri



Trimble

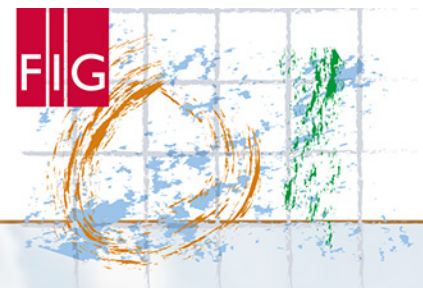


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METHODOLOGY

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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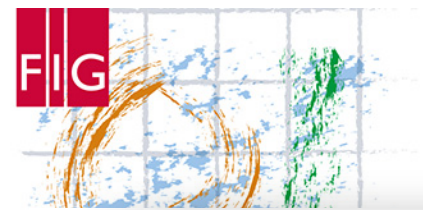


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The screenshot displays the Learning Catalytics interface for a session. At the top, the browser address bar shows the URL <https://learningcatalytics.com/courses/11/lectures/203>. The page header includes the text "learning | catalytics" and "Brian Lukoff | Harvard University | Log out". A navigation menu contains "Courses", "Participate", "Review", "Classrooms", "Account", and "About".

The main content area shows "current session: 766079 | 69 students". Below this are control buttons: "Stop session", "Review results", "Seat map", "Show floating session ID", "Edit", "PDF", and "Delete". A "Jump to" menu lists slides 1 through 15, with slide 4 selected. A play button is visible on the right.

The central problem text reads: "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." 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. A pink plus sign is overlaid on the diagram.

On the right side, there are two round-robin results:

- Round 1:** 57 responses, 58% correct. The diagram shows a green arrow pointing left and several red arrows pointing in various directions.
- Round 2:** 51 responses, 73% correct. The diagram shows a green arrow pointing left and several red arrows pointing in various directions.

 Below Round 2, it says "8 get it now" and "0 still don't get it". A pink plus sign is overlaid on the Round 2 diagram.

At the bottom right, there is a "feedback & support" button.

Overlaid on the left is a mobile app view of the same session. The app shows "session 766079" with "Leave" and "Logout" buttons. The text and diagram are identical to the web view. Below the diagram, there is a "Submit response" button and a "Switch to text response" option. The current seat is "A2" and there is a "Change seats" option.

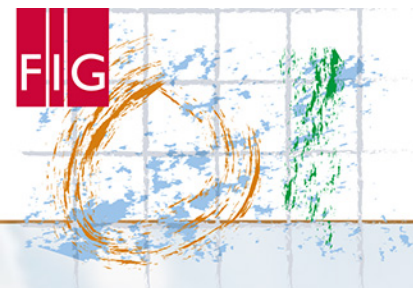


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Tool used

learning catalytics

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

Brian Lukoff | Harvard University | Log out

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

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

Round 1 57 responses, 58% correct

Round 2 51 responses, 73% correct

8 get it now 0 still don't get it

feedback & support



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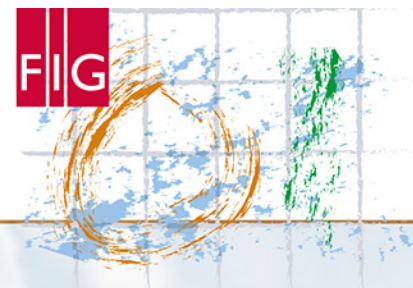


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Tool used

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%; 7.00: 6%.
- Direction**: A diagram showing green arrows pointing towards a red point.
- Expression**: A list of mathematical expressions with percentages: 1/20: 2%, 1/2: 34%, 1/2*ln(2): 3%.
- 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 numbers 1-5 and letters A-E, some cells containing colored squares.
- Multiple choice**: A bar chart showing percentages for categories A (33%), B (8%), and C (77%).
- Priority**: A horizontal bar chart showing relative strengths for categories: programs, cats, dogs, hamsters.
- Ranking**: A bar chart showing percentages for categories: 00 < 00 = 00: 100%, 00 < 00 = 00: 100%, 00 < 00 = 00: 2%.
- Region**: A map showing red dots on a white background.
- 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 word cloud with the word "practice" prominently displayed, along with other words like "observing", "work", "experience", "learning", "others", "people", "through", "time", "practicing", "watching".
- Slide**: An image of a computer monitor displaying a blue screen.



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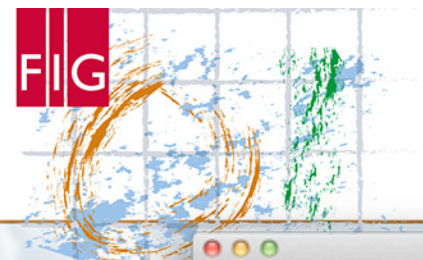


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learning catalytics

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

Brian Lukoff | Harvard University | Log out

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%

Carrier 11:17 AM

Leave session 399757 Logout

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

Please discuss your response with:

- Brian Lukoff (to your left)
- I am talking to this person/people



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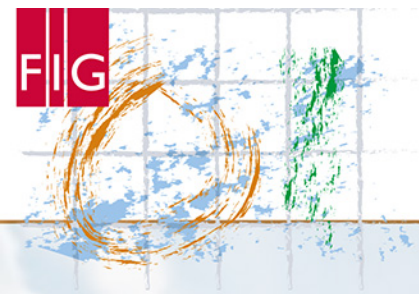


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SURVEY

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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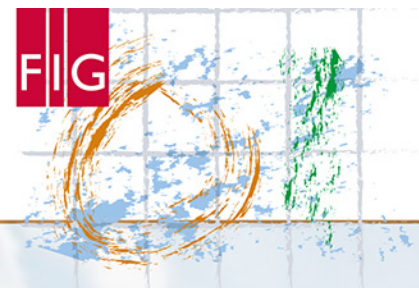


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RESULTS

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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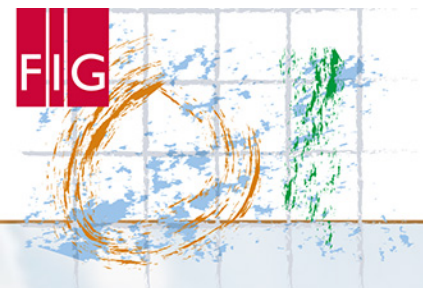


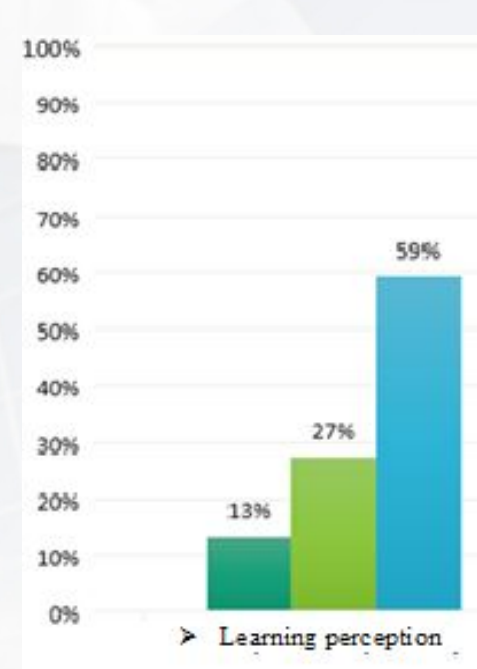
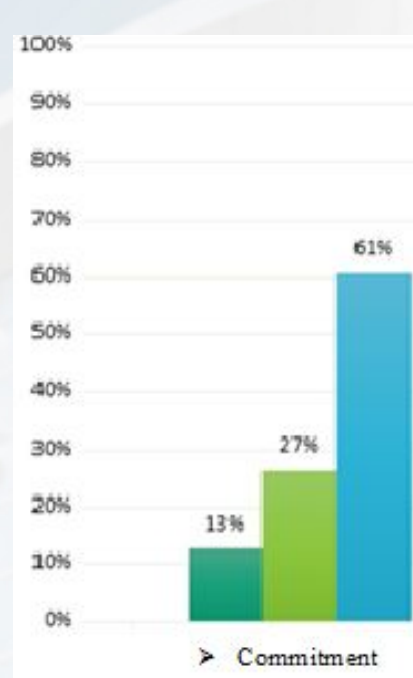
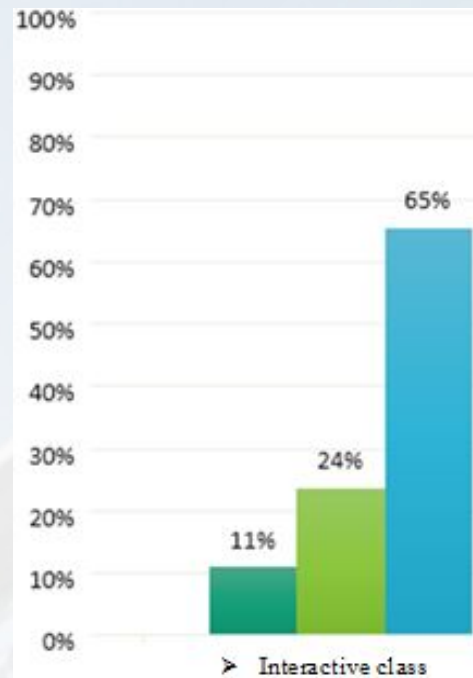
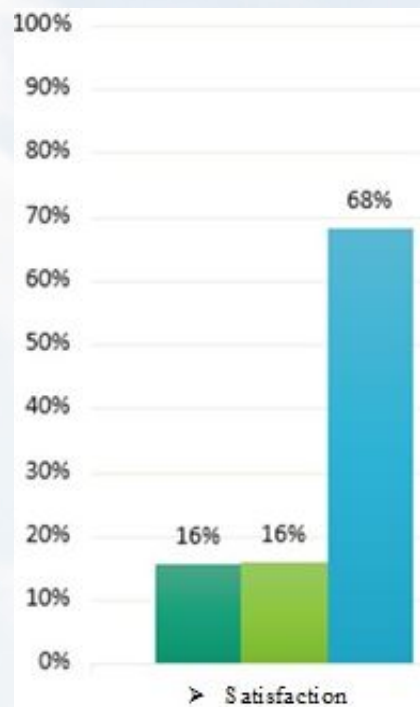
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Results from the surveys (only those using tools)



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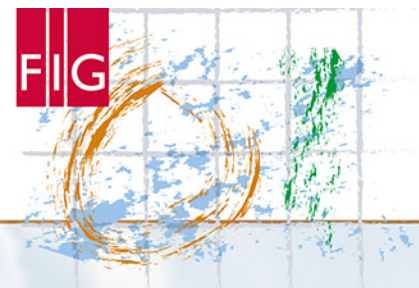


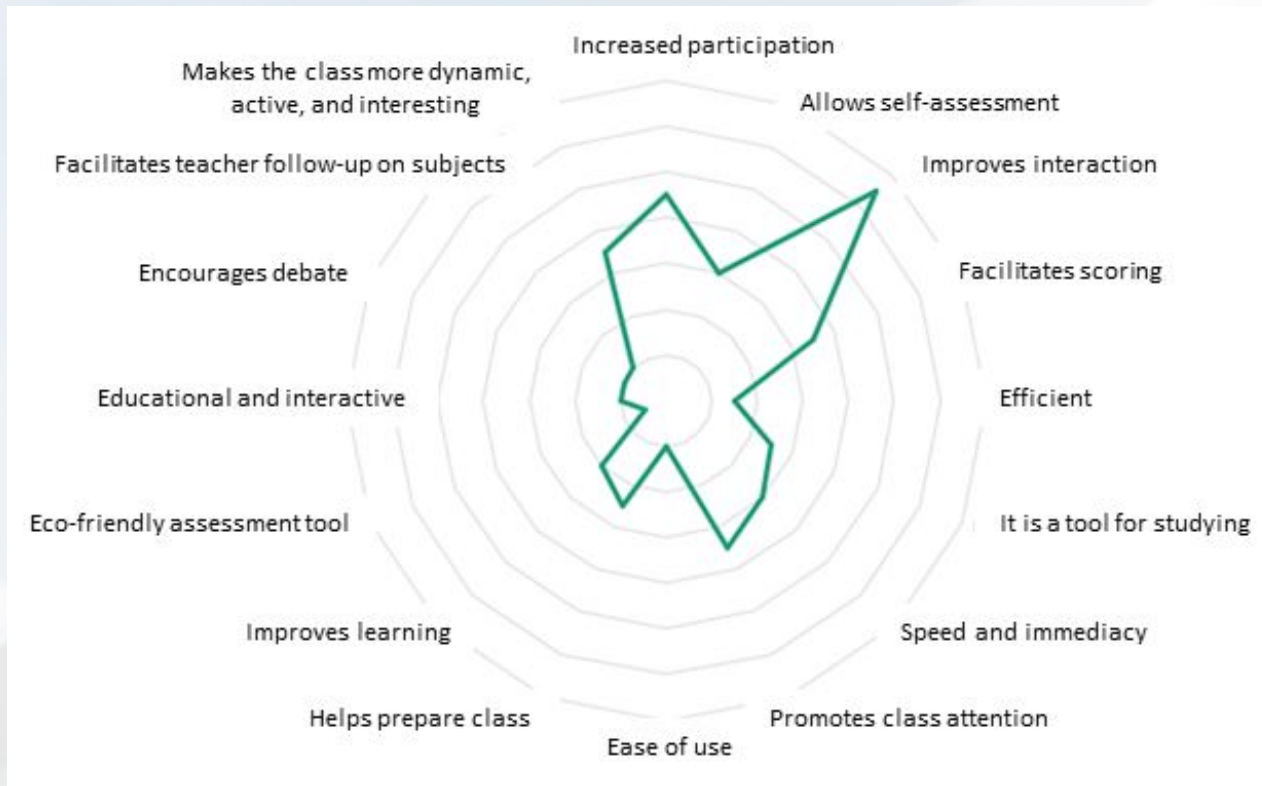
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RESULTS



Perceived strengths



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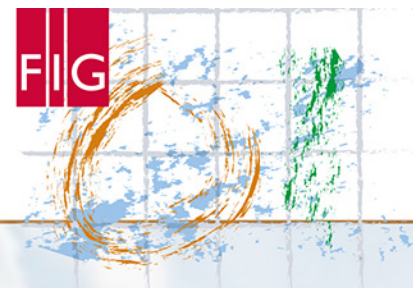


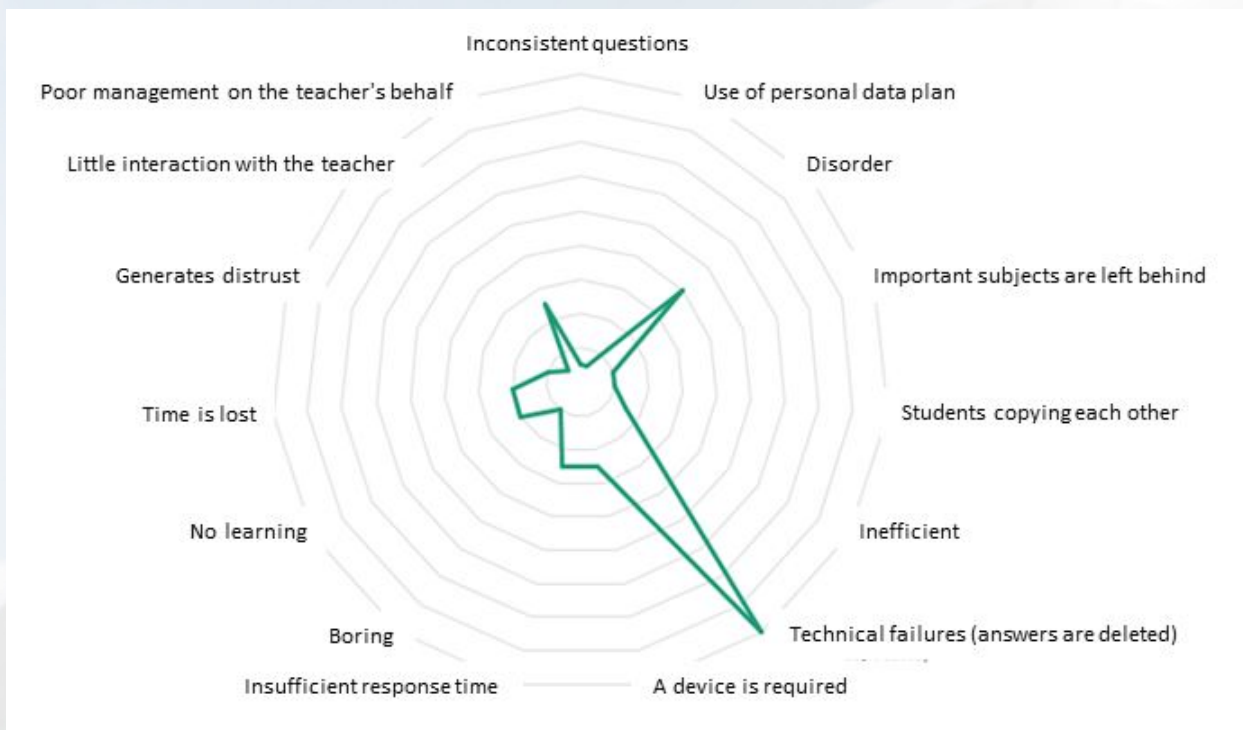
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RESULTS



Disadvantages



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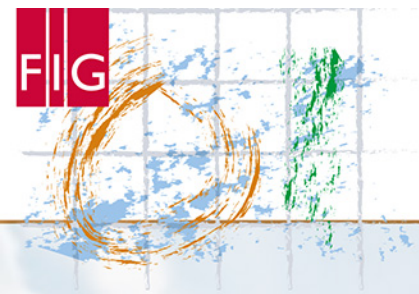


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CONCLUSIONS

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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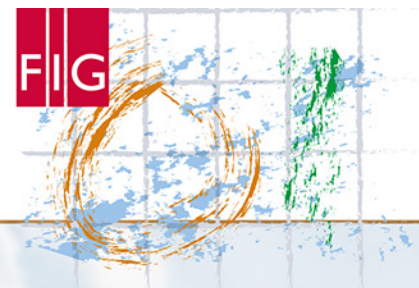


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THANKS



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