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The use of field trips in the context of engineering collaborative teaching: Experiences of hands-on Geomatics activities in Colombia (Paez, Arango, Rubio)





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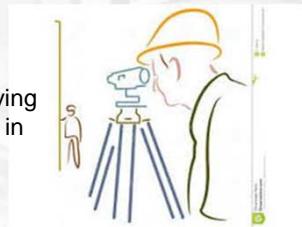
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Introduction

This paper describes and critically evaluates a field trip activity realized into the Geomatic course at the Andes University.

Main Message

- Field trips are good for Geomatic class
- Field trips are not good for all areas of Surveying
- Students enjoy a lot and want more field trips in other engineering subjects



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Course Properties

- Compulsory subject of the Civil and Environmental Engineering programs
- Geomatics introductory subject for engineering, includes the study of land surveying, levelling networks and Traverses, the use of new technologies GPS, GIS, UAV, LIDAR
- Geomatic course has between 100 and 120 students per semester
- 14 weeks per semester, 3 hours of lecturing and 3 hours of practical per week.
- Field trip: 3-days camping in a national park.



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FIELD TRIP GOALS



Subject-specific knowledge



Skills of group leadership and communication



Socialization and personal development



Better knowledge retention



cooperation between teachers and students



Planning the Field Trip



It's an effort that worth





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Los Andes University experience



Competition in
groups of 5 students

- Special incentive for winner team.
- Each group is a mix between persons with different performances in the first exam.
- Combine academic and practical experience with motivation and the entertainment that provide the physical and competitive activities.



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Activities



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Complex geomatics activities **Flying Fox**

In this activity, students must use the given data to calculate an angle from a known azimuth so that it intersects with the flying fox line and a team member can drop a water balloon on those calculated coordinates



The teacher's assistant level a total station at know point at positions a prism in the end of the flying fox

The teacher's assistant gives to the students

- Coordinates of the total station
- Coordinates of the prism
- Coordinates of the target

Students have to calculate the angle and measure it from the position where they have leveled a theodolite



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Flying Fox

While one student is at the flying fox, the others are measuring the angle with a theodolite to indicate the target point

When the student in the flying fox arrive to the desire point, the students who calculate the angle make noise to indicate the correct moment to drop the balloon



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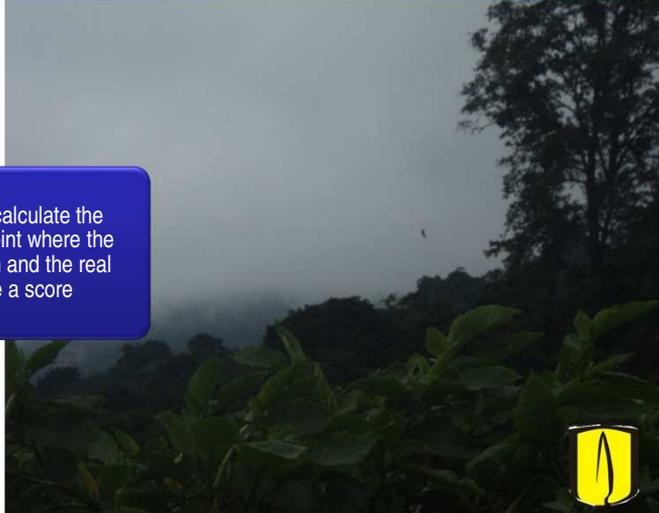


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Flying Fox

The teacher assistant calculate the distance between the point where the student drop the balloon and the real target to give them a score



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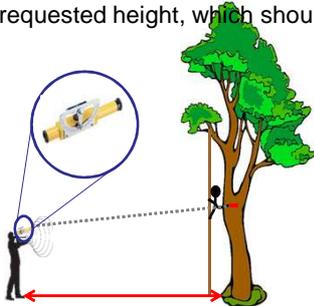


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Complex geomatics activities Tree measuring and climbing

Students must find a specific height in a 40 meters tree using a locke hand level. Students may use marked distances on the ground at 5, 10 and 15 meters away from the tree and use of operations to calculate the trigonometric approximation of the requested height, which should be indicated by a group member who climbs the tree



The teacher's assistant measure and mark three point in the ground from the tree at 5, 10 and 15 meters

The teacher's assistant indicates to the students a specific height that they must find

The students must calculate the corresponding angle to the height and one of the distance given





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Tree measuring

While one of the students climbs the tree, the other is measuring the angle calculated before with the lock hand level and indicates where the student climbing should stop and mark the height

The teacher's assistant verifies the mark with a total station and give the score



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Other activities



Stakeout
measure and correct a polygon with the help of a total station



Race to the waterfall
measurements with tape and make a floor plan of some key points



Night time activity
Found a specific target using high precision and handheld GPS



Final Race
Take measures to reach the final line



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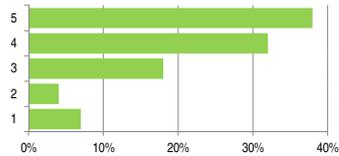


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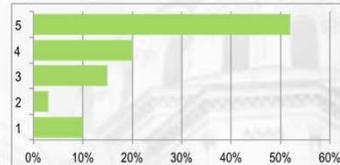
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Survey's results

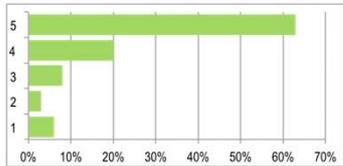
-Contributes to my training as an engineer?



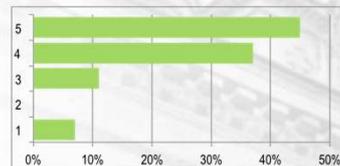
It is an activity that facilitates geomatics learning?



Helps to improve my teamwork skills?



Helps to improve my ability to solve problems?



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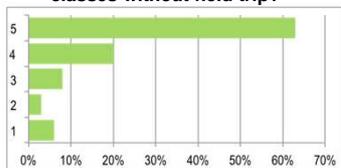


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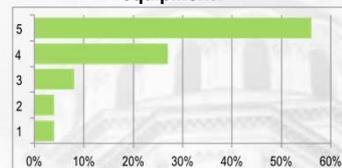
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Survey's results

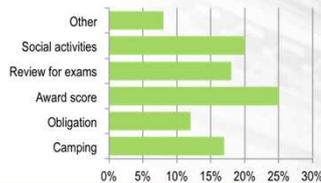
It makes the class more formative than other classes without field trip?



Contributes to improve my ability handling equipment?



What was your motivation to attend the field trip?



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Analysis

	2014-1		2014-2	
	Didn't attend	Attended	Didn't attend	Attended
Assembling equipment	2,67	4,50	2,40	3,76
Levelling	1,67	1,50	4,50	3,90

- The average scores of final exams of students who attended the field trip were 63% higher than those not attending the field trip.
- Students who attended the field trip performed much better at setting up the equipment.
- In the levelling task, there wasn't such a difference between students that attended and those that did not attend the field trip. This is probably related to the fact that levelling was only a part of one activity in the field trip.



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Conclusions

- Results from surveys clearly shown a wide acceptance of the activity within students.
- Results from this study suggest that focuses placed in the planning and development of activities in the field trip place a crucial part in the learning process of students. The student's final exam grades improves in aspects with high focus into field trip in in comparison with students who didn't attended it.
- Results show that students attending the field trip did not perform better in the final exam levelling part compare to those attending because it was low focus in the field trip.



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