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Google classroom as a tool-mediated for learning

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Abstract. Abstract. One of the biggest matters which has a teacher at the University is how to find the most efficient way to administer their courses? With the aim to the students will interest and motivated to learn. The web service google classroom was included physics III laboratory and mechanics II laboratory at the Universidad Industrial de Santander as an alternative to the Moodle platform, to give students another point of view about learning in the physics laboratories and those topics traditionally studied through blackboard. Google classroom has been accompanied by a methodology of continuous monitoring, stimuli, activities based on problem-solving and assignments to improve their writing skills. Also, google classroom created courses were easy to follow. The methodology proposed could be extrapolated to other experimental or theoretical subjects. In addition, google classroom showed to be friendly to the environment.

1. Introduction

The dropout rate of university students exceeds 50% in Colombia, the largest dropout populations are in the first semesters [1–3]. Then, the Colombian Ministry of Education promotes the use of Information and Communication Technologies ICTs [4,5] as a pedagogical and didactic tool to connect students with those crucial sensitive experiences for their learning [6]. Such that, the old form of blackboard teaching and the books could not teach [7]. Due to the exposed above, the new teaching-learning strategies use ICTs in the study of physics [8,9]. Another initiative to be considered as an example to follow from the University of Colorado, they develop interactive simulations so that students can learn by exploring. The key is which the online platform to be intuitive enough in order to the student can advance their learning independently [10]. The culture of the modern student is based on smartphones use [11]. They like writing and reading content on social networks. It's seemed a problem, we have turned it into an opportunity to mediate the teaching-learning process. We have selected the web service google classroom to implement the strategy Just in Time Teaching (JiTT) [12] and other elements of mediated learning to improve transversal skills, such as reading and writing [13]. Through the google classroom, we haven't only adapted to the modern student, but we have managed to involve students with the contents of their interest and writing of short texts such as essays, abstracts, and reports.

We observed which the students were satisfied with the teaching accompaniment through the web service google classroom. They commented google classroom is nice to the user, the flow of activities is easy to follow, and activities are relevant and captivate the students. The concept of grade goes into the background prioritizing the expectation to learn.

2. Methods

Nowadays, at the Universidad industrial de Santander has institutionalized the strategy (JiTT) with elements of mediated learning through the learning platform Moodle, in the physics I, II and III



laboratories [8].

The physics laboratory courses for physics students offered in the academic calendar and laboratory courses for engineer students offered on vacations don't have coverage of the learning platform Moodle for the implementation of the (JiTT). Therefore, in this work we implemented (JiTT) and mediated learning elements with the google classroom web service. The selected subjects to this study were physics III laboratory oriented to engineering students and mechanics II laboratory oriented to physics students.

The grade from physics III laboratory has a value of 20% within the theoretical subject. Both are considered as a single subject for engineering area. On the other hand, the laboratory subjects for physics students are independent.

2.1. Methodology for engineering students

The web service google classroom is divided into three tabs: stream, people and information. The tabs were used as follows. The students were invited through their email accounts to join the class. Their contact information was stored in the people tab.

In the information tab, the initial guidelines of the course were uploaded, such as programming of the laboratory sessions, activation dates of the preparation laboratory questionnaires, reports delivery dates, tutorial videos for use CASSY Lab software, instructions before laboratory sessions, worksheets and finally the research projects.

Laboratory preparation questionnaires were published in the stream tab and it's were enabled 28 hours before the laboratory session. The students did have 5 days to present their report. The assignments were uploaded for the students to submit each one of the reports. Finally, a research proposal on one of the studying issues in the laboratory to be proposed of recyclable materials and low cost was published.

The questionnaires were developed on google forms. Each questionnaire had four questions, two about the conceptual framework, one about the experimental methodology and one of the expected results. The percentages were, questionnaires 30%, reports 40% and research proposal at end course 30%.

2.2. Methodology for physics students

The mechanics II laboratory three hours per week for seventeen weeks was taught. The other hand, the laboratory for engineers in four weeks was taught, daily two hours. The physics students had more time to develop the activities.

Before the laboratory session in addition to the questionnaires, each student had to write an abstract content as follows: keywords, experimental methodology and expected results. They should write an essay for the technical visit to the steel plant, where metallographic preparation, tensile-compression tests, and hardness-microhardness tests were made. The students had fifteen days a deadline to submit the essay. Also, the reports had two weeks for deadline. The evaluation percentages are detailed in Table 1.

Table 1. Mechanical II laboratory grading.

Assignments	Percentage over grade
Laboratory preparation questionnaires	15%
Abstracts	15%
Essays	10%
Reports	40%
Final investigation proposition	20%

2.3. Measurement of the methodology

The Likert items with eleven questions was developed to evaluate the opinion of the students regarding the use of google classroom in laboratory subjects. The questions in three groups were separated: one,

about used of google classroom (U), course resources (R) and alumni-teacher communication (C). The statements and questions formulated are shown in the Table 2.

Table 2. Likert items.

Group	Items
U	Have I used learning platforms other than Google classroom in physics?
	I think that google classroom is attractive, pleasant and easy to follow. The instructions on google classroom was clear.
	I would like to use google classroom to another practice and theory subjects. The objectives presented by the teacher was achieved.
R	The assignments posted on google classroom allowed me to improve the way learning I'm.
	I needed more explanation in order to understand the assignments.
	The course materials were according to the contents of the subject.
C	The assignments and feedback published thought google classroom were clear and coherent.
	I think to submit assignments and reports by mean google classroom was eco-friendly.
	Have I used to google classroom to make questions, class comments or announcements?

3. Results

The engineering and physics laboratory courses were taught using mediated learning through the google classroom web service. Every week, the teacher submitted assignments, questionnaires, comments, questions, assignments feedback; and resources such as scientific papers and documents to develop the experimental configuration named research projects, worksheets, videos and software. The other side, students submitted reports, essays, abstracts, questionnaires and interacted with the teacher leaving their questions as comments. At the end of the course, the students filled Likert items (see Table 2).

The opinion of engineering and physics students regarding the implementation of the methodology proposed here was shown in Figure 1. The results were grouped as seen in Table 2.

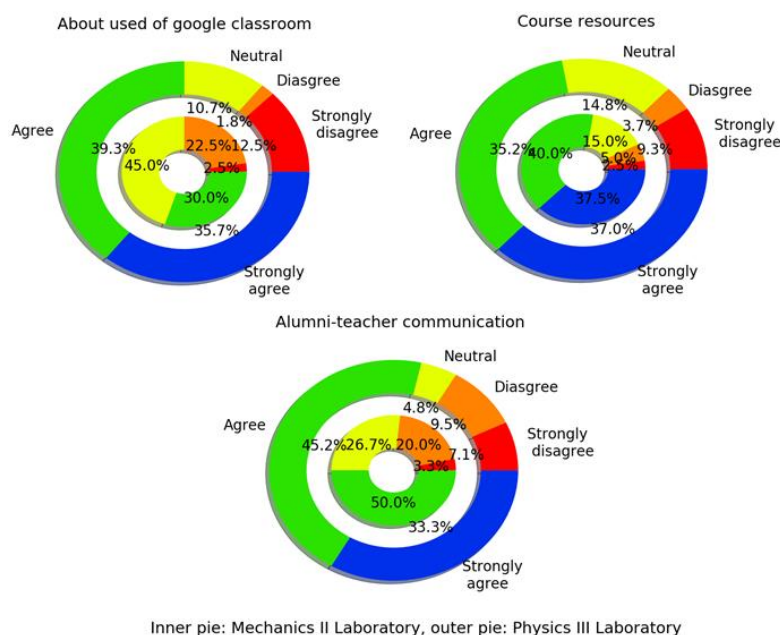


Figure 1. Results of Likert items application on physics III laboratory and mechanics II laboratory. The questions are organized by groups: about used of google classroom, course resources, and alumni-teacher communication. The colors mean Likert scale: strongly disagree (red), disagree (orange), normal (yellow), agree (green) and strongly agree.

The results of the Likert items showed that students receive very well the implementation of technological tools in the laboratory courses. Because they think it's a way to keep contact with the teacher outside the classroom, they keep informed in real time the flow of activities, including their grades. When they keep contact allows them to understand that they are in a process of collaborative learning instead of the classic learning process, the teacher as the transmitter and the student as the receiver. The students wait for mediated learning to be implemented in the theoretical courses with an online platform. They think that google classroom so much simple and friendly than others online platforms for teaching.

A teacher who wants to use the platforms for teaching could think to use the tool is more work to him. On the contrary, we affirm to keep course organized, makes teacher's work more efficient and then easier. It's used to measure opinions, perceptions and response to a statement.

4. Conclusion

Strategies to strengthen the writing and learning processes from physics laboratories, such as elements of mediated learning combined with (JiTT) were implemented through the google classroom web service. The impact of the methodology proposed here was measured through Likert items, resulting in acceptance by the students of engineering and physics, as well as two orderly and reproducible courses (physics III laboratory and mechanics II laboratory) for the next academic periods.

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