Can you plan an ideal Ad campaign for Rihanna's new single?

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Proposed plan

- Groups should be established at the beginning of the first lesson.
- Midway through (e.g. after assignment 3) it may be a good idea to summarize and let each group present their considerations in front of the whole class.
- Ending with a similar presentation round can be beneficial.

Suggested teaching strategy

1. These open-ended activities afford opportunities for students to be reflective and critical of the mathematical models which well-known aspects of everyday life rest upon.

2. Students should work in groups of 3-5, and everybody should be encouraged to participate actively in the discussions. Students can be allowed to reveal to the teacher how they think about, and put to use, mathematics in specific situations, by being prompted to communicate and represent their ideas to other group members and other groups.

3. The students' work in groups should be backed up with 2 or 3 summative discussion-/presentation-sessions in which the entire class participates. These sessions allows the teacher to fine-tune students' usage of mathematical concepts.

4. The teacher should play the role of an interpreter, by listening to students' proposed solutions and endeavoring to refine students' responses. The nature of the activities allows students to evaluate their proposed solutions themselves. It is not, as such, important that students find a "correct" solution. Rather, students should strengthen their deeper understanding of how to argue from mathematics and what it means to model complex and dynamics processes in society.

5. If it is required the teacher may preface the activities by discussing what it means to construct mathematical models. Hereunder

a. Introducing the different modeling tools (graphs, tables, equations, verbalizations, rules of thumb, etc.)
b. Discussing the power to predict from models, and what it means to argue from a mathematical model)

6. In **assignment 1**, students should be encouraged to apply different modeling tools (drawing graphs, tabularizing, and working with inequalities). Students should be encouraged to communicating why a specific tool is chosen and how the application of that tool will provide a solution.

7. In **assignment 3**, students should be encouraged to use different ways of representing the dependence relations between 'impact' and 'exposure'. Students should be encouraged to communicate why and how this dependence relation would figure in a model which helps optimize an Ad campaign.

Learning outcomes per activity

Having engaged with assignment 1, students are expected to be able to

- Communicate to other members of the group their ideas behind a choice of mathematical tool.
- Apply one or more modeling tools (verbalization, plotting graphs, setting up tables, or constructing equations).
- Working with inequalities.

Having engaged with assignment 2, students are expected to be able to

- Apply knowledge about own behavior as consideration and argumentation in a (re)formulation of their model.
- Work with weighting of variables.
- Calculate percentages.

Having engaged with assignment 3, students are expected to be able to

- Identify and consider dependence relations and verbalizing the manner of dependence.
- Using these considerations as an argument in a discussion of which variable in their model to maximize.

Having engaged with assignment 4, students are expected to be able to

- Consider a broader landscape of factors influencing the success conditions of the given situation.
- Applying weights to variables and communicating the ideas behind specific choices of weighting.

Having engaged with assignment 5, students are expected to be able to

- Consider qualitative factors influencing the success conditions of the given situation.
- Discussing how to include qualitative factors in mathematical models.
- Communicate the benefits and drawbacks of mathematical models in general.