In 2020, due to the Covid-19 pandemic, classrooms were teleported to virtual environments. In September, with the return of face-to-face education, there were many constraints imposed by health safety rules, making group work in the classroom unfeasible. Yet, group work brings students numerous advantages in terms of learning, not only regarding mathematical content, but also regarding transversal skills, like problem solving, which are useful for future life.

**Introduction**

In 2020, due to the Covid-19 pandemic, classrooms were teleported to virtual environments. In September, with the return of face-to-face education, there were many constraints imposed by health safety rules, making group work in the classroom unfeasible. Yet, group work brings students numerous advantages in terms of learning, not only regarding mathematical content, but also regarding transversal skills, like problem solving, which are useful for future life.

**Aim**

To know and understand the interactions of students, in small groups, while solving problems in a virtual environment.

**Results**

How they organize themselves inside the group

B shares screen. T starts reading what they have to do. After a certain point he is no longer able to read, B continues.

How they manage the difficulties encountered in solving technical problems

B: "How do you write divide on the computer?"
T: "You go to the symbols and think you have it there?"
B: "Ok, I didn't find it"
R: "Didn't a stripe appear on your calculator?"
B: "I'm on the computer. I don't know how to put the division symbol here."
R: "But did you really go to the computer calculator? Put that trait in it."
B writes...
B: "Like this?"
R: "I'll write it in the chat?

Different views of two students: virtual vs face-to-face group work

BF: "Maybe I prefer in a normal classroom, in person... Maybe virtual is a little bit more complicated. It is not always possible to orient ourselves very well here online. And I think it's more fun in person.
G: "I prefer it in a virtual environment because in group work in the classroom, if we are discussing or making a lot of noise, there we can shut up but here we have more freedom less possibility to discuss because we can turn off the computers or call. At the classroom, we cannot turn off the micro or turn on.

I like to work in a group because...

BF: "It's a funny idea and I like it... Even because of the interaction between the group and even because I'm a little bit shy and I think it's also good to spend some time with other colleagues, too."
G: "In the group we can divide the tasks in each one, and so for example, if you have a task where you are alone and you have a lot to do like that, it is more difficult than in a group."

**Remarks**

Data analysis is still at the beginning but it is possible to affirm that group work in virtual environments demands students to develop other skills than "just" problem solving. They rely on each other to cope with technical difficulties and to learn new skills related to technology use. As expected, group work was a productive setting to develop problem solving skills, but not all groups worked nicely - some groups, students' interaction was quite low, and their learning fell short of what it could be.

**Theoretical frame**

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<th>Problem solving</th>
<th>Interaction</th>
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<td>September to January</td>
<td>Classroom lessons</td>
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**Methodology**

Students from two 7th grade classes solved mathematical problems of different types, both at APE and in (online) classes, in small groups, using Microsoft Teams, the platform adopted by the school for the emergency remote teaching.

The study privileges a qualitative approach through:
- the observation of the students' work in virtual environments,
- the realization of semi-structured interviews with some selected students (9 students from both classes),
- the collection of the problem solutions from various groups (at APE* and online classes).

*APE is an optional moment in the students' timetable and is common to the two classes. The goal of APE is to provide students with opportunities to do mathematics, mainly by solving problems, in a group setting.

How they manage the difficulties encountered in resolving conflicts

T: "And I think we can do this for everyone. But I don't know if you agree."
B: "It's fine for me. I don't know who is there but whoever is there, if you agree, just say it...
T: "But calm down, B. Let me do the math here to see if...."

How they manage the difficulties encountered in solving the problems that are proposed

T: "So we have to make 200 divided by 12"
R: "Which gives approximately 16.6"
T: "I think we are doing it wrong. Why don't we, instead of doing this, why don't we do how many times the 4 fits into 267 and we see the number it gives and we put it there. And we do that for others."
B: "Ok, we can try"
R: "Because in this one, as we are doing, it will not be enough to reach the numbers that are here to make one."
T: "So... How many times does 4 fit into the 26 times table? Ok, it doesn't work.
It doesn't work because 4 times 5 is 20. 4 times 6 is 24 and 4 times 8 is 26. That's why it doesn't work."

H: "How did you get the result? Not to the result, to that?"
B: "Look, read the problem."
T: "Read the problem and you already know..."