

Education of parents vs pupils' confidence in solving mathematical problems. (PISA-2012)

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The project is aimed to show, how the level of **education of parents** is related to **abilities of their children**.

In order to do that, we analysed data from **PISA 2012**. PISA — The Programme for International Student Assessment — is a worldwide study by the Organisation for Economic Co-operation and Development (OECD) in member and non-member nations of 15-year-old school pupils' scholastic performance on mathematics, science, and reading.

Our hypothesis is that *children of more educated parents deal better with mathematics than children of less educated parents*.

In PISA's questionnaire there were questions about academic degree of pupils' parents. Among answers there were different levels of ISCED (International Standard Classification of Education). We grouped them into three groups:

- first (1): not completed ISCED level 1, ISCED level 1, ISCED level 2
- second (2): ISCED level 3A, ISCED level 3B, ISCED level 3C, ISCED level 4
- third (3): ISCED level 5A, ISCED level 5B, ISCED level 6

Then we assumed that “*parents' education level*” equals **maximum** from academic degree of father and mother.

In order to check how advanced in mathematics are pupils, we looked at their answers for the following questions (**Q30** from the questionnaire) of how confident do they feel about having to deal with the following tasks:

- 1) Using a train timetable to work out how long it would take to get from one place to another.
- 2) Calculating how much cheaper a TV would be after a 30% discount.
- 3) Calculating how many square metres of tiles you need to cover a floor.
- 4) Understanding graphs presented in newspapers.
- 5) Solving an equation like $3x+5=17$.
- 6) Finding the actual distance between two places on a map with a 1:10,000 scale.
- 7) Solving an equation like $2(x+3)=(x+3)(x-3)$.
- 8) Calculating the petrol consumption rate of a car.

Possible answers were: *very confident, confident, not very confident, not at all confident*.

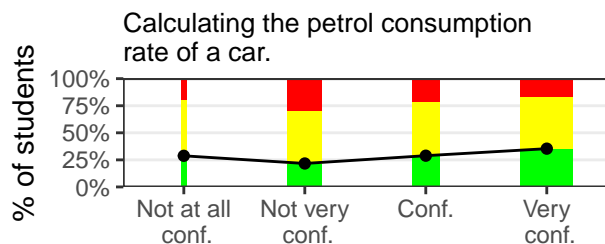
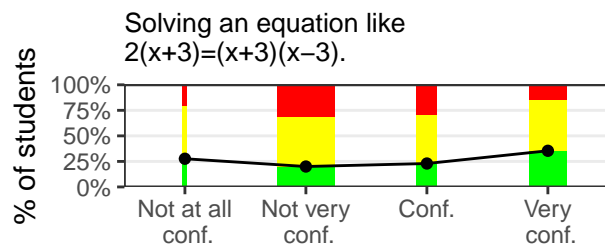
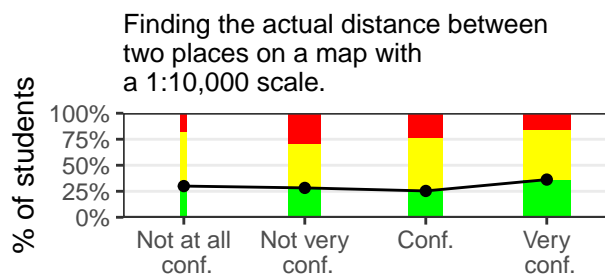
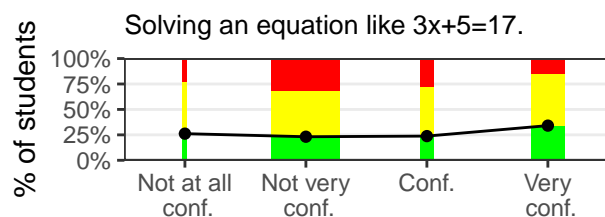
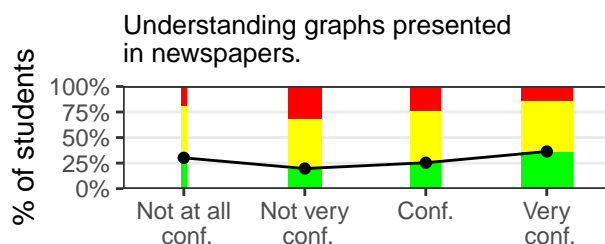
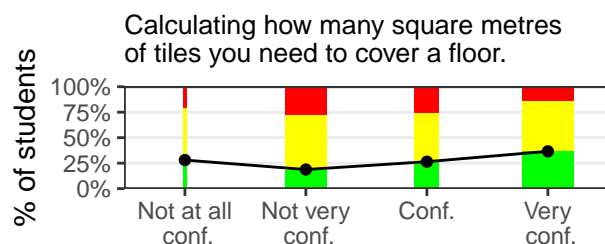
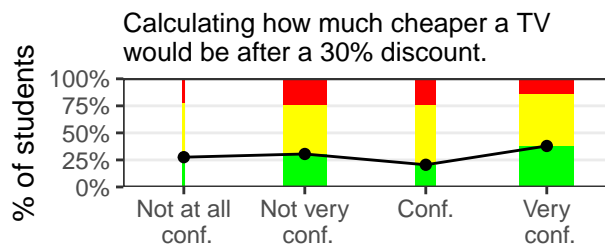
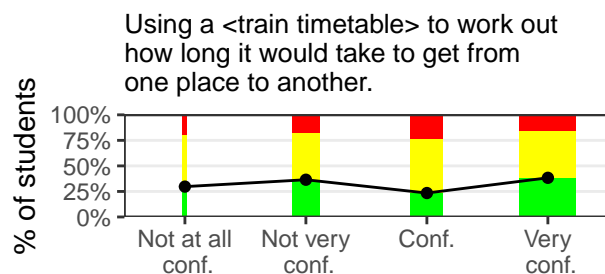
Following sheets sum up if our hypothesis happen to be correct for different countries for collected data.

Plot reading. Each plot represents answers to the aforementioned questions in respective countries, showing the share of answers of pupils of certain “*parents' education level*”: (1), (2), or (3) in all answers. The width of each bar is proportional to the share of pupils who gave the respective answer in the questionnaire (the thicker the bar is, the more popular is the answer).

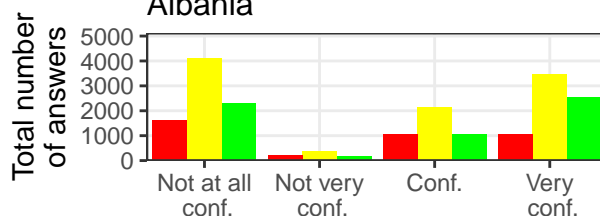
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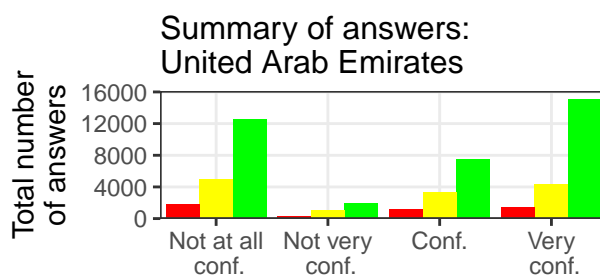
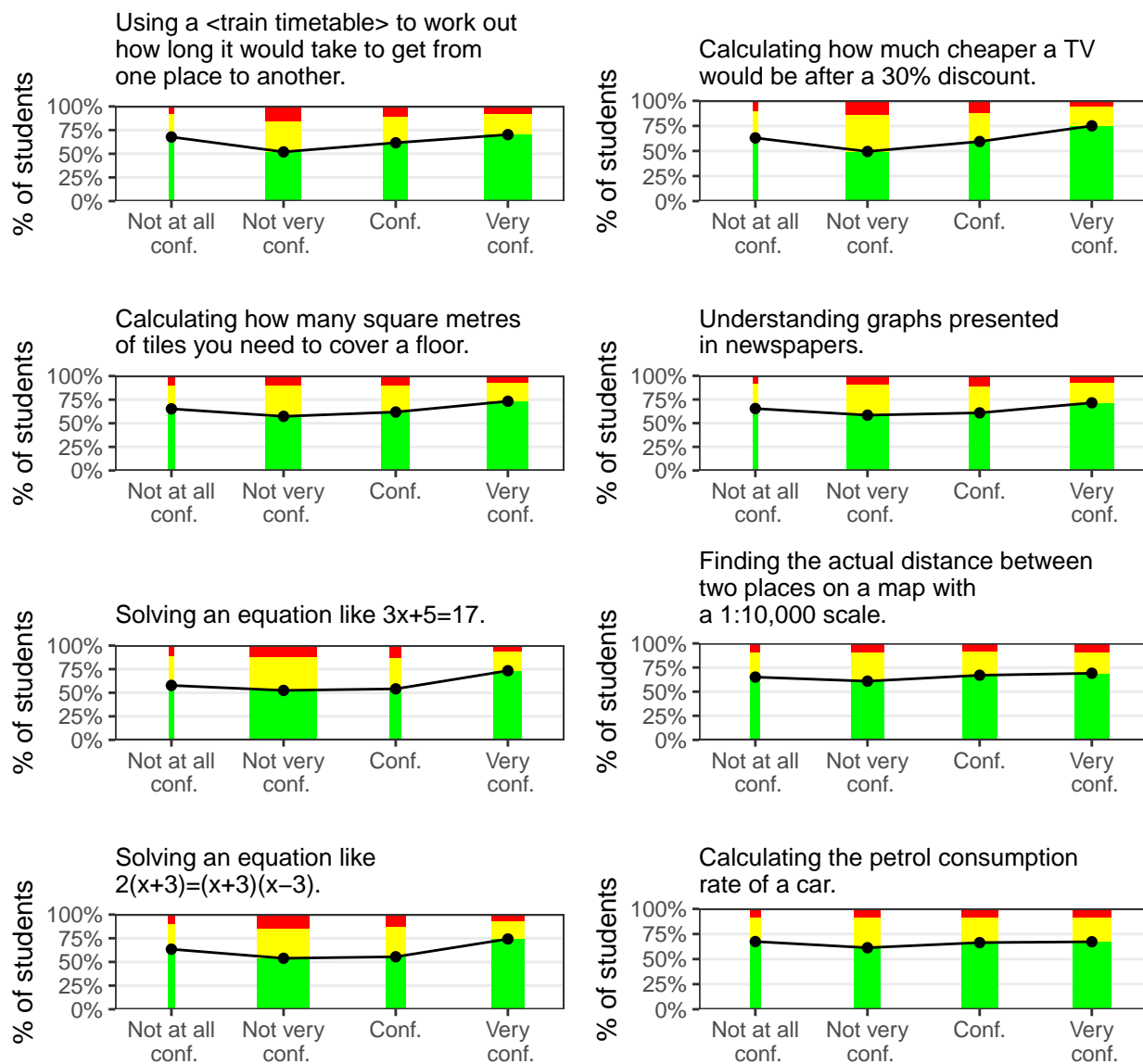
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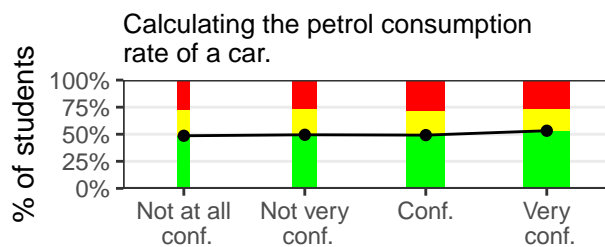
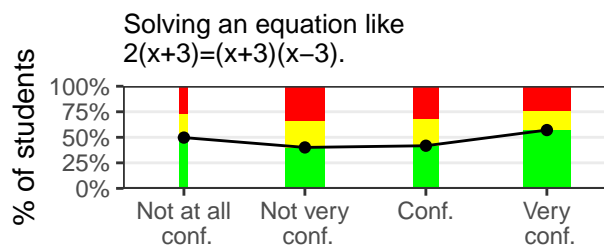
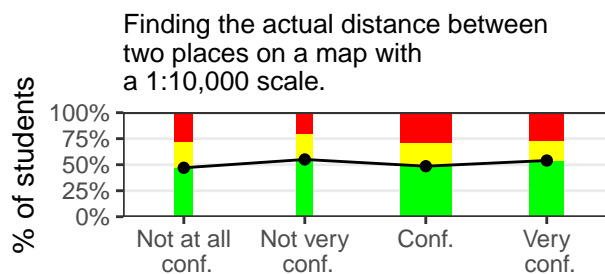
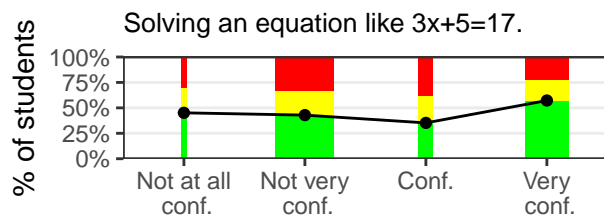
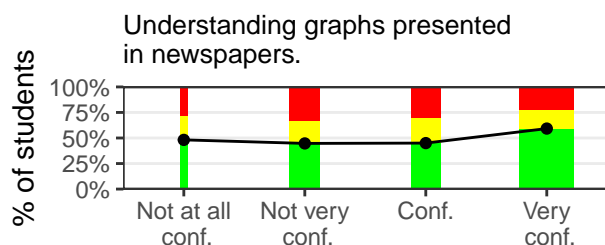
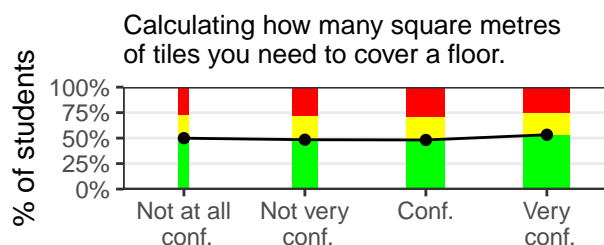
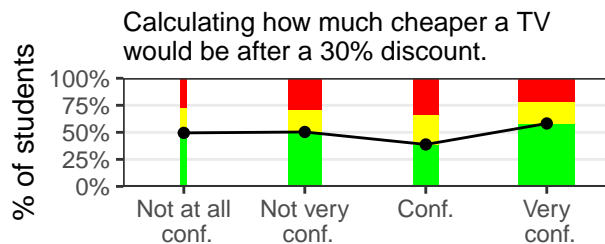
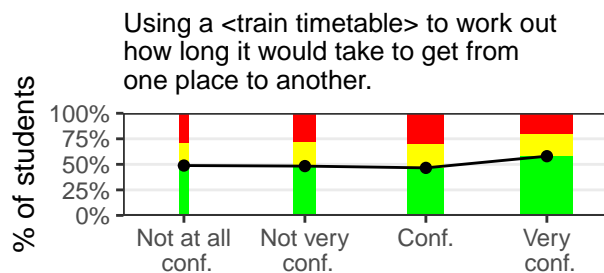
Summary of answers: Albania



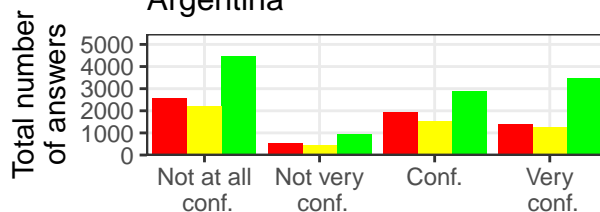
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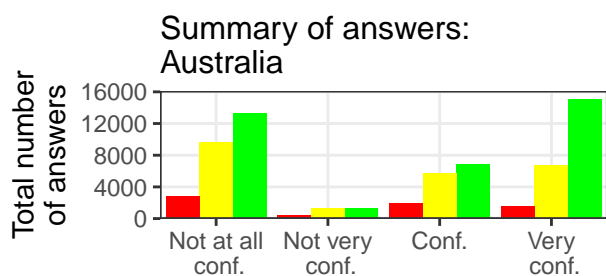
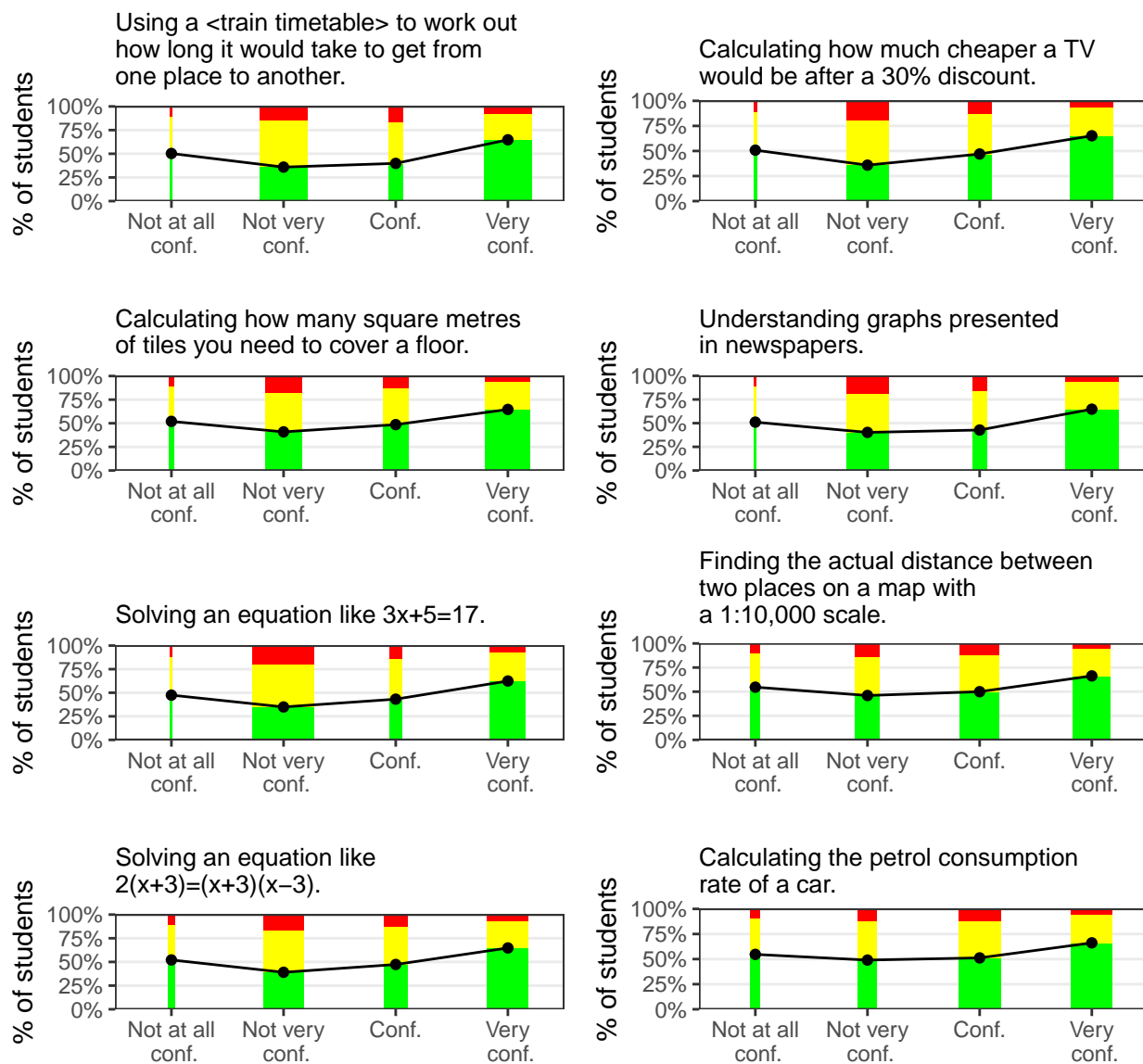
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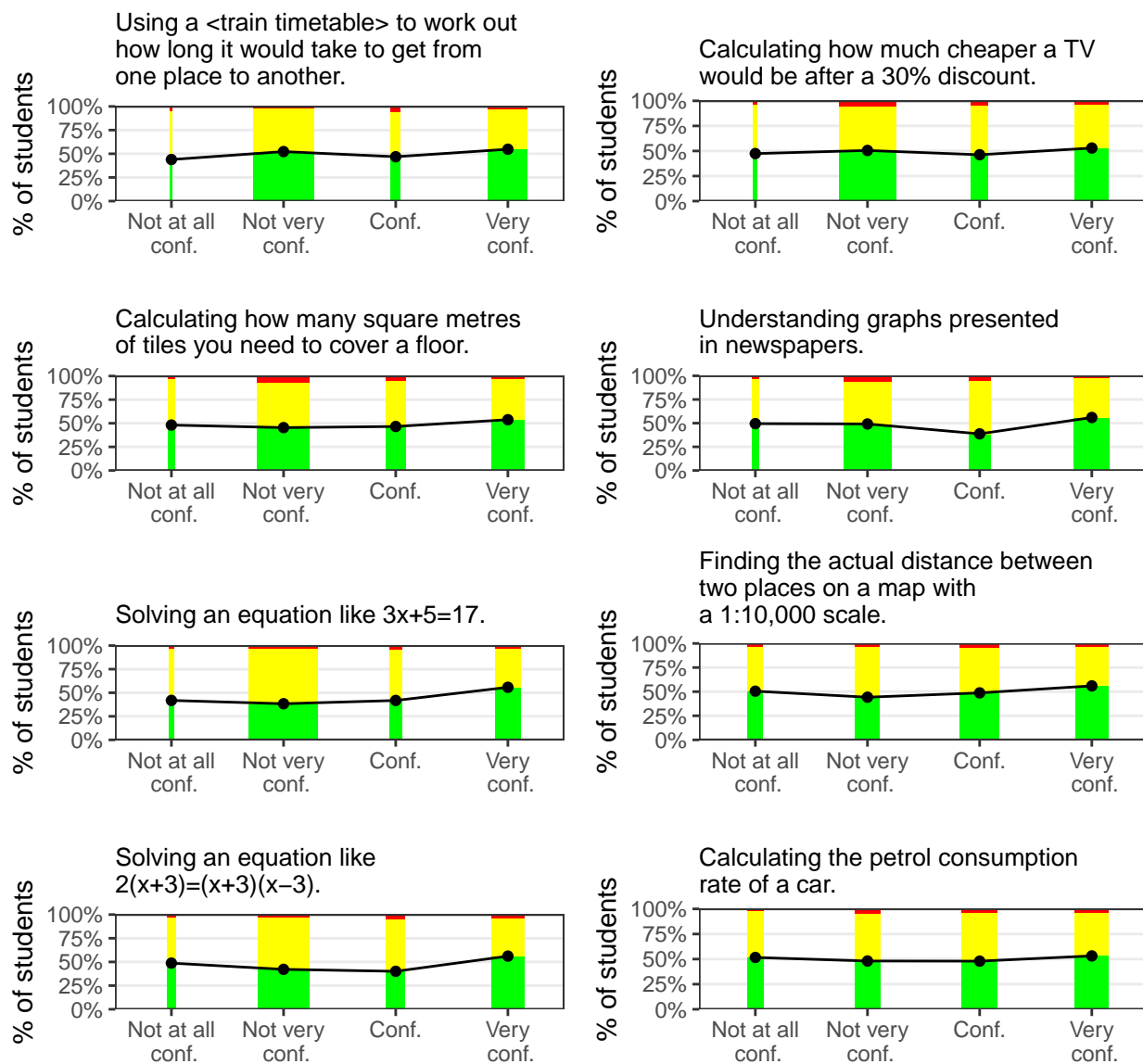
Summary of answers: Argentina



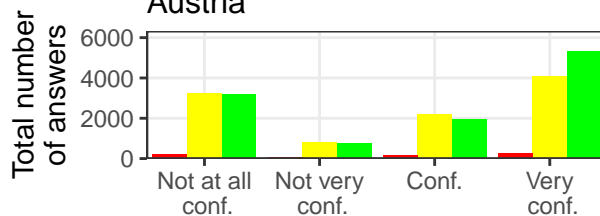
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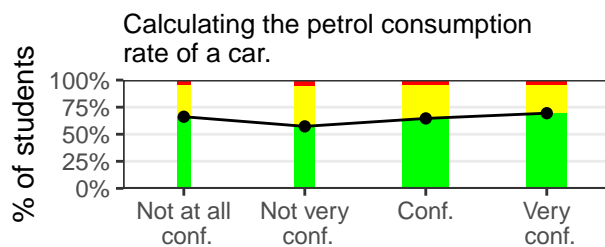
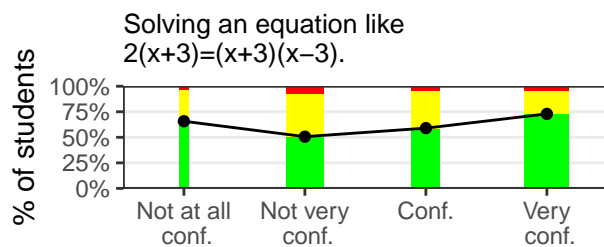
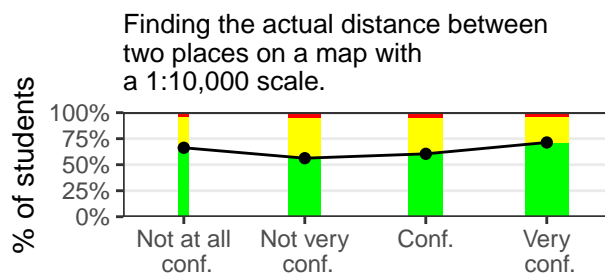
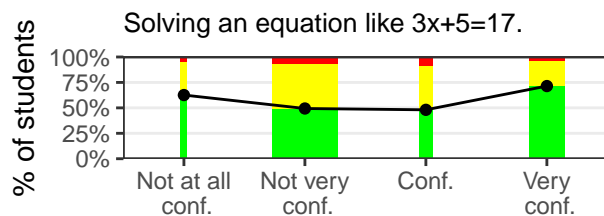
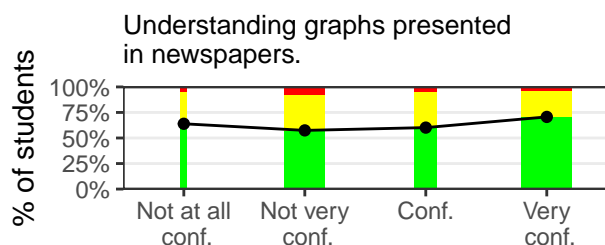
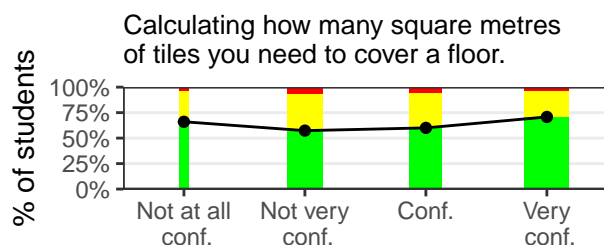
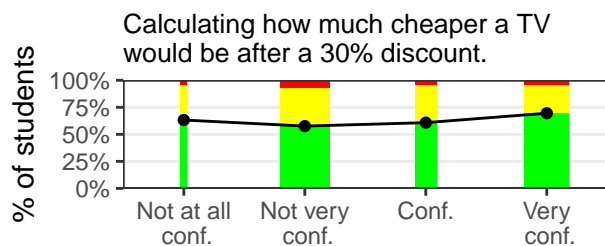
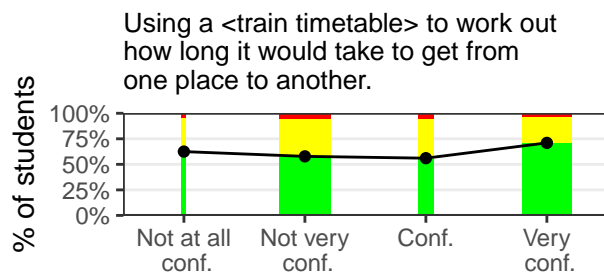
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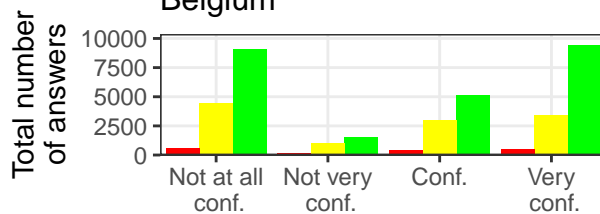
Summary of answers: Austria



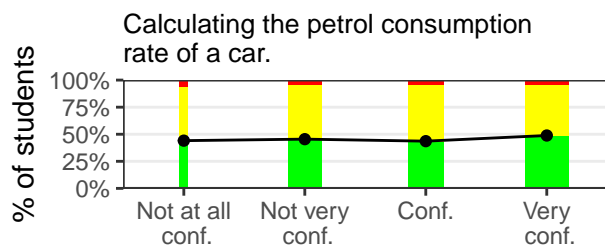
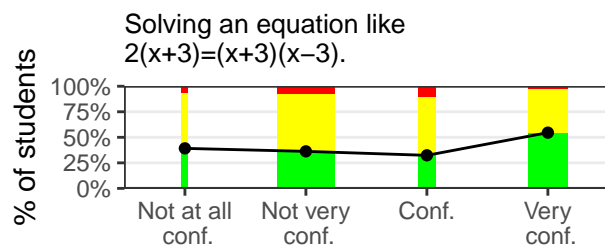
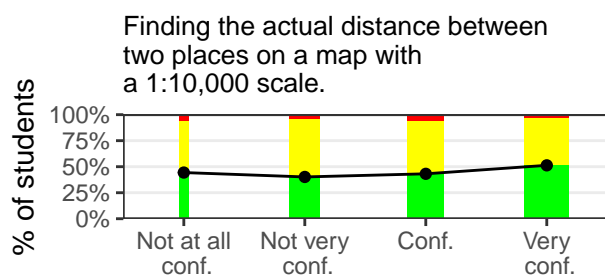
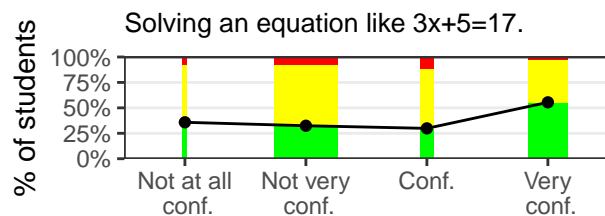
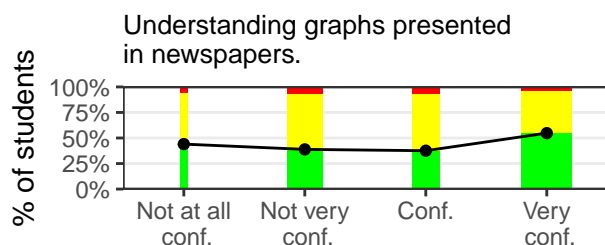
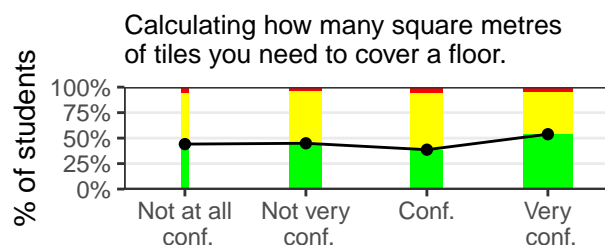
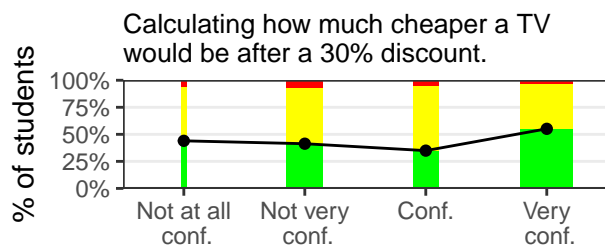
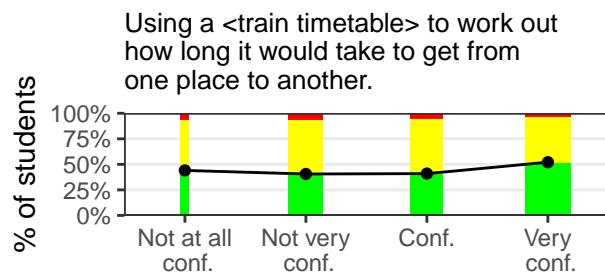
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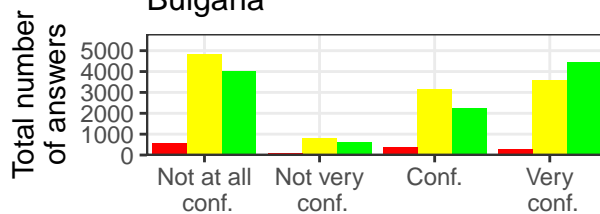
Summary of answers: Belgium



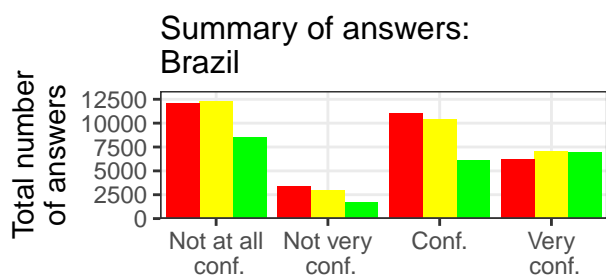
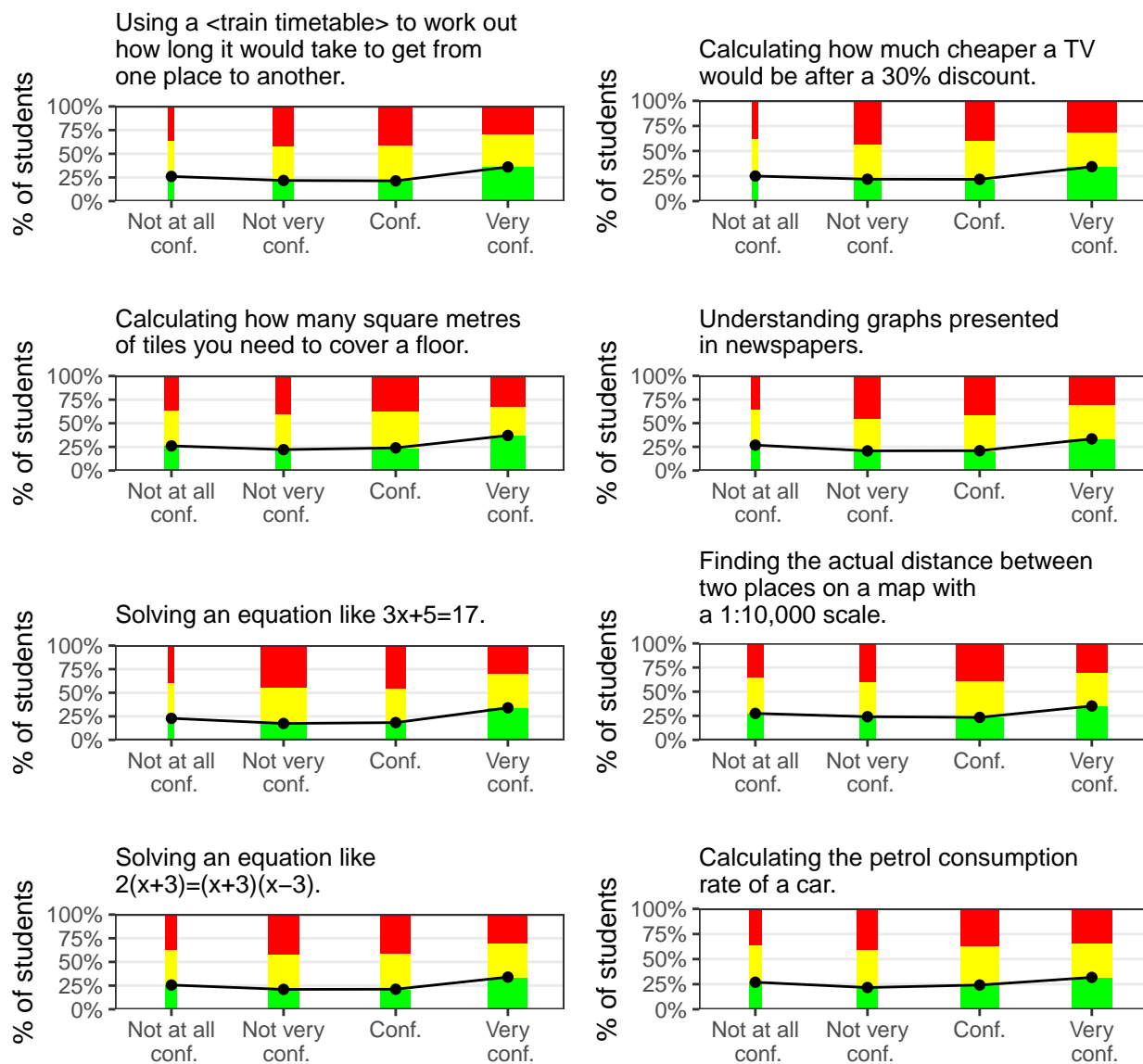
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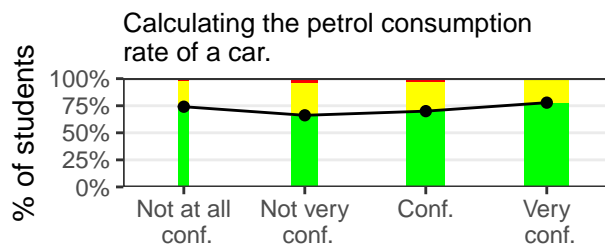
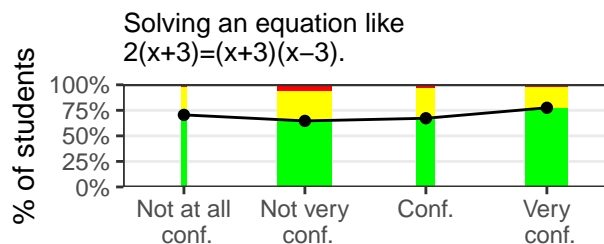
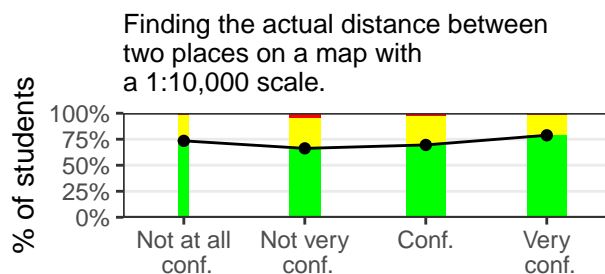
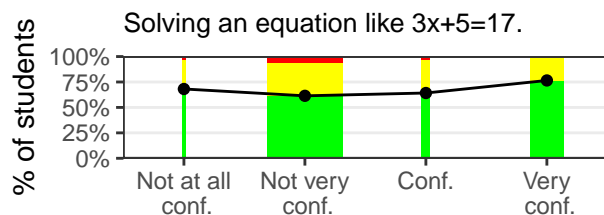
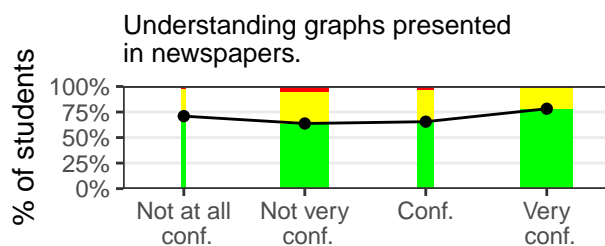
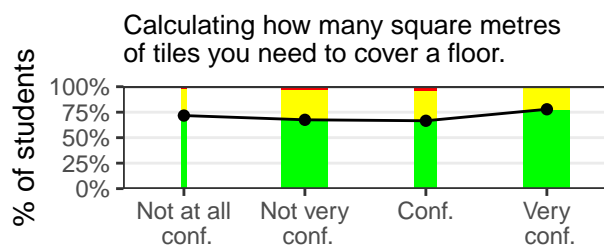
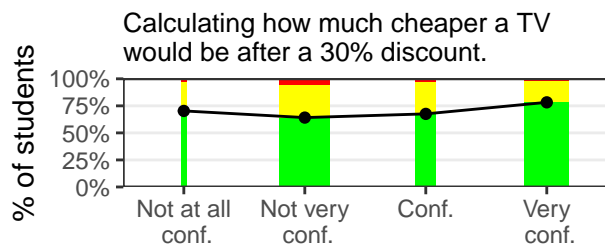
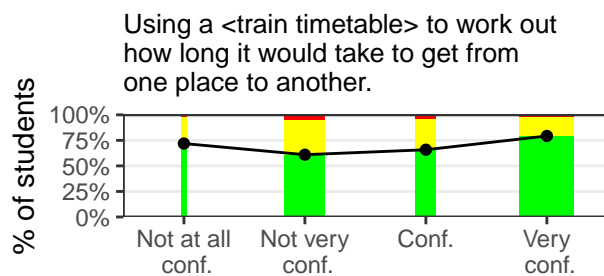
Summary of answers: Bulgaria



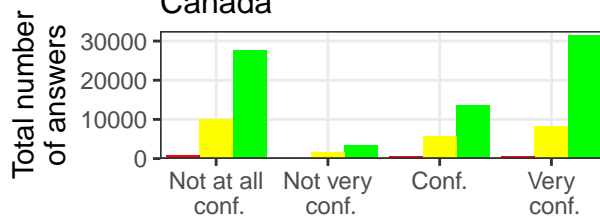
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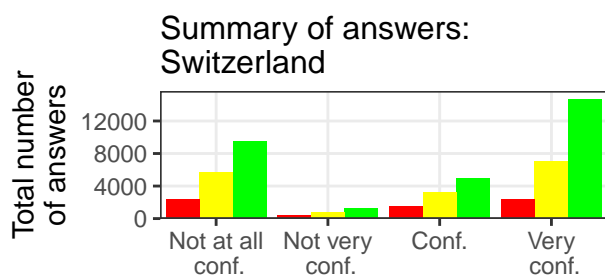
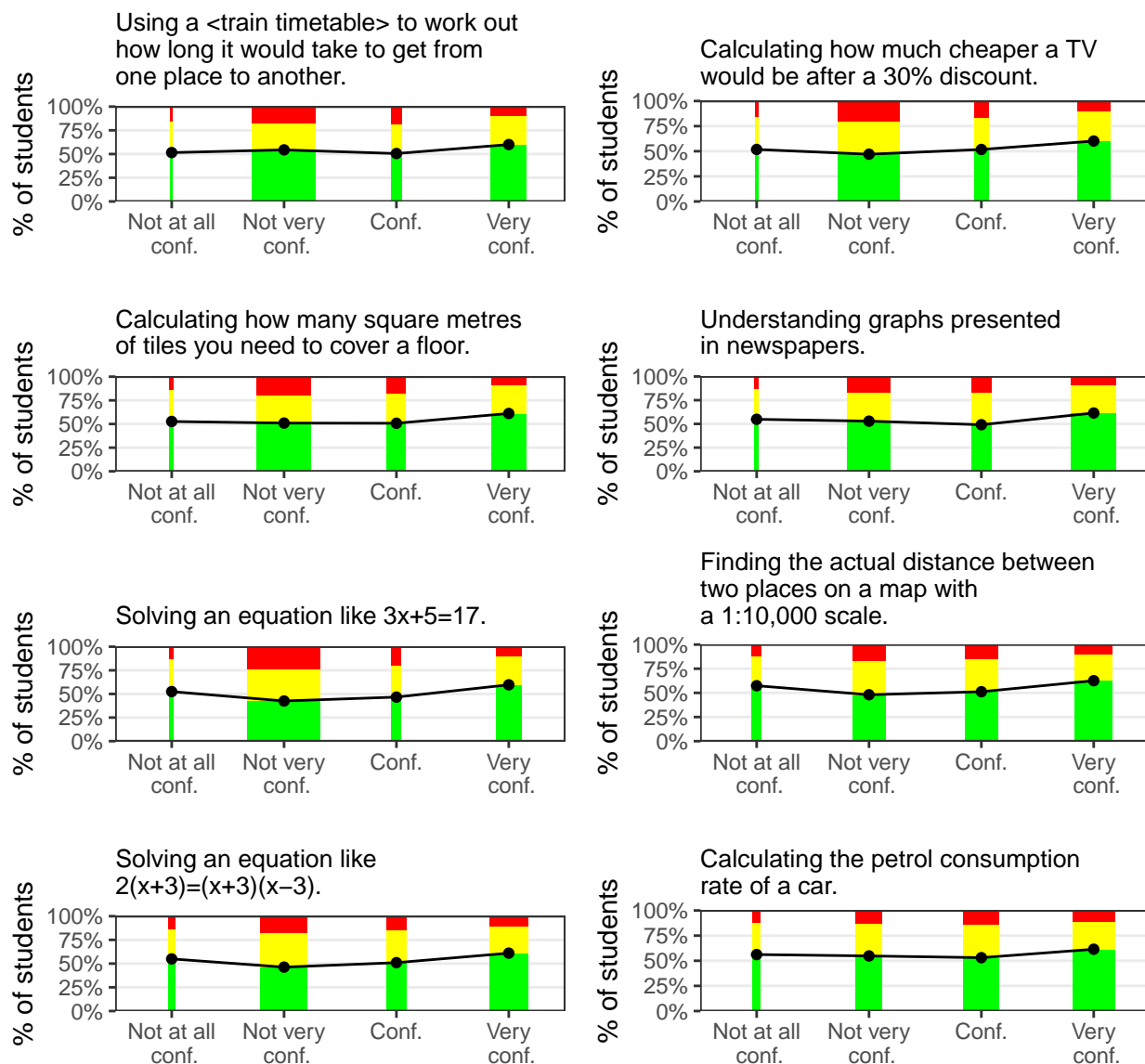
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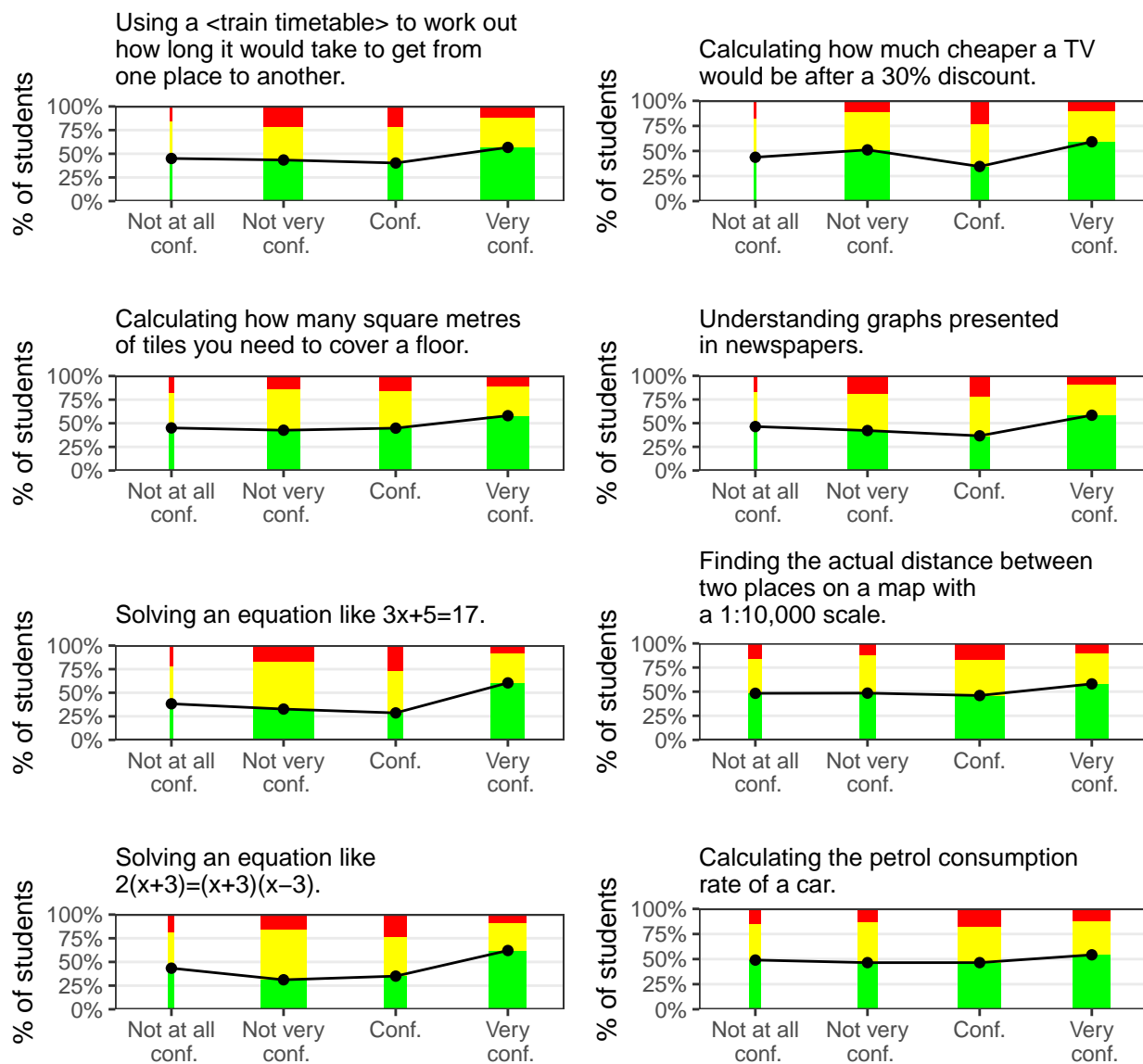
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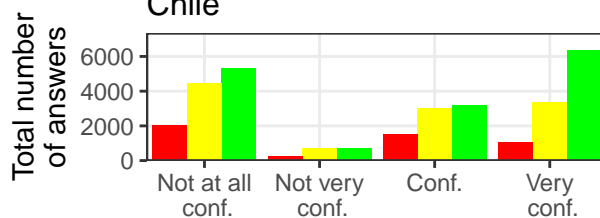
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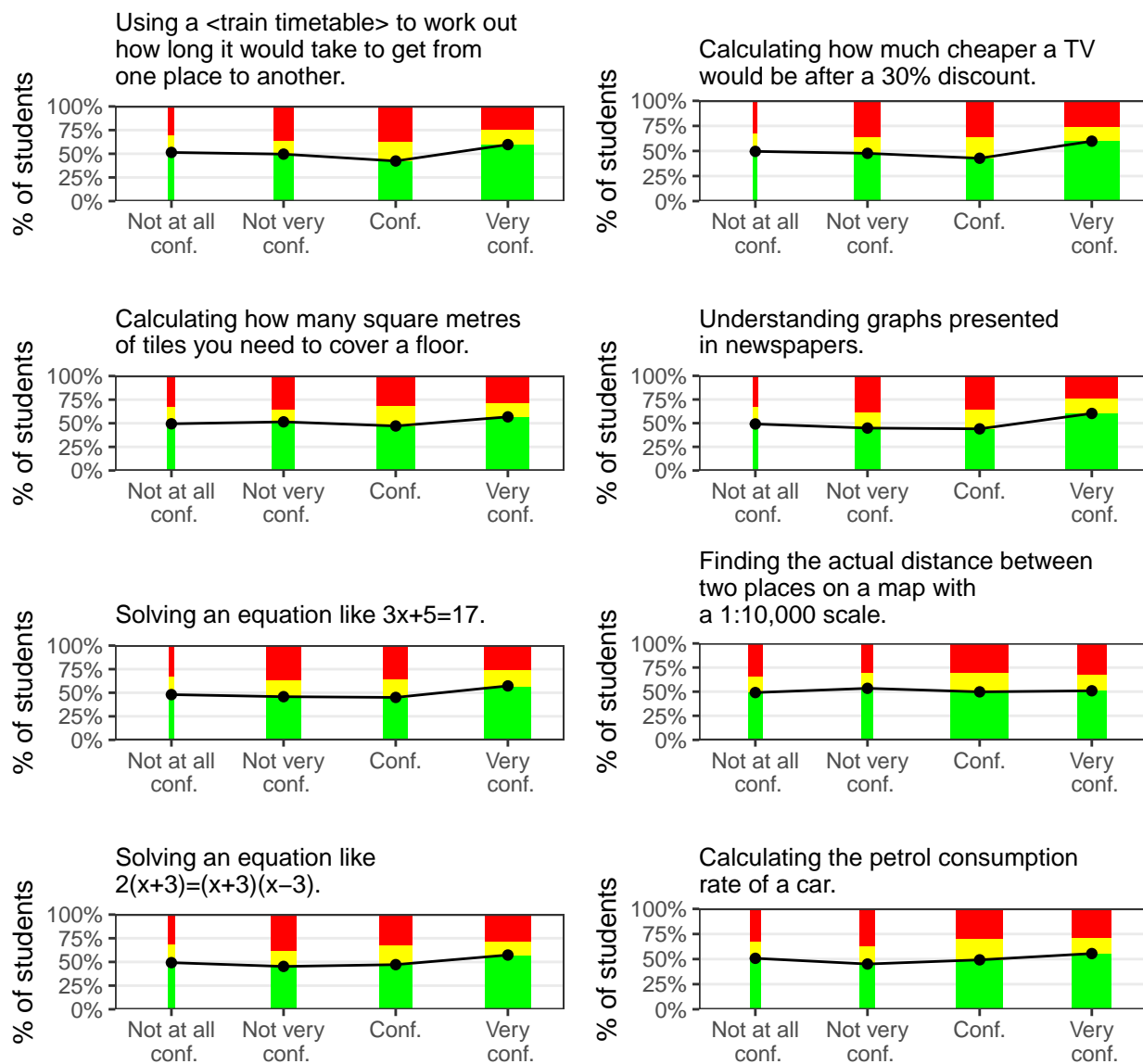
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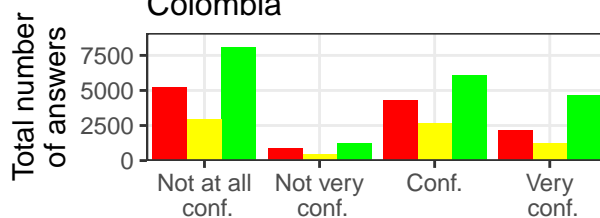
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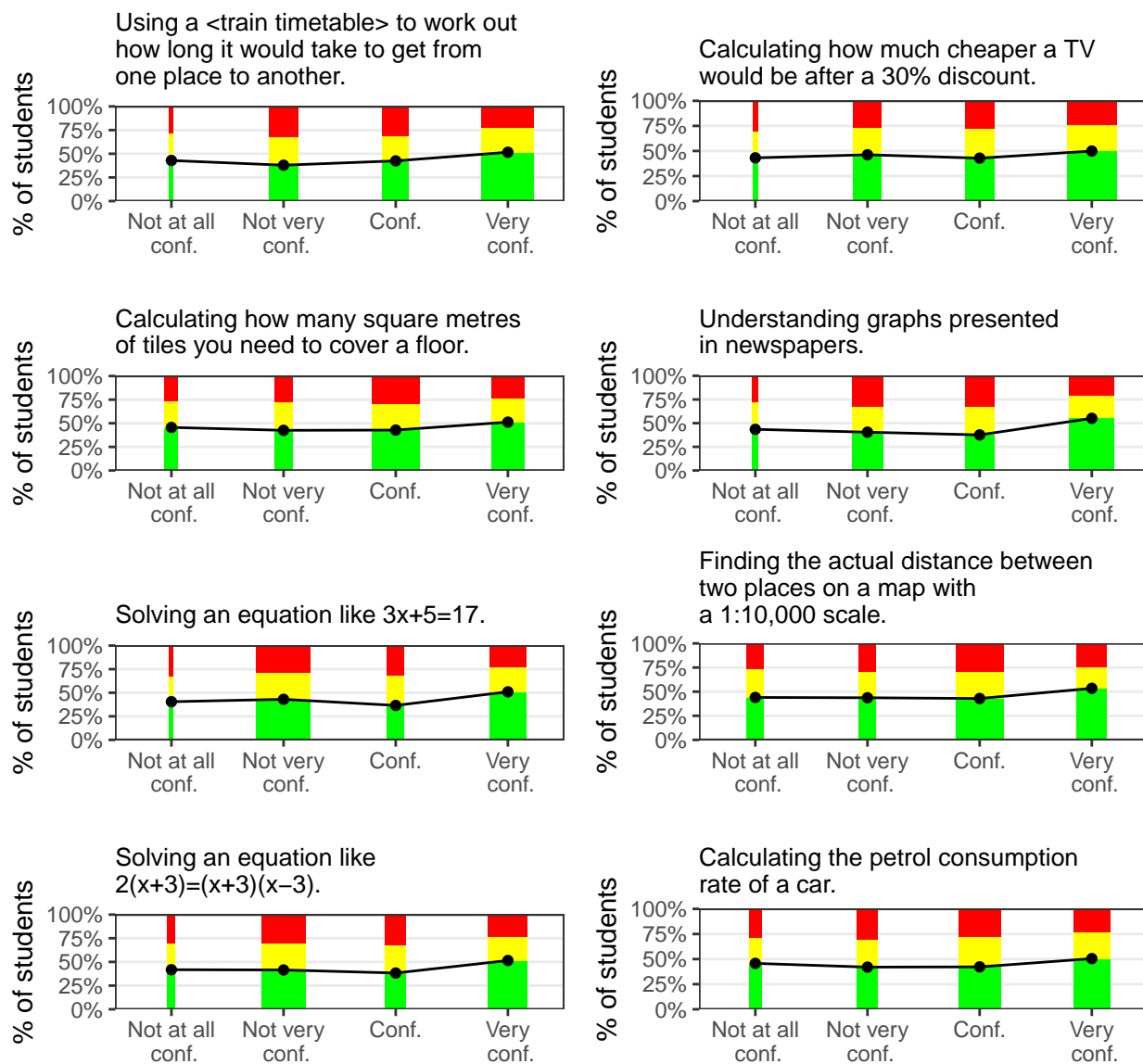
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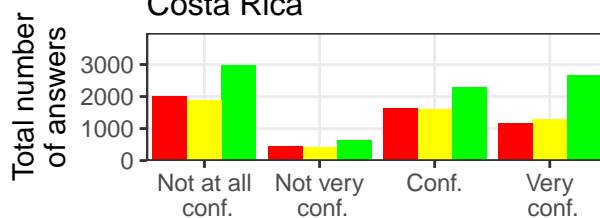
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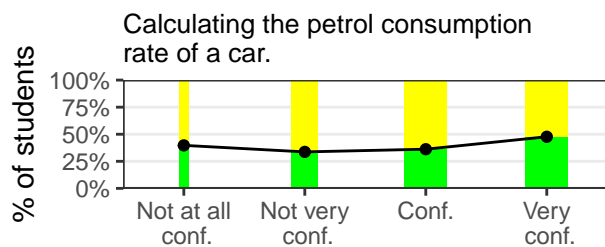
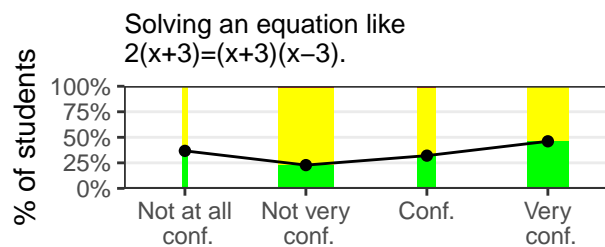
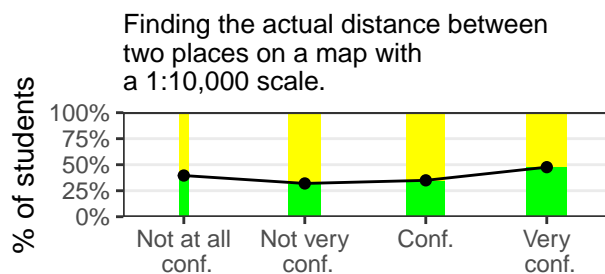
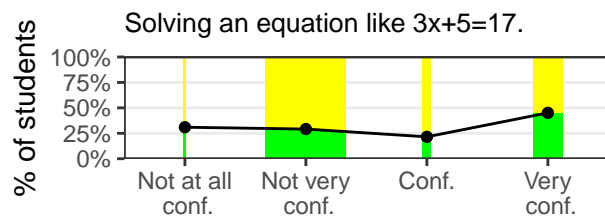
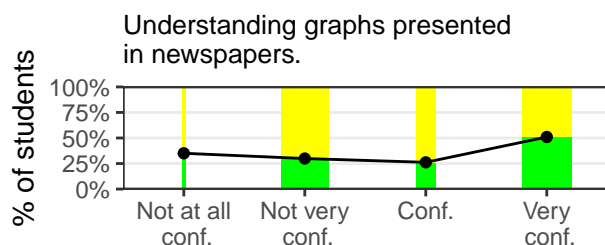
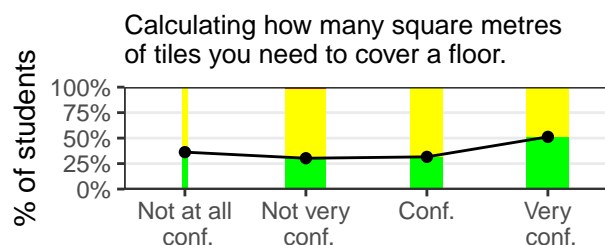
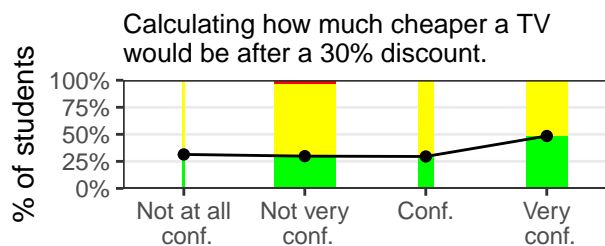
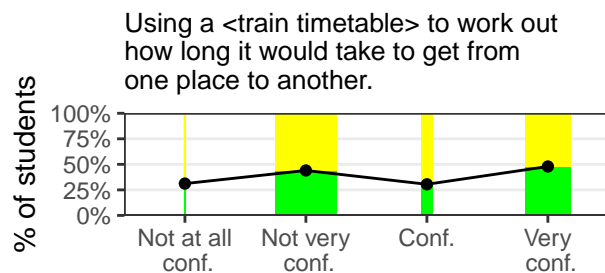
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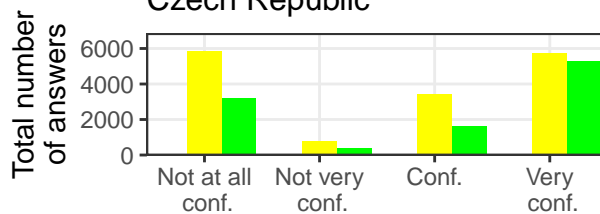
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Costa Rica



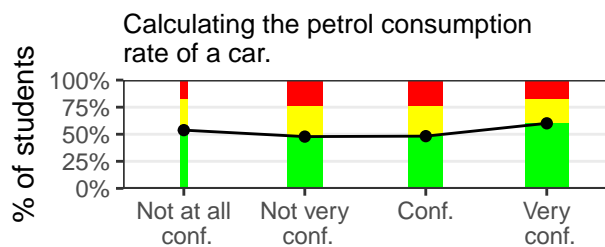
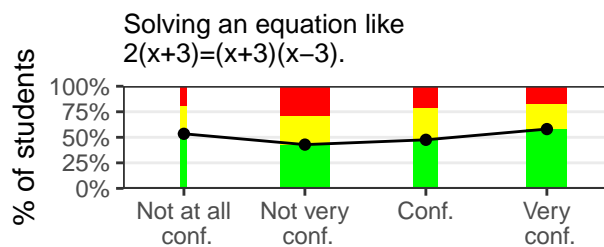
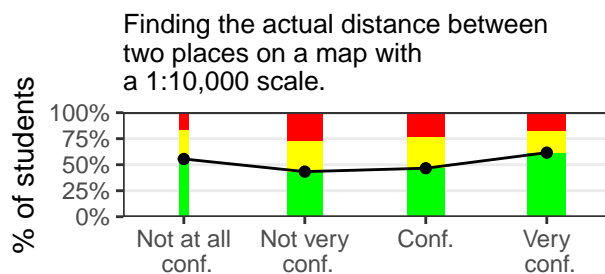
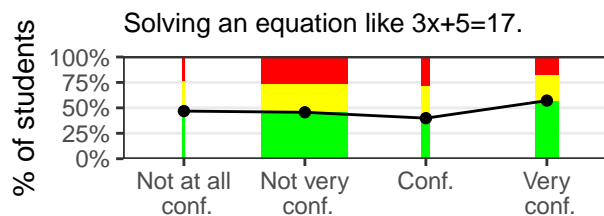
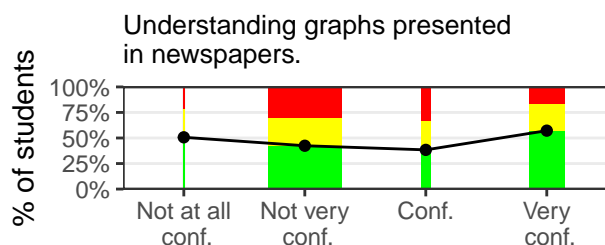
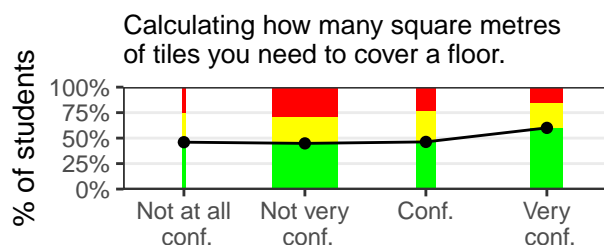
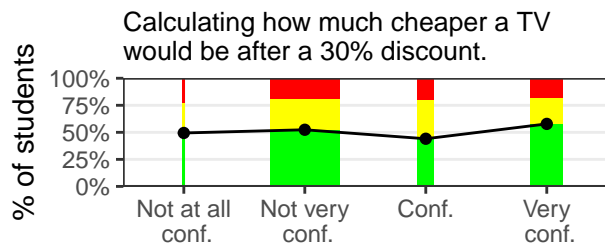
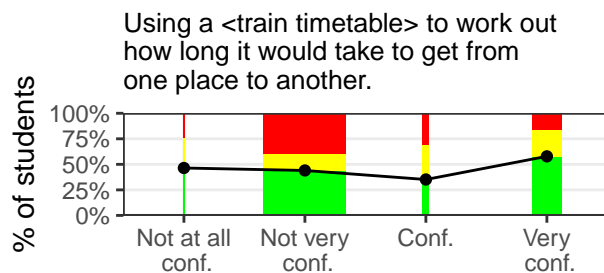
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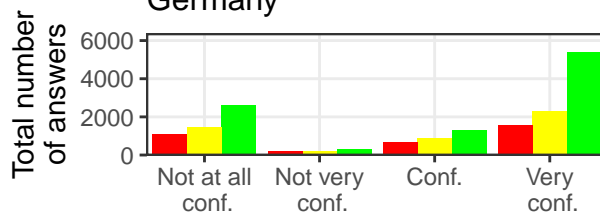
Summary of answers: Czech Republic



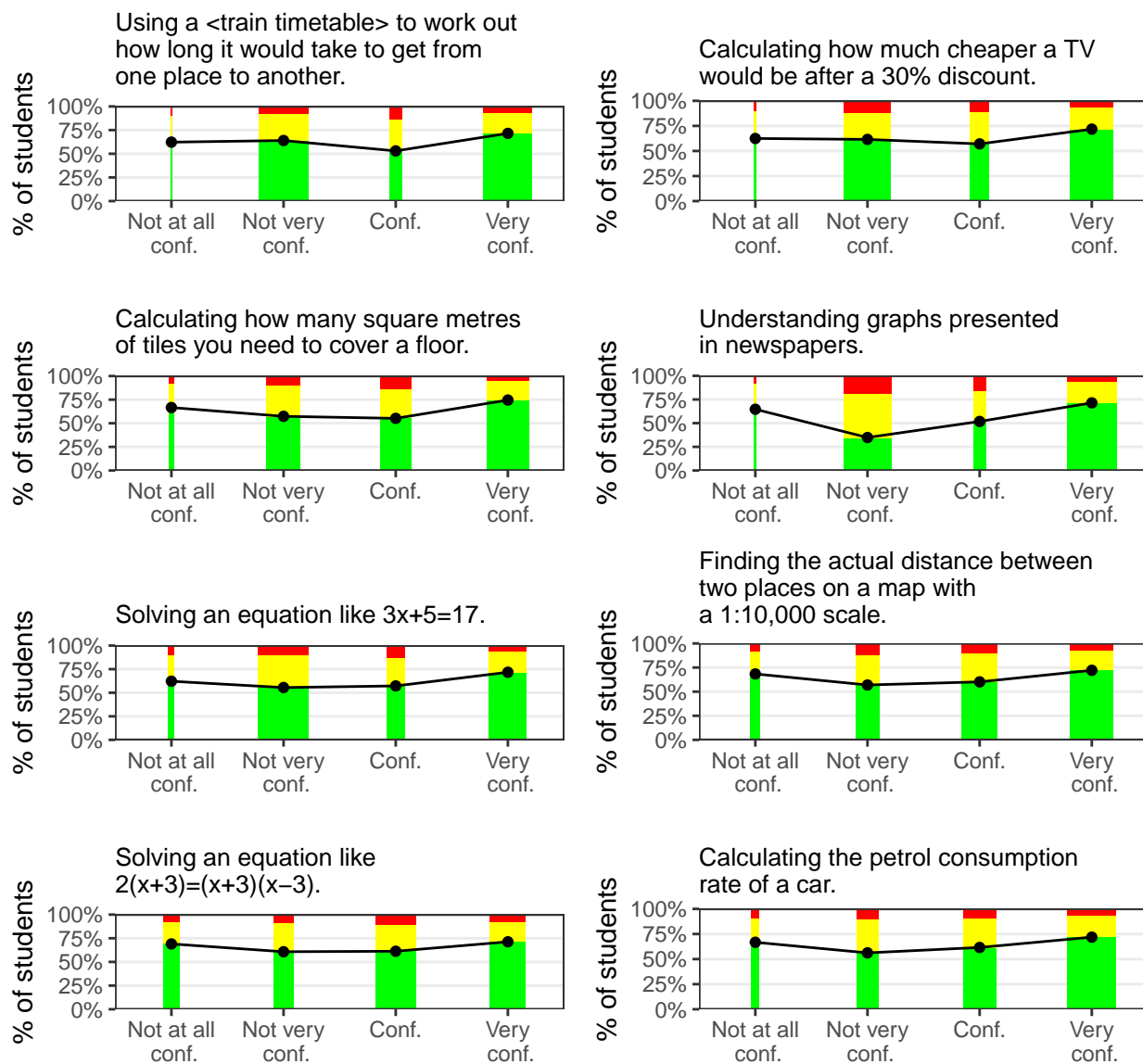
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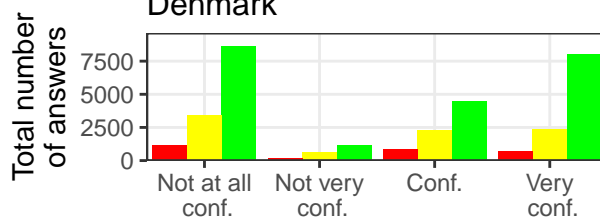
Summary of answers: Germany



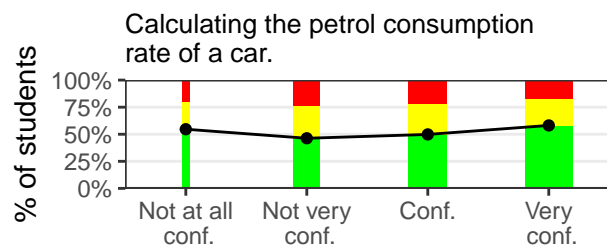
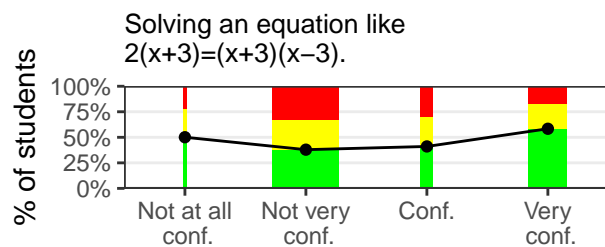
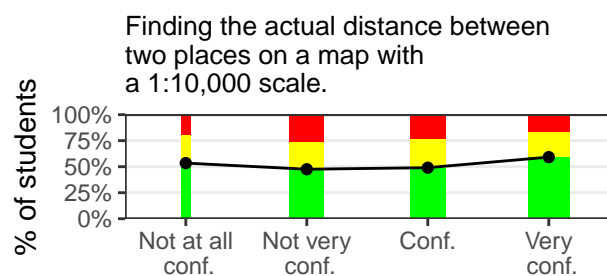
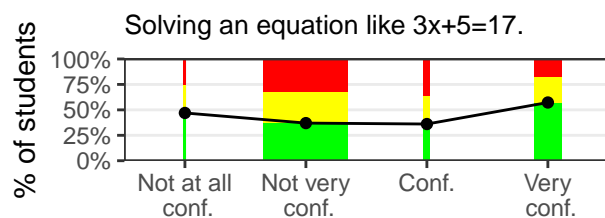
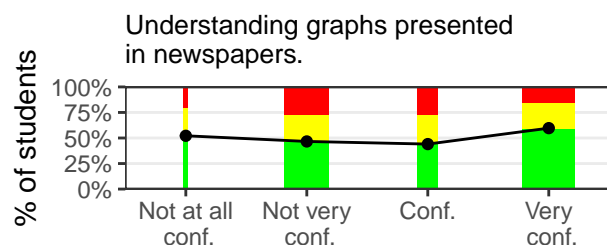
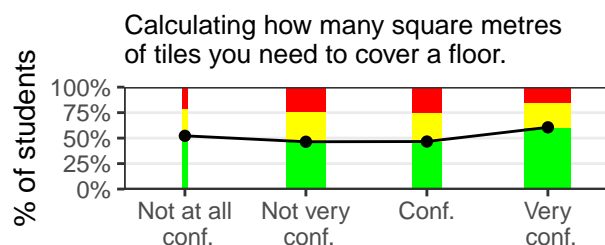
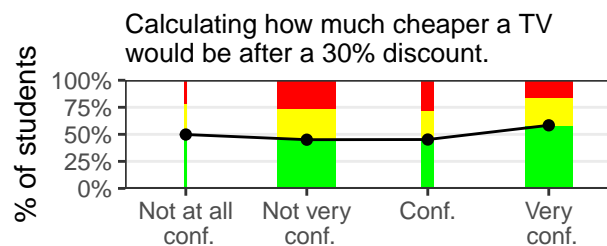
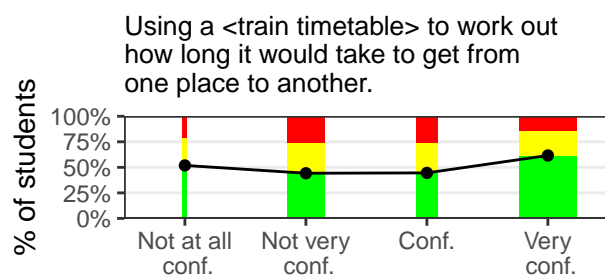
16 Denmark



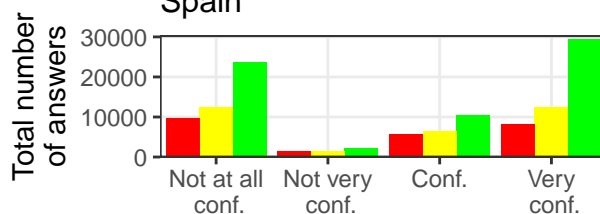
Summary of answers: Denmark



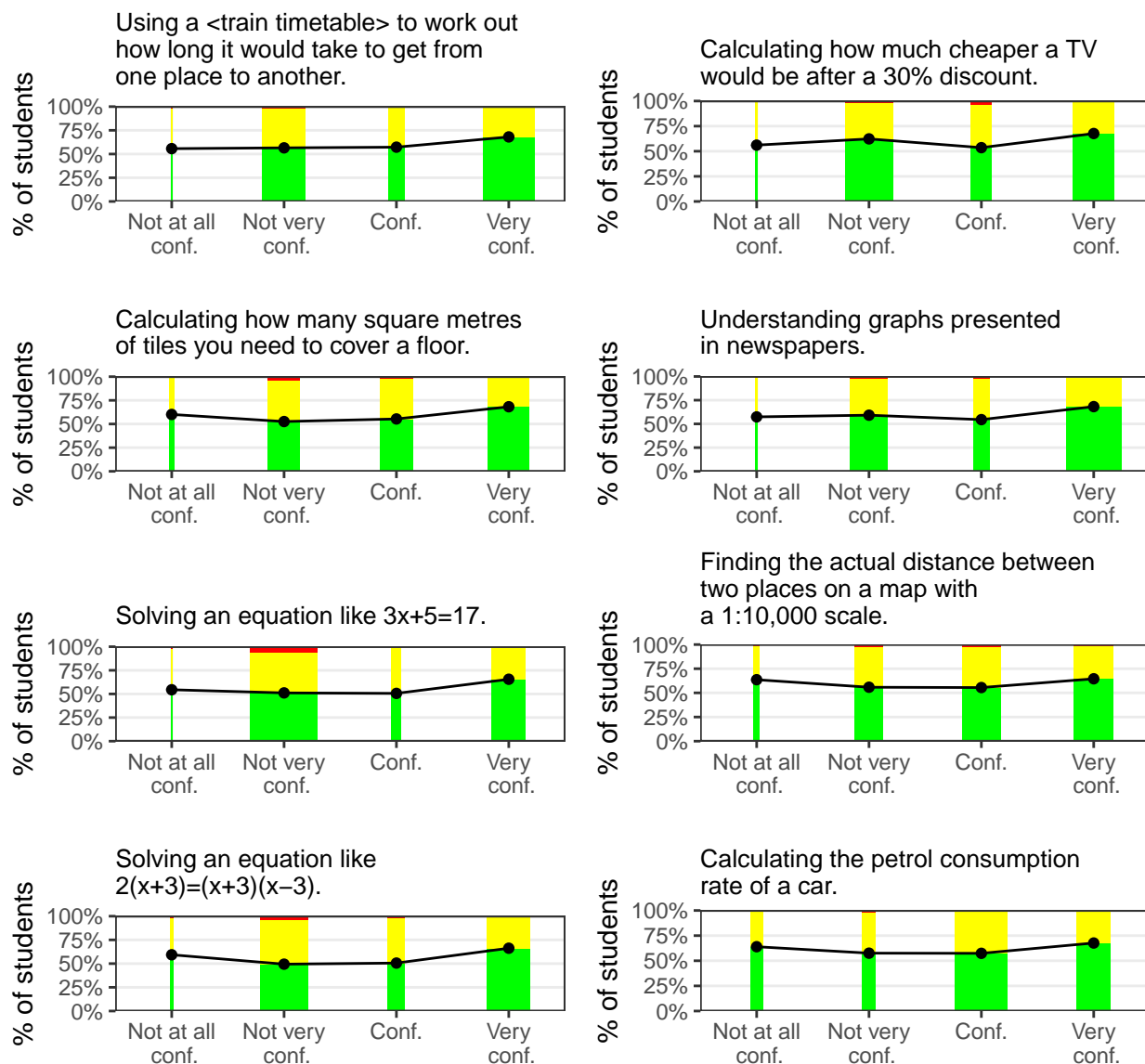
17 Spain



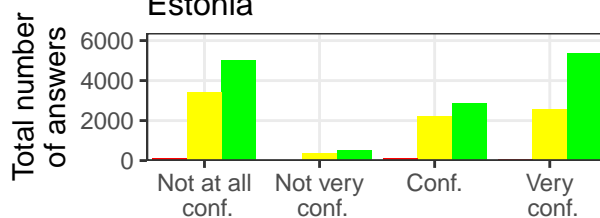
Summary of answers: Spain



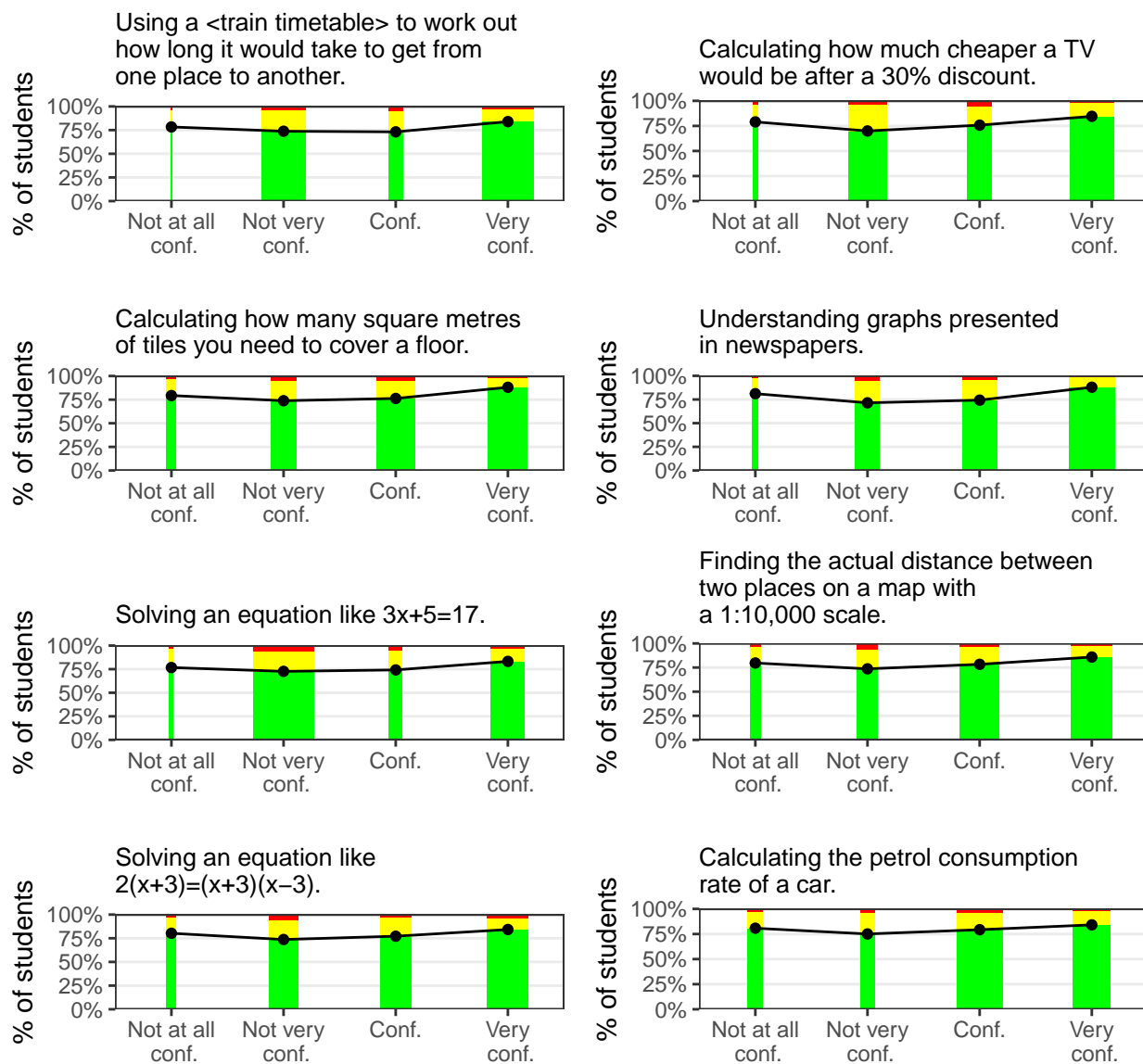
18 Estonia



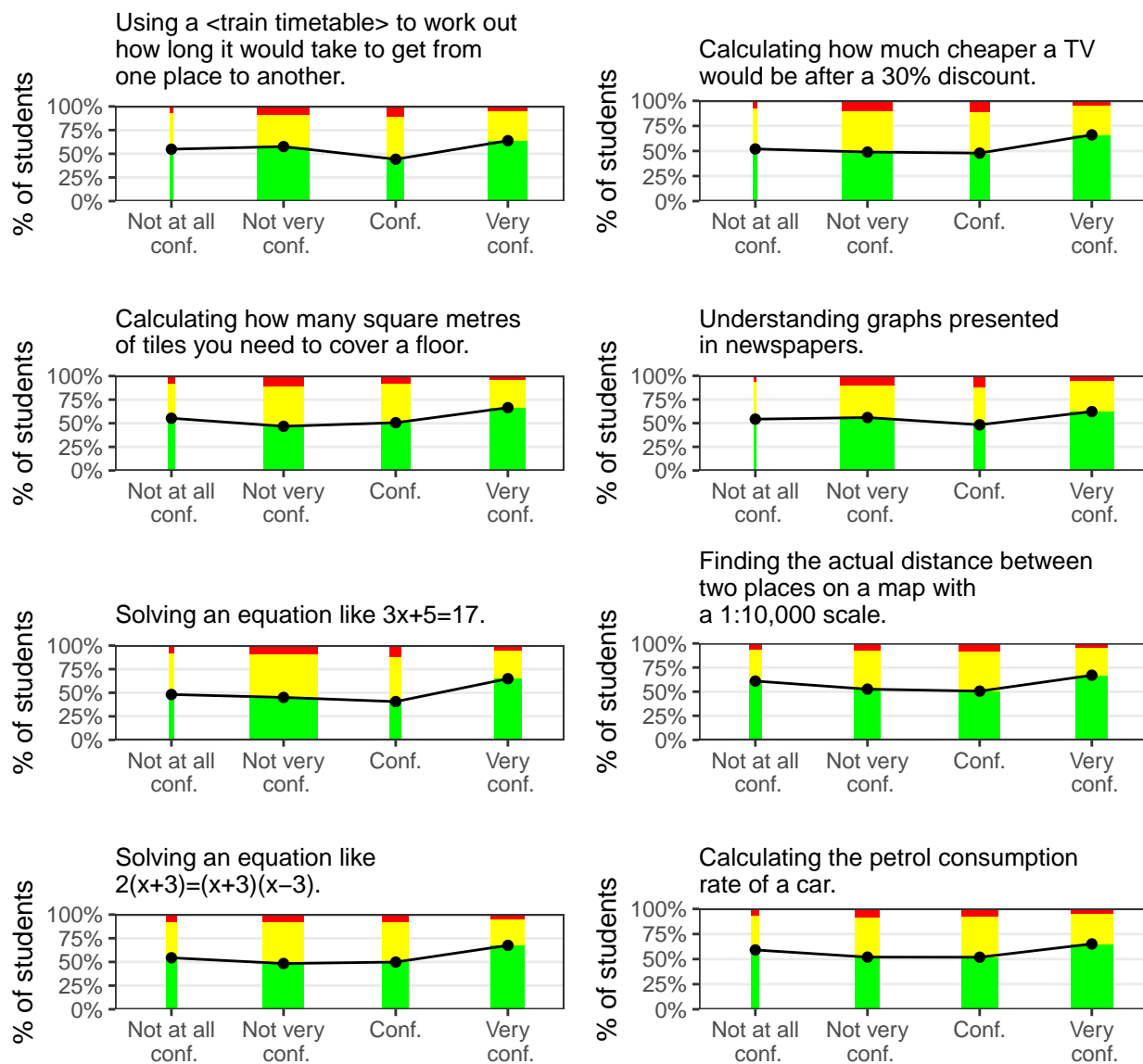
Summary of answers: Estonia



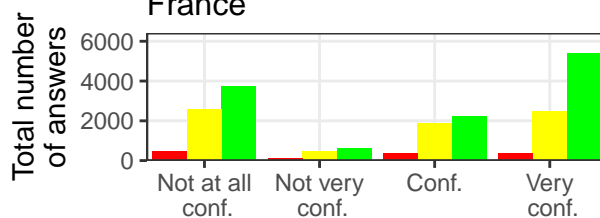
19 Finland



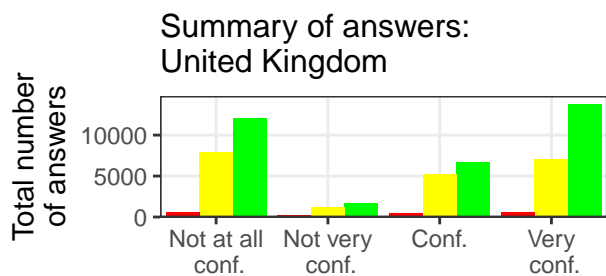
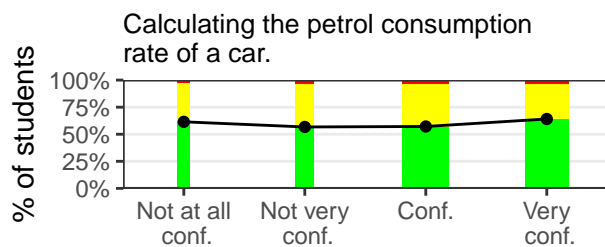
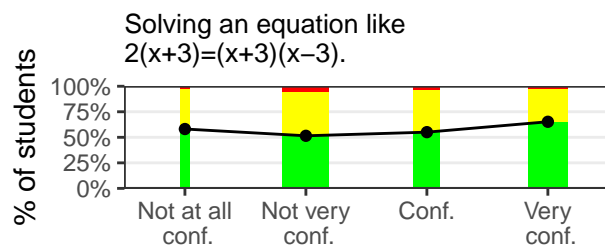
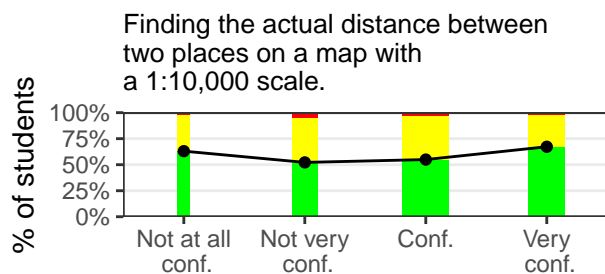
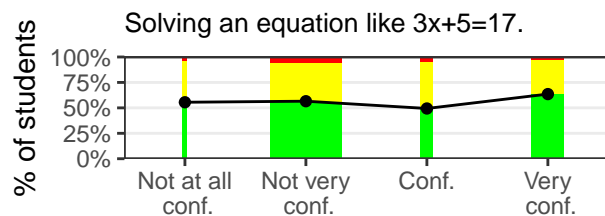
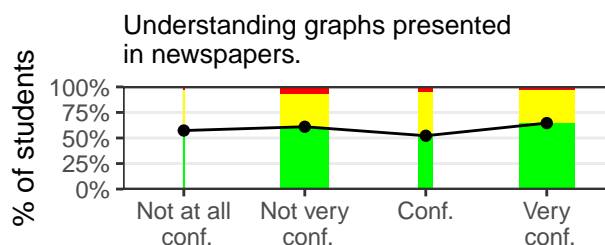
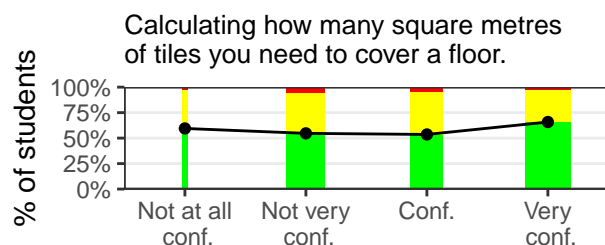
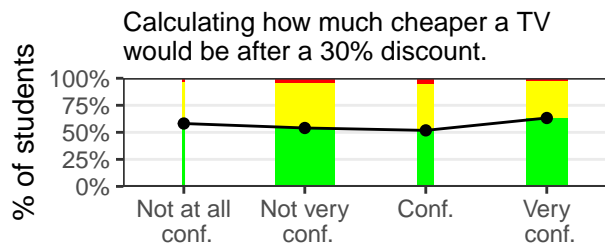
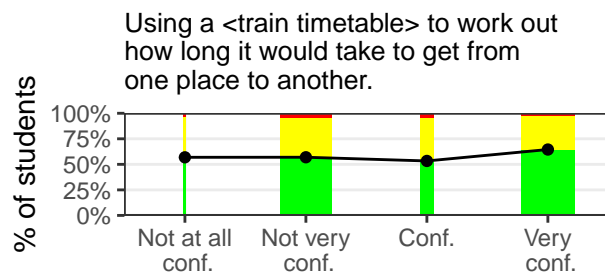
20 France



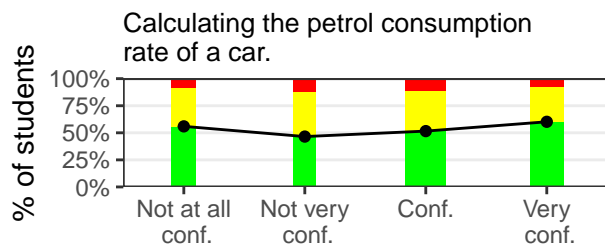
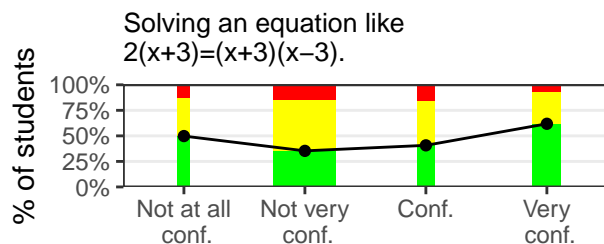
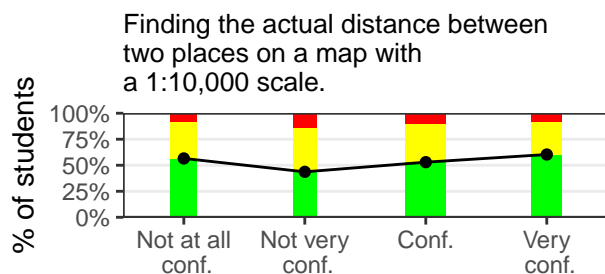
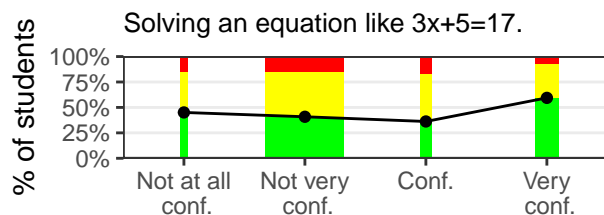
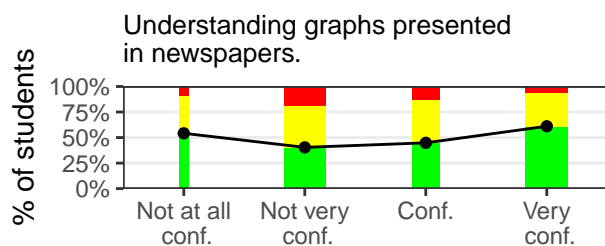
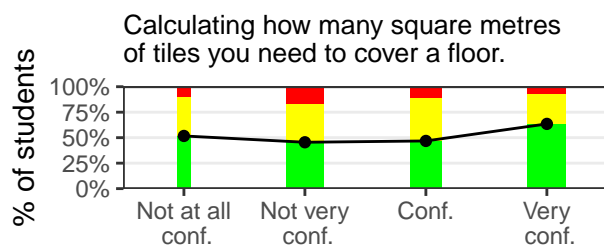
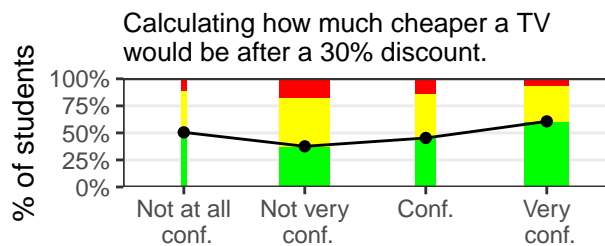
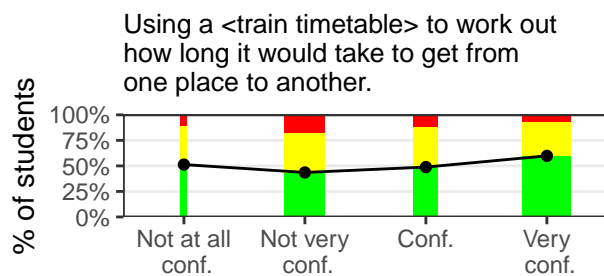
Summary of answers: France



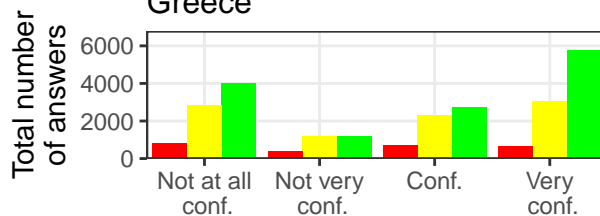
21 United Kingdom



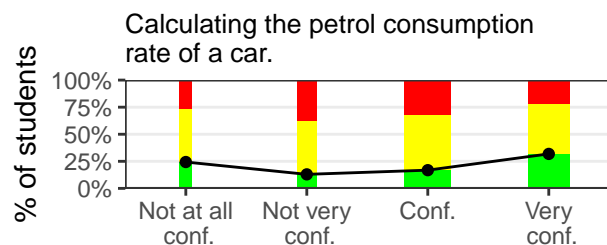
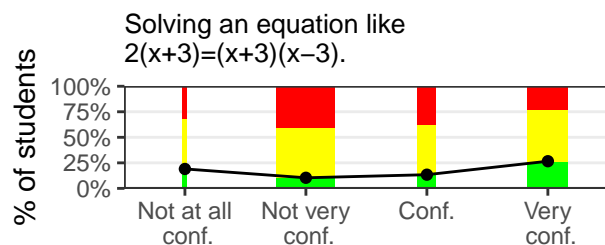
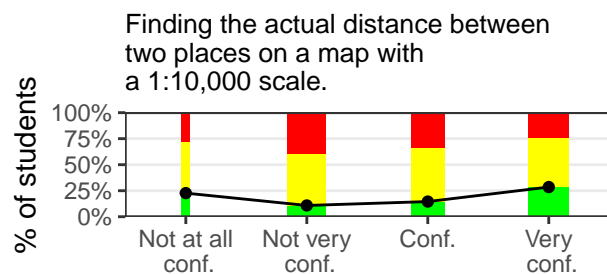
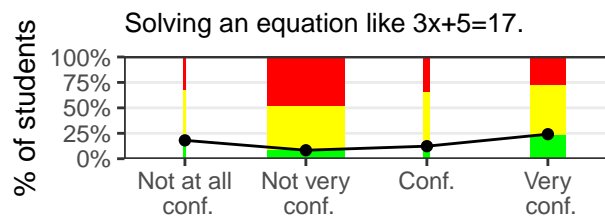
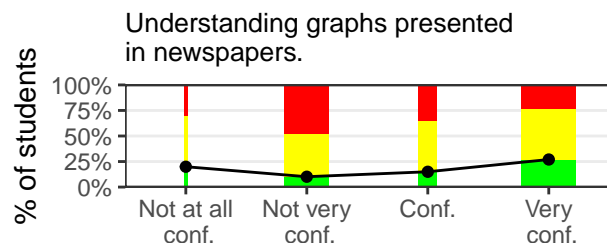
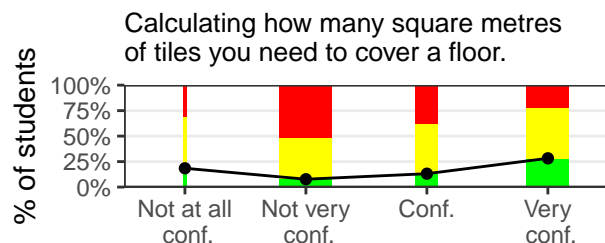
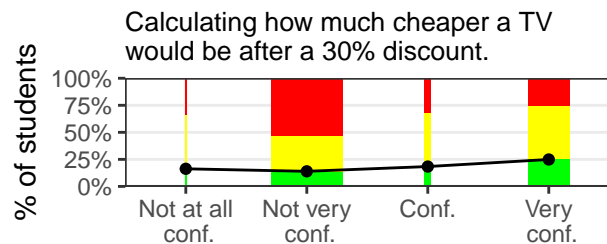
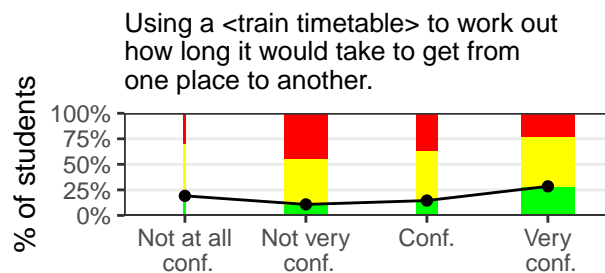
22 Greece



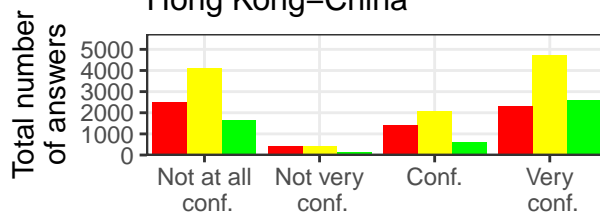
Summary of answers: Greece



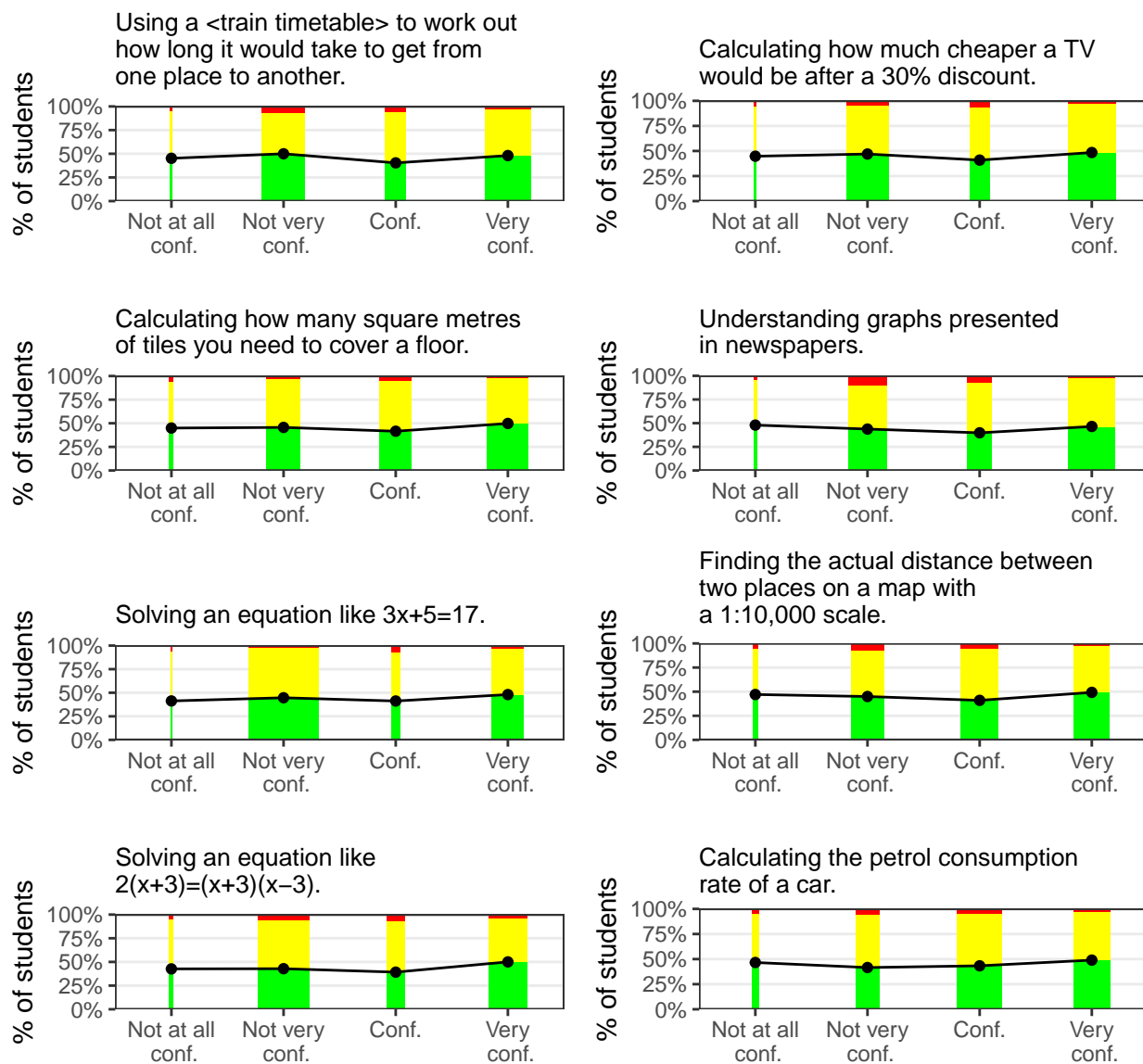
23 Hong Kong-China



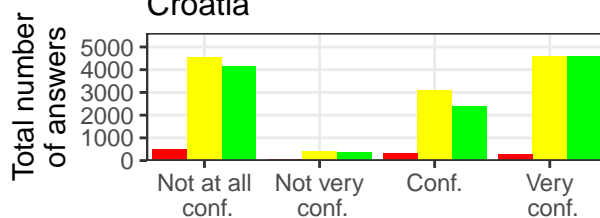
Summary of answers: Hong Kong-China



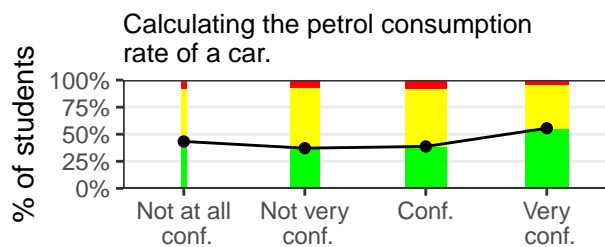
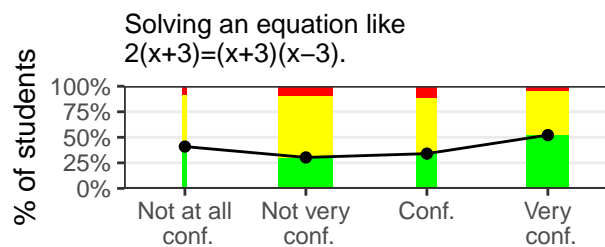
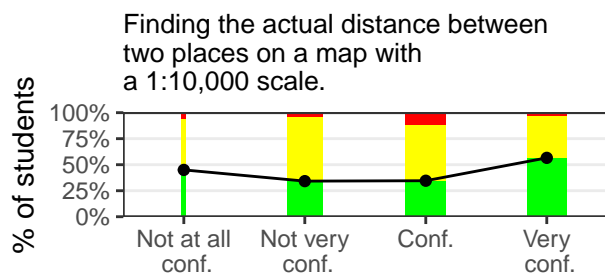
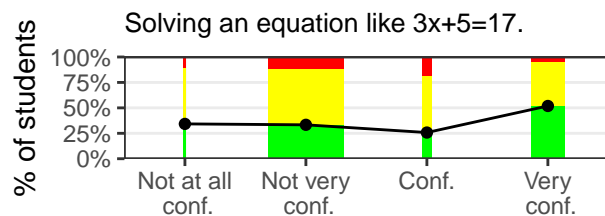
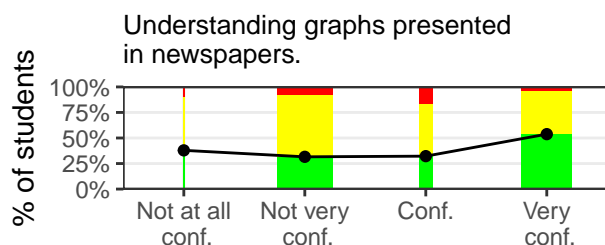
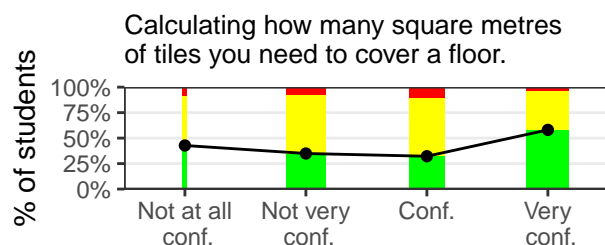
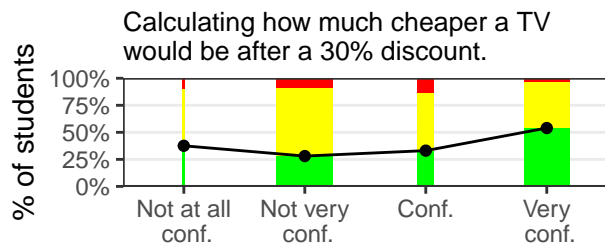
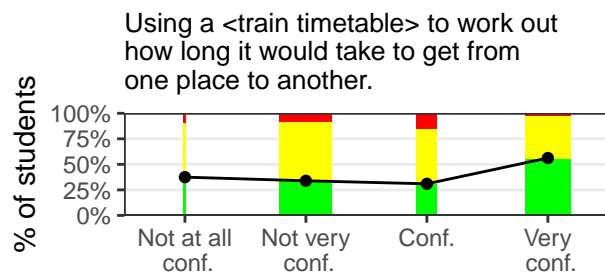
24 Croatia



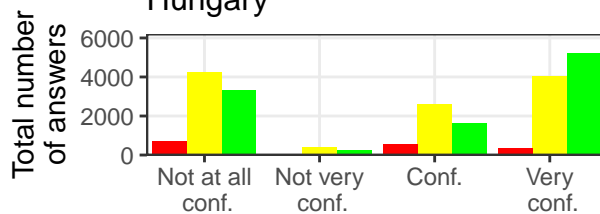
Summary of answers: Croatia



25 Hungary

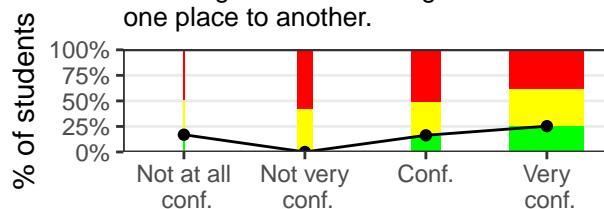


Summary of answers: Hungary

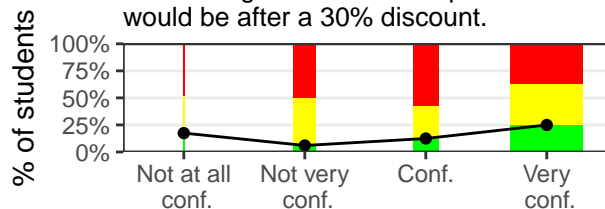


26 Indonesia

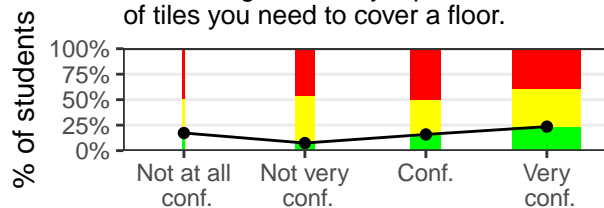
Using a <train timetable> to work out how long it would take to get from one place to another.



Calculating how much cheaper a TV would be after a 30% discount.



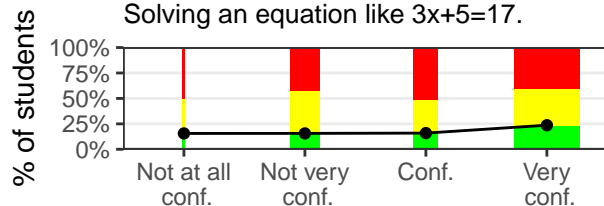
Calculating how many square metres of tiles you need to cover a floor.



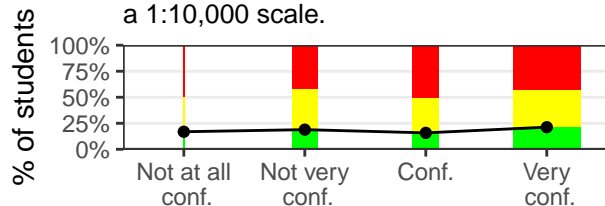
Understanding graphs presented in newspapers.



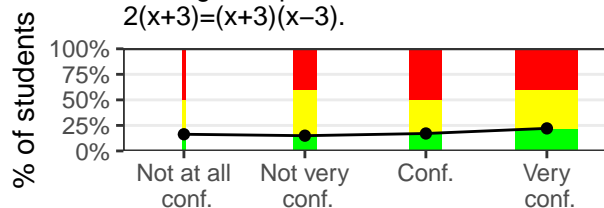
Solving an equation like $3x+5=17$.



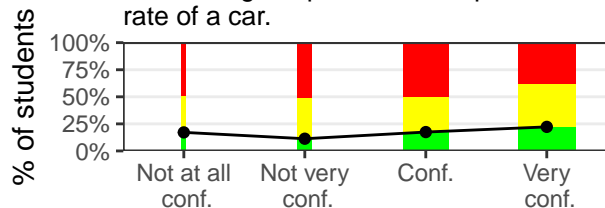
Finding the actual distance between two places on a map with a 1:10,000 scale.



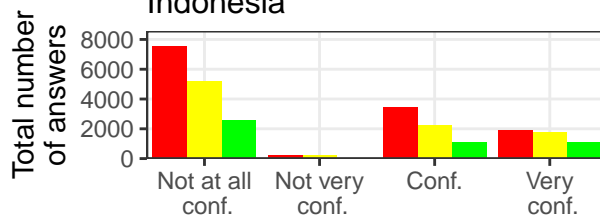
Solving an equation like $2(x+3)=(x+3)(x-3)$.



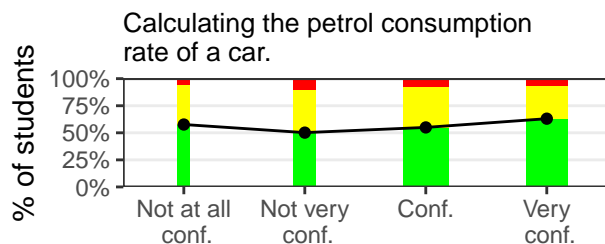
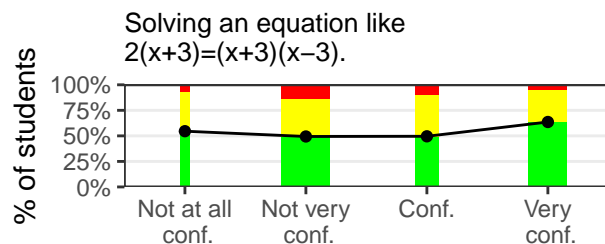
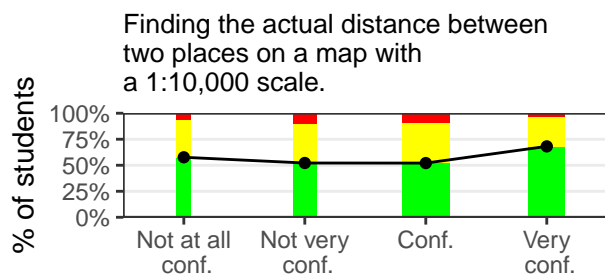
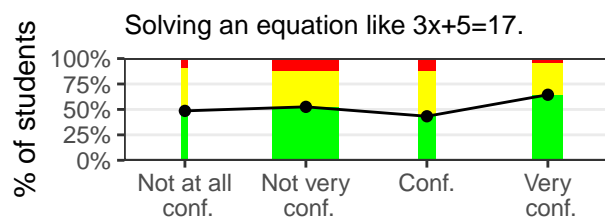
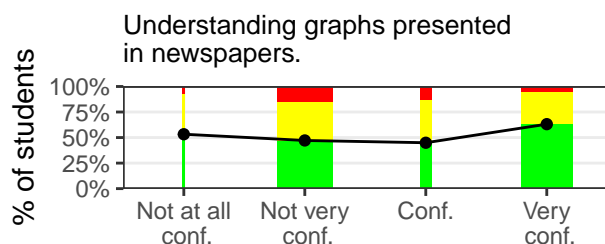
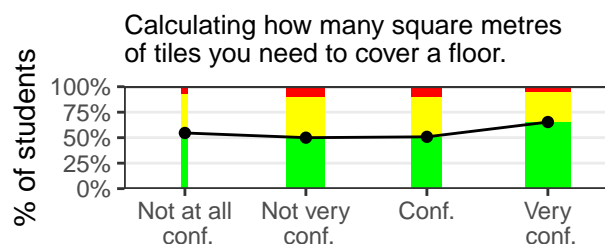
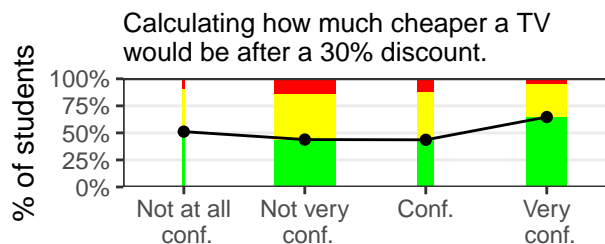
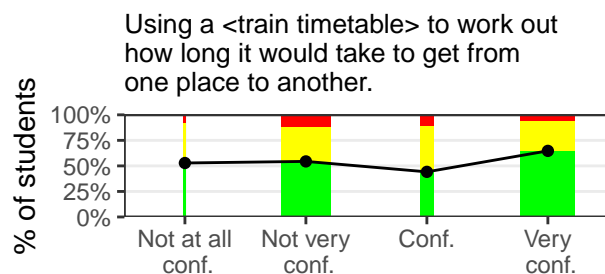
Calculating the petrol consumption rate of a car.



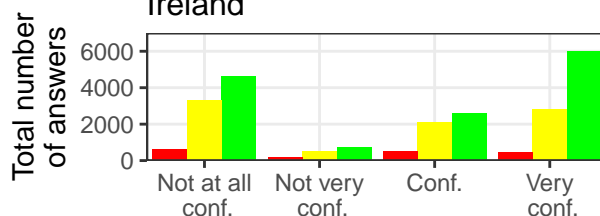
Summary of answers: Indonesia



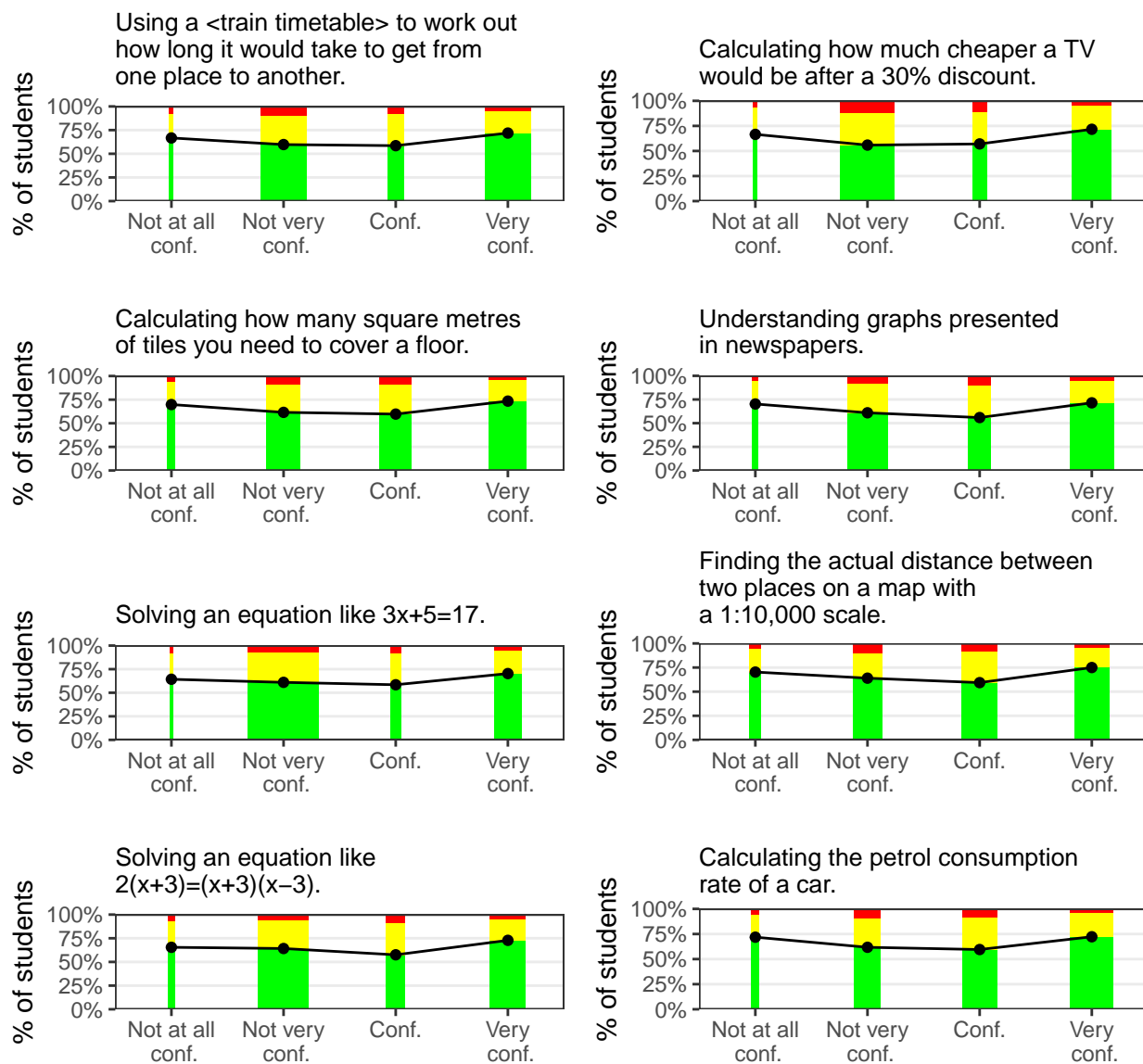
27 Ireland



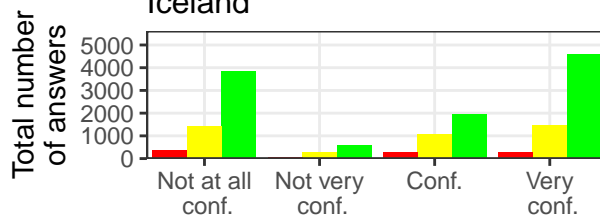
Summary of answers: Ireland



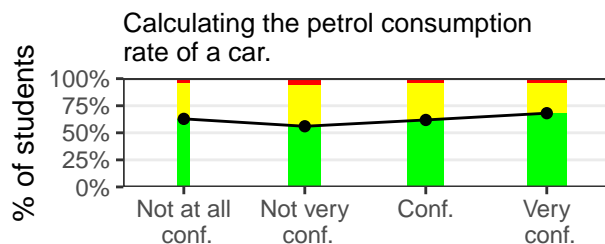
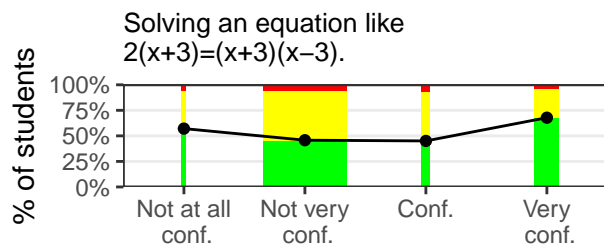
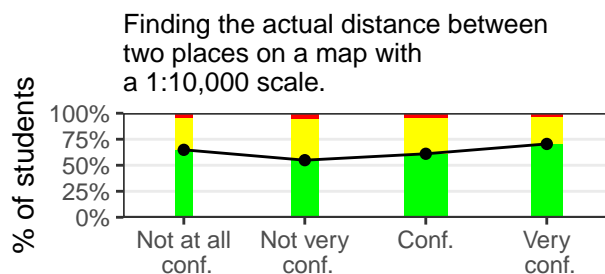
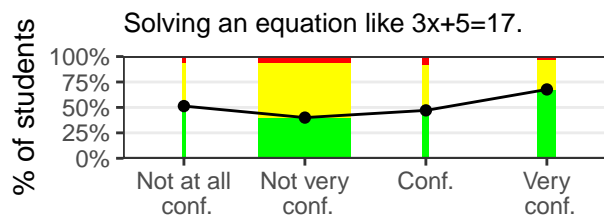
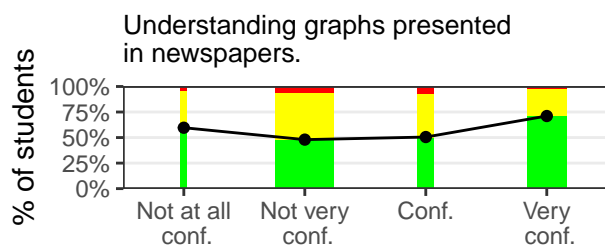
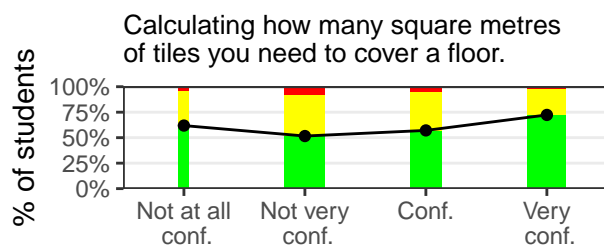
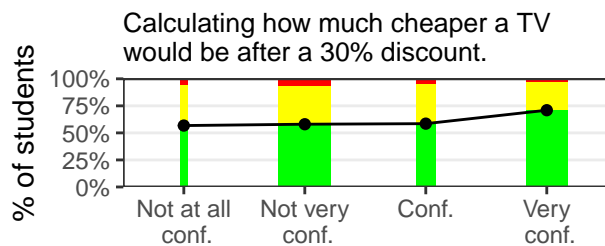
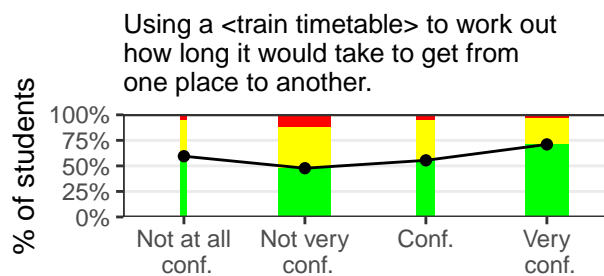
28 Iceland



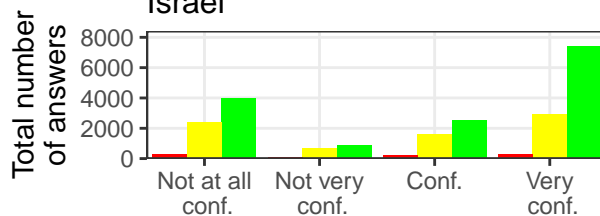
Summary of answers: Iceland



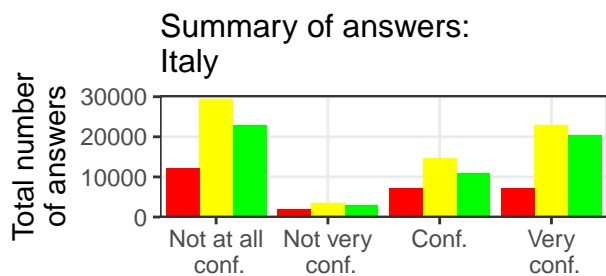
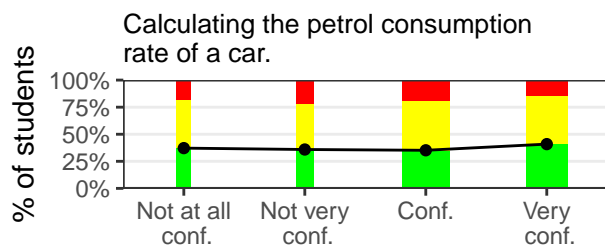
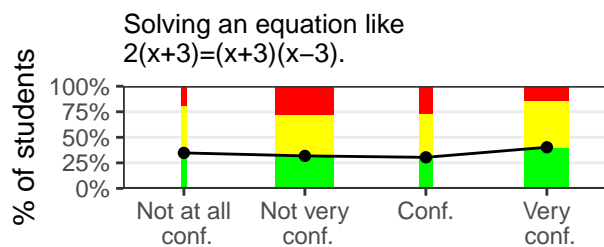
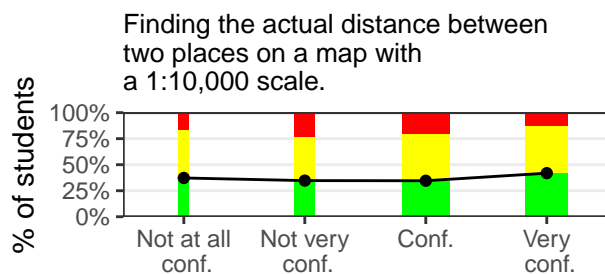
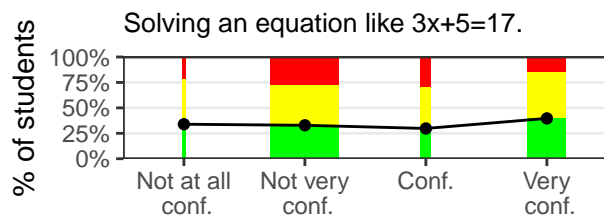
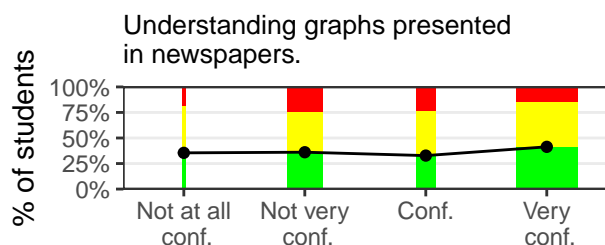
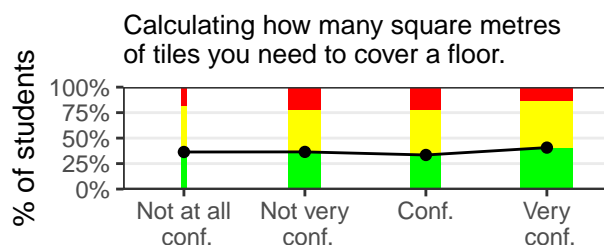
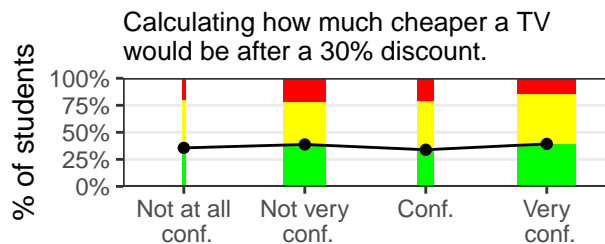
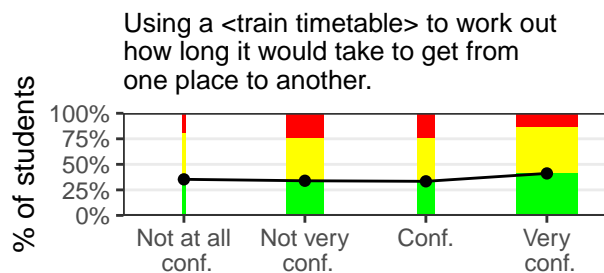
29 Israel



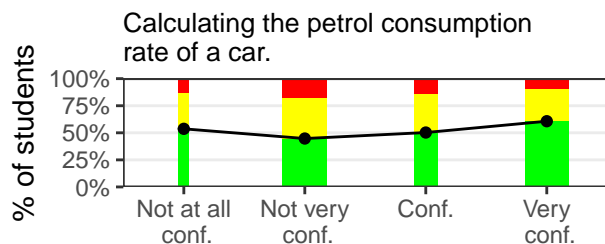
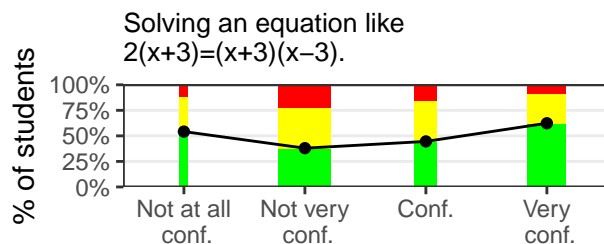
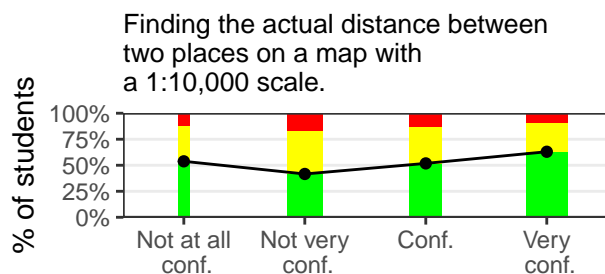
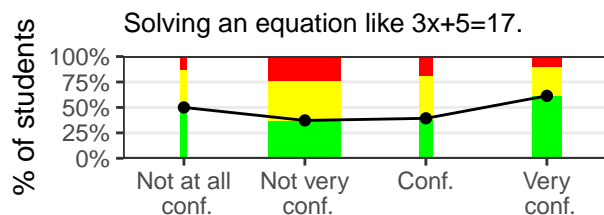
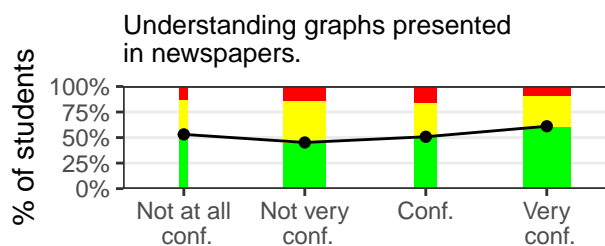
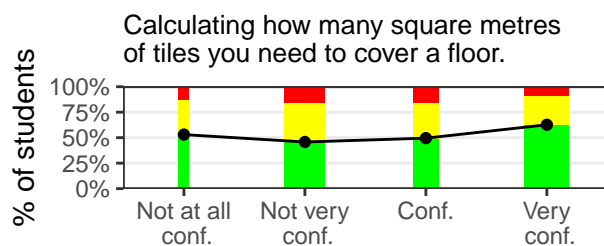
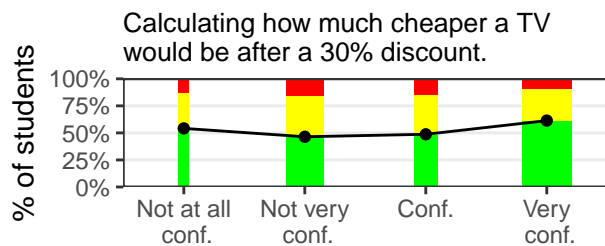
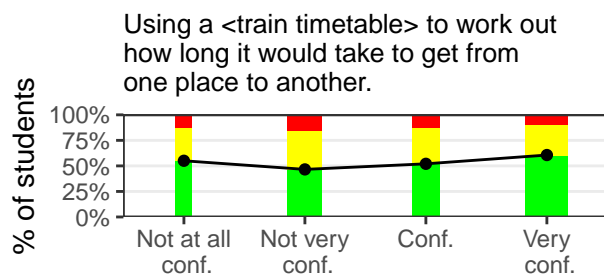
Summary of answers: Israel



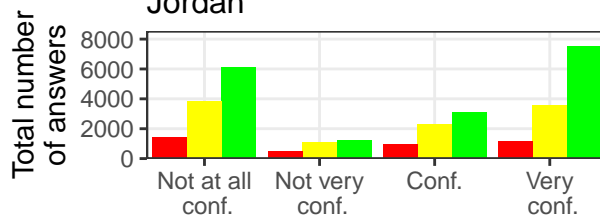
30 Italy



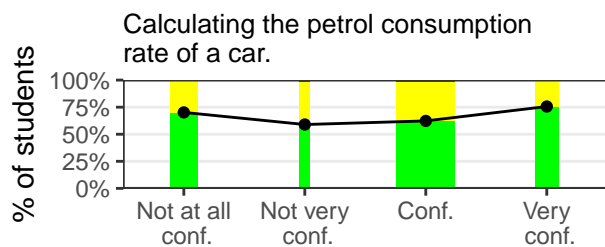
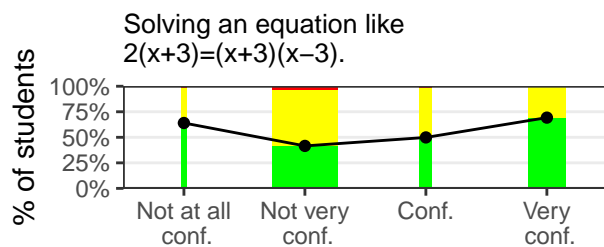
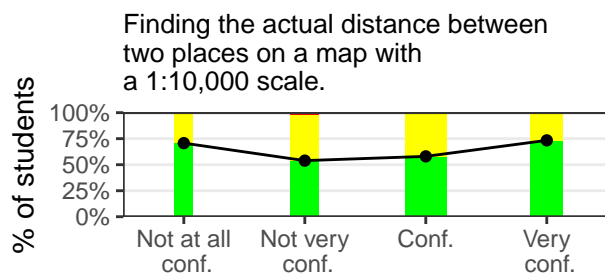
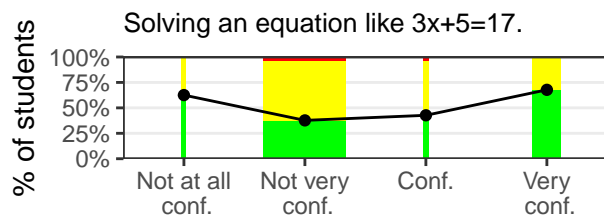
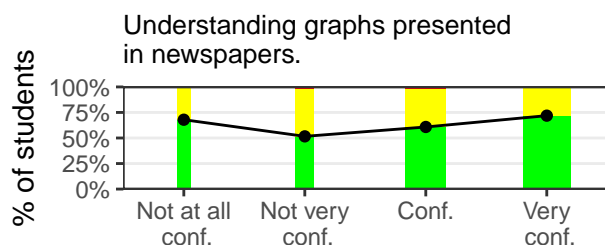
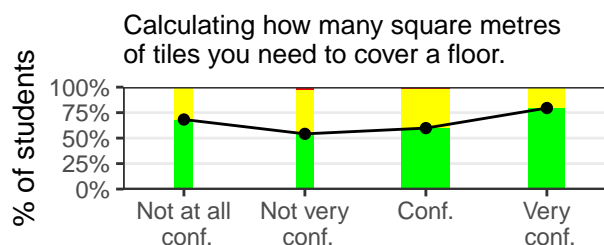
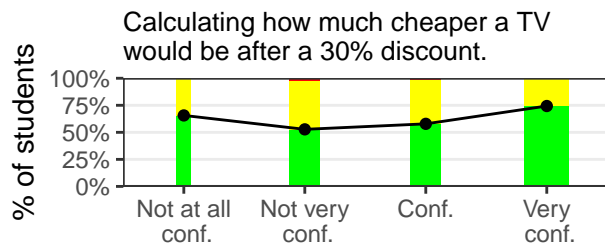
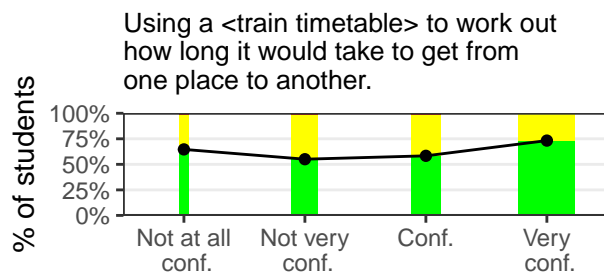
31 Jordan



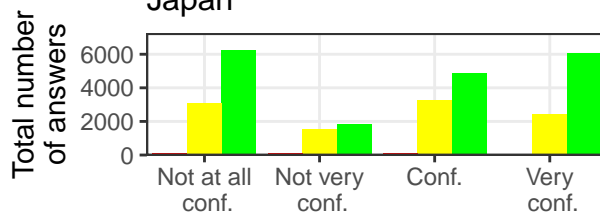
Summary of answers: Jordan



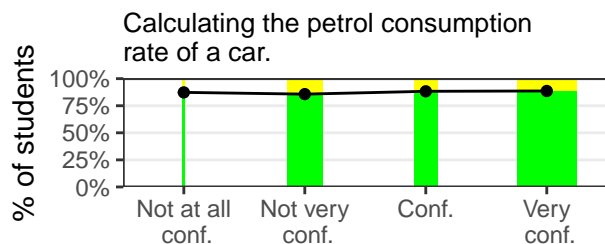
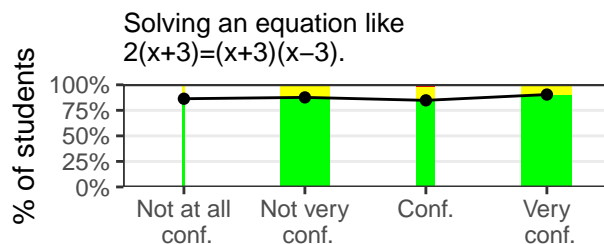
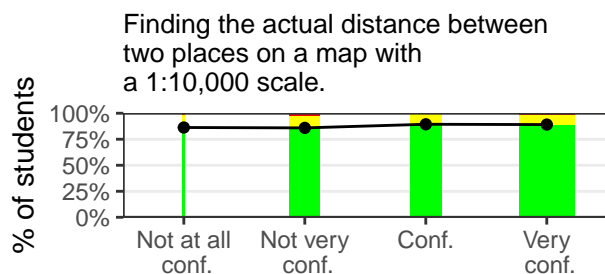
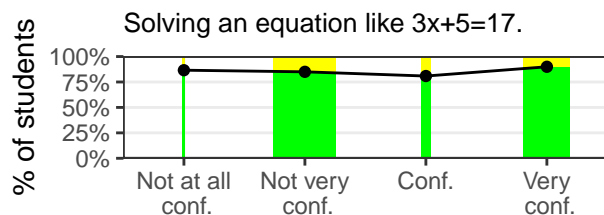
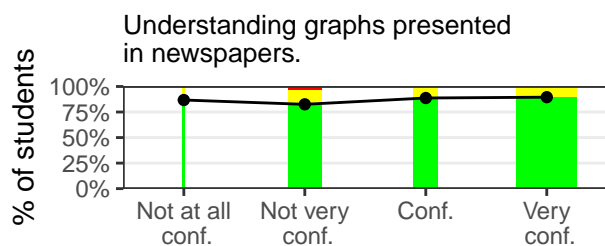
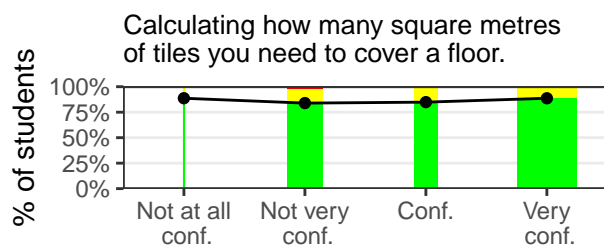
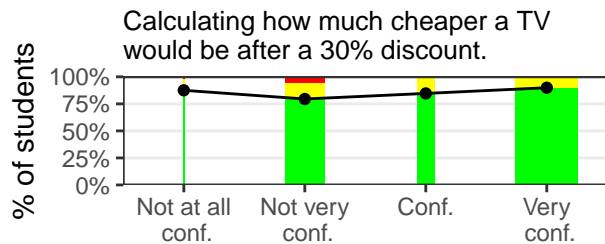
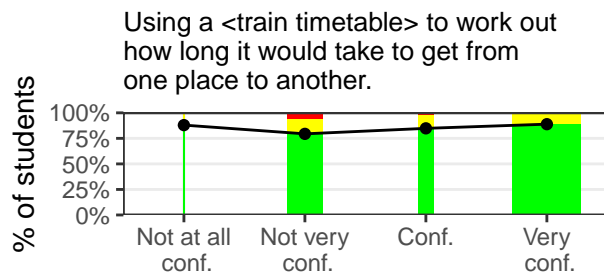
32 Japan



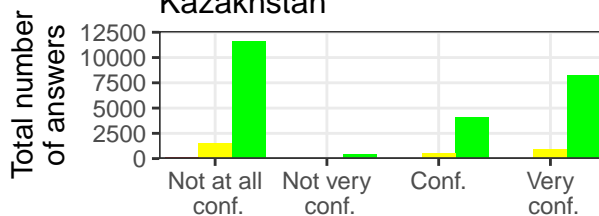
Summary of answers: Japan



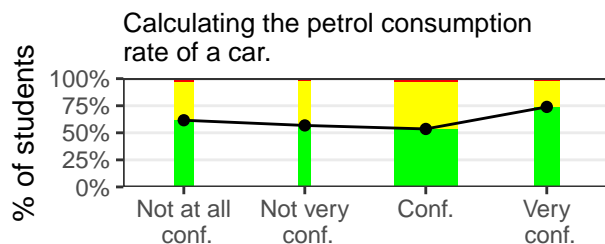
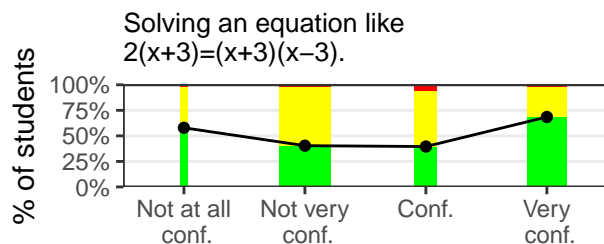
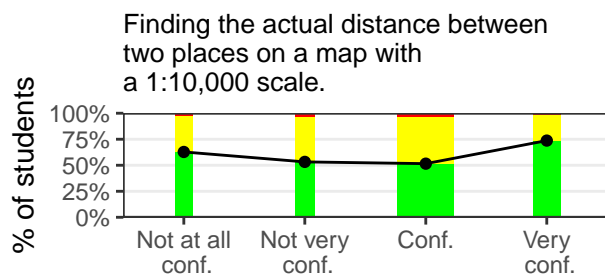
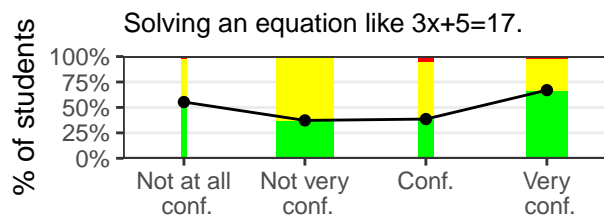
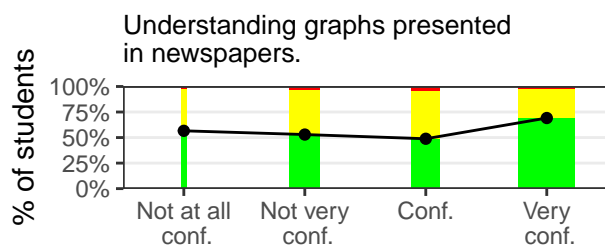
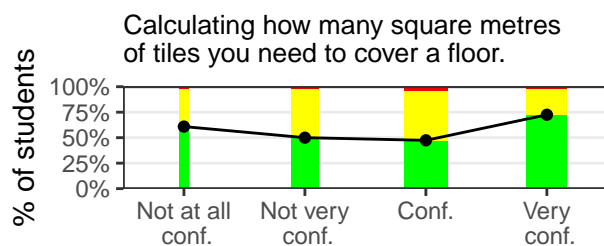
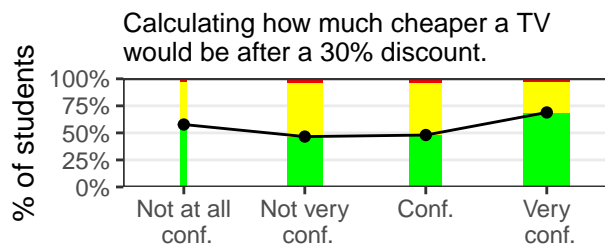
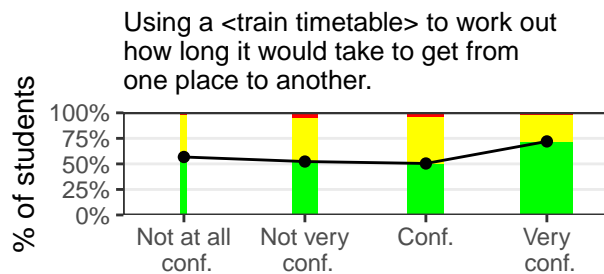
33 Kazakhstan



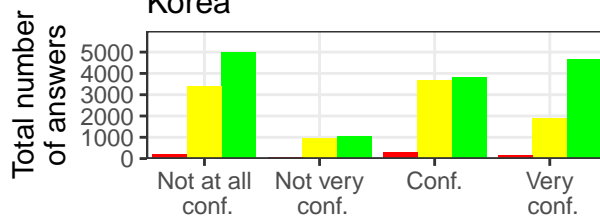
Summary of answers: Kazakhstan



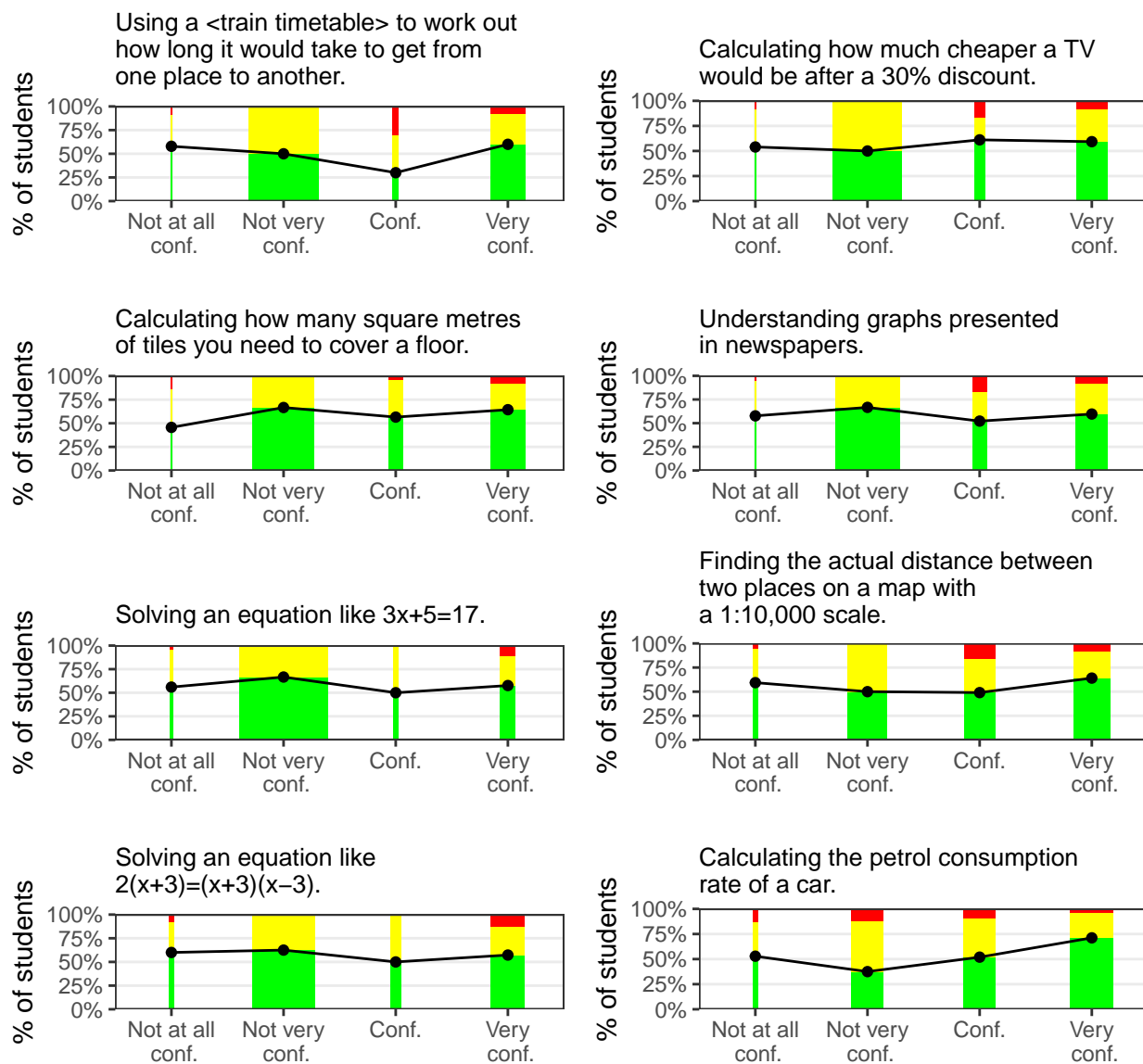
34 Korea



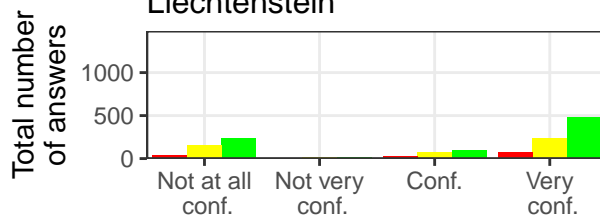
Summary of answers: Korea



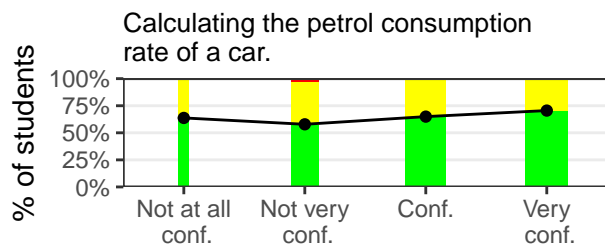
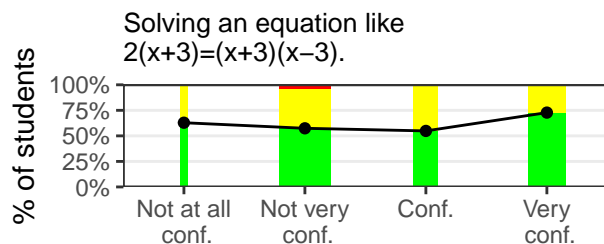
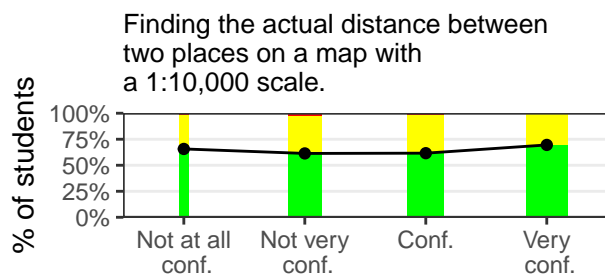
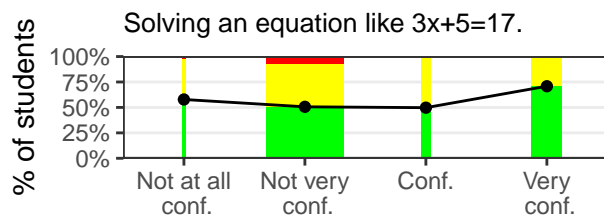
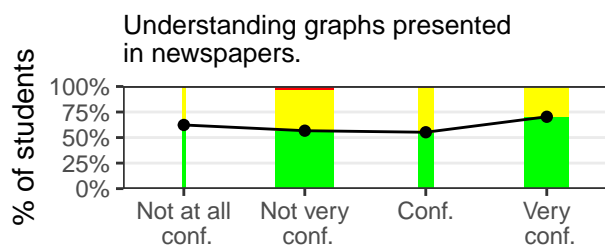
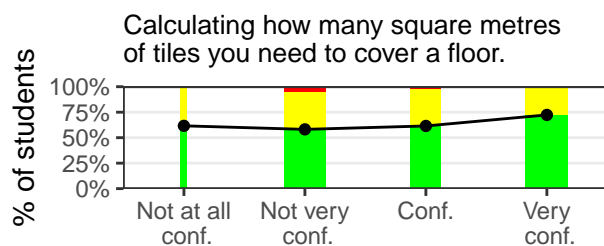
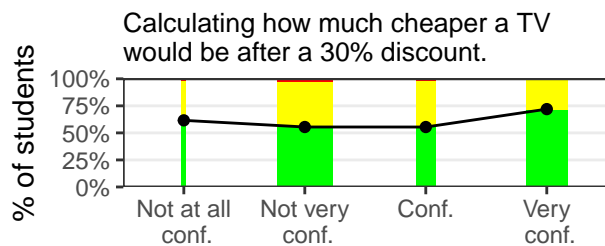
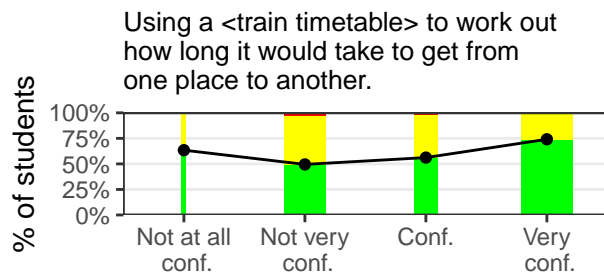
35 Liechtenstein



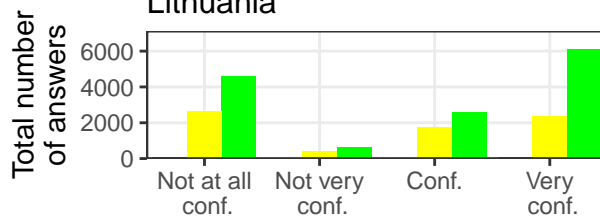
Summary of answers: Liechtenstein



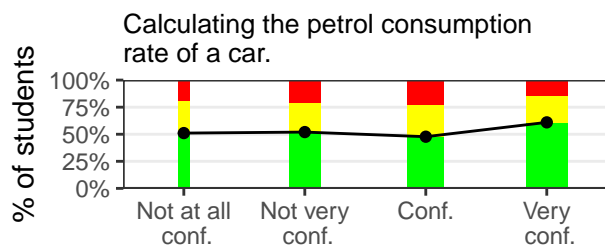
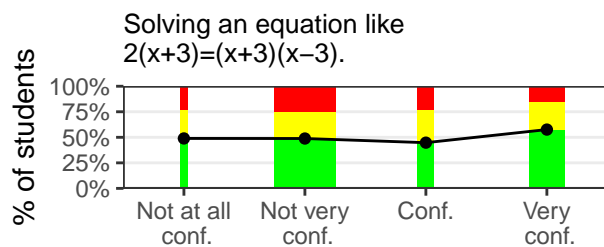
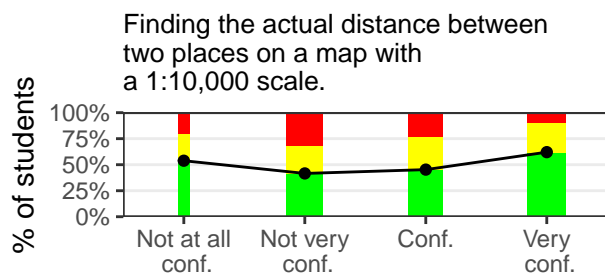
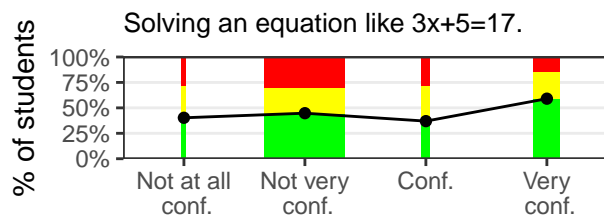
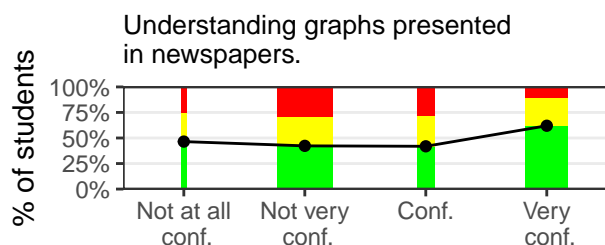
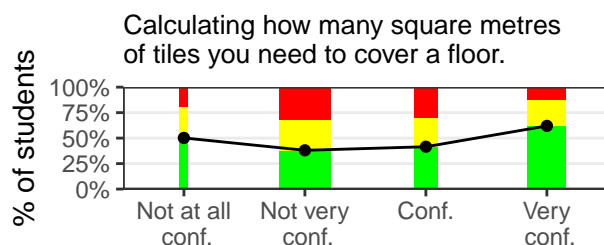
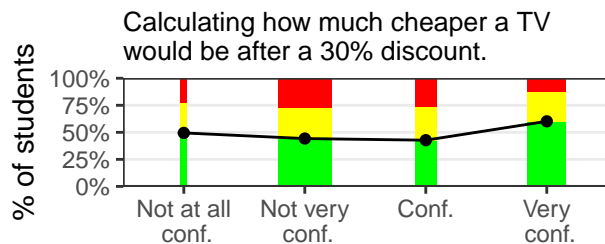
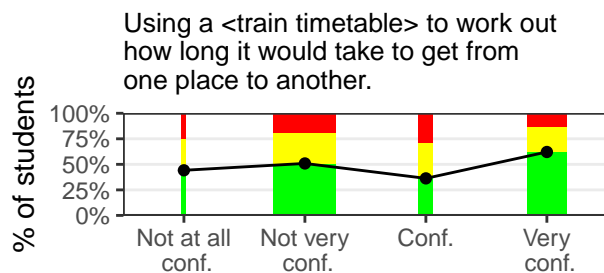
36 Lithuania



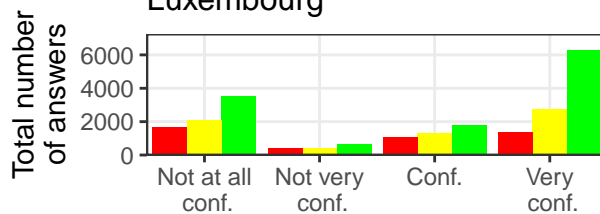
Summary of answers: Lithuania



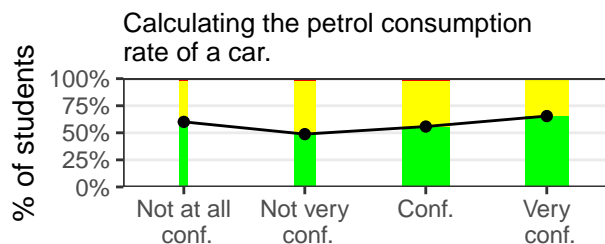
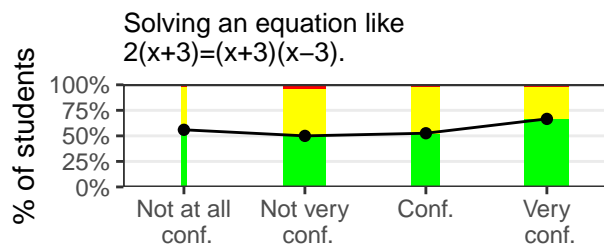
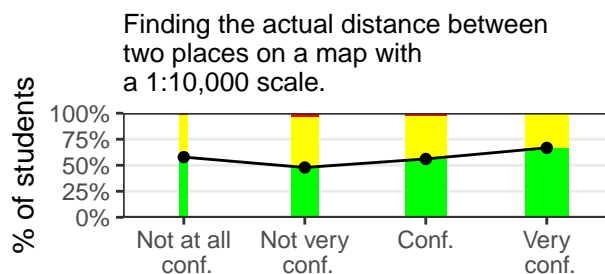
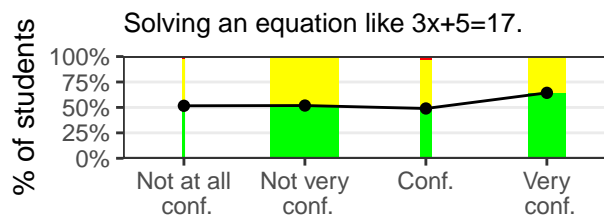
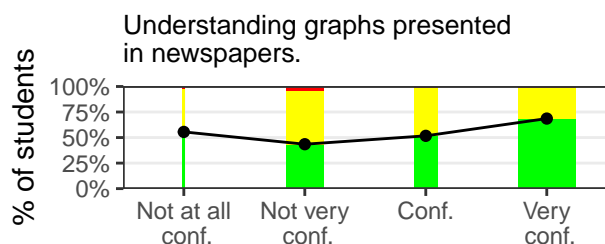
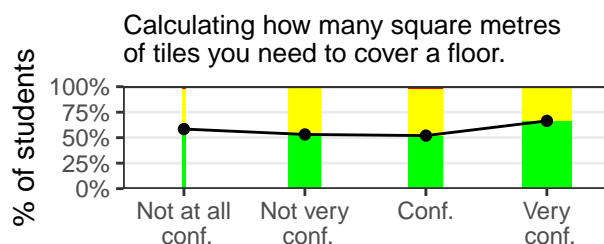
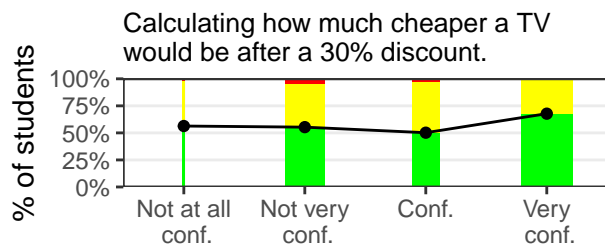
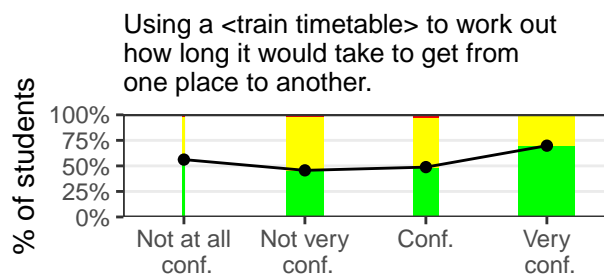
37 Luxembourg



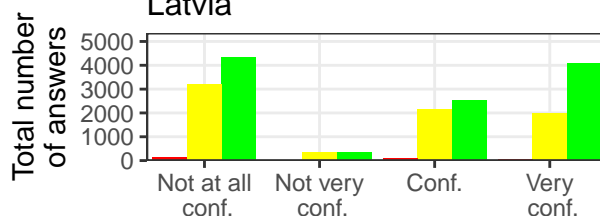
Summary of answers: Luxembourg



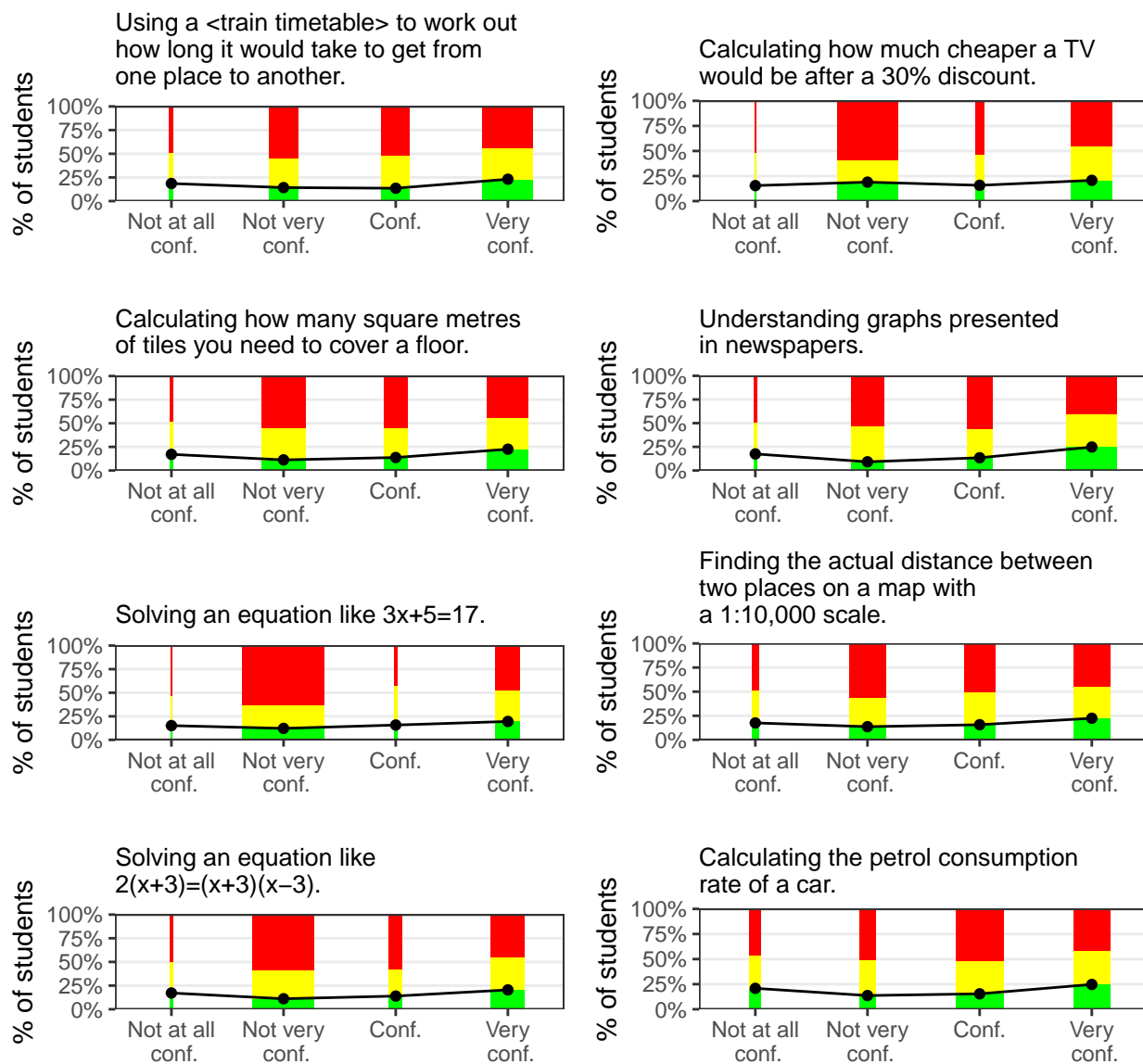
38 Latvia



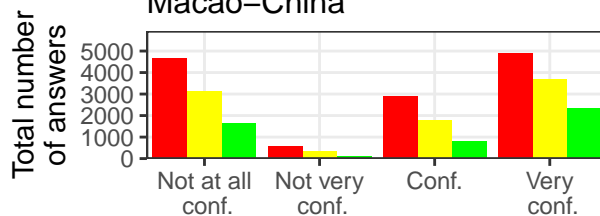
Summary of answers: Latvia



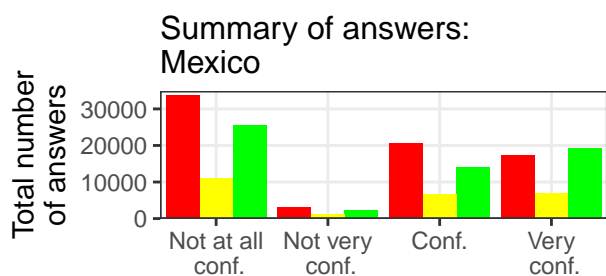
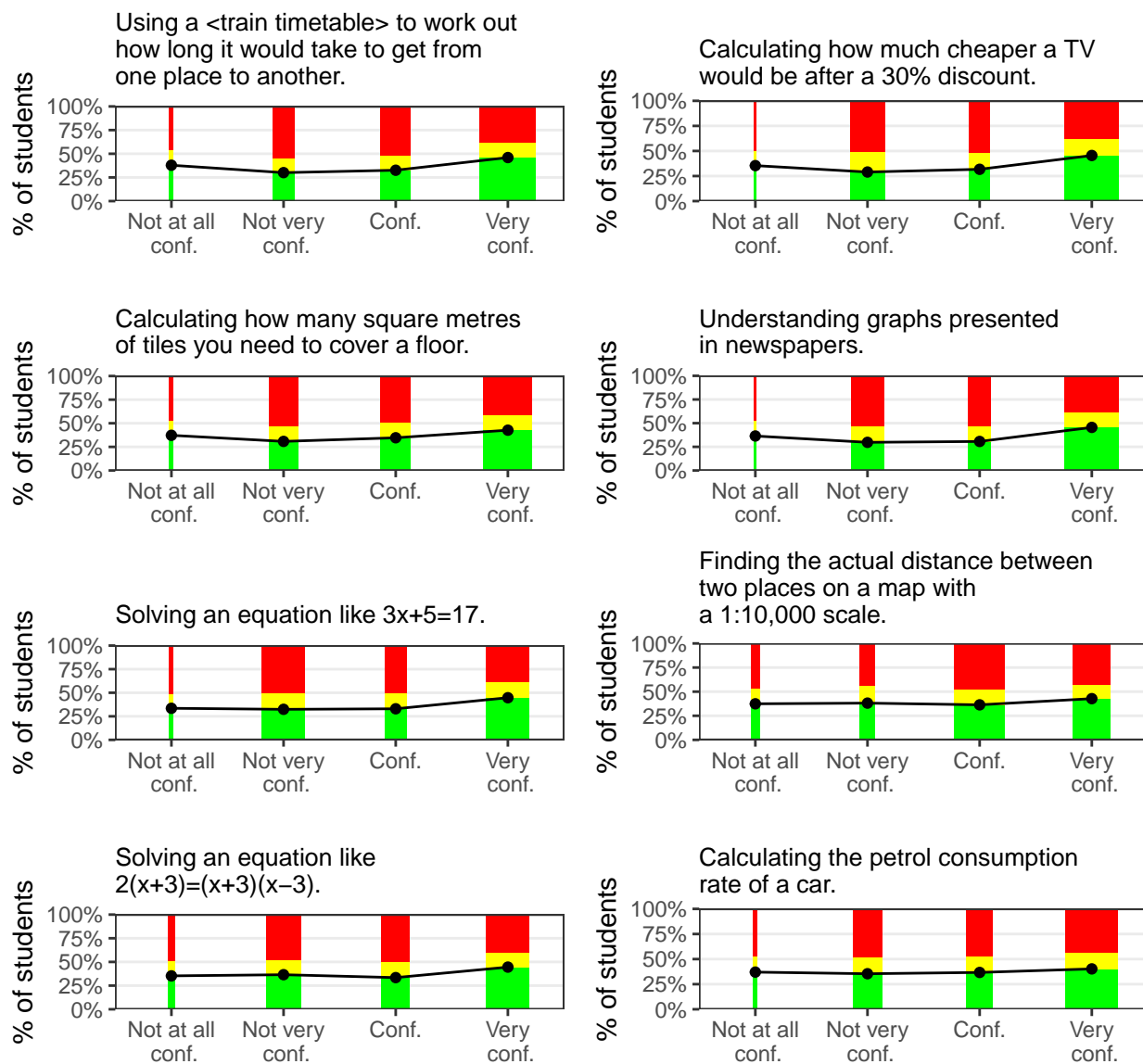
39 Macao-China



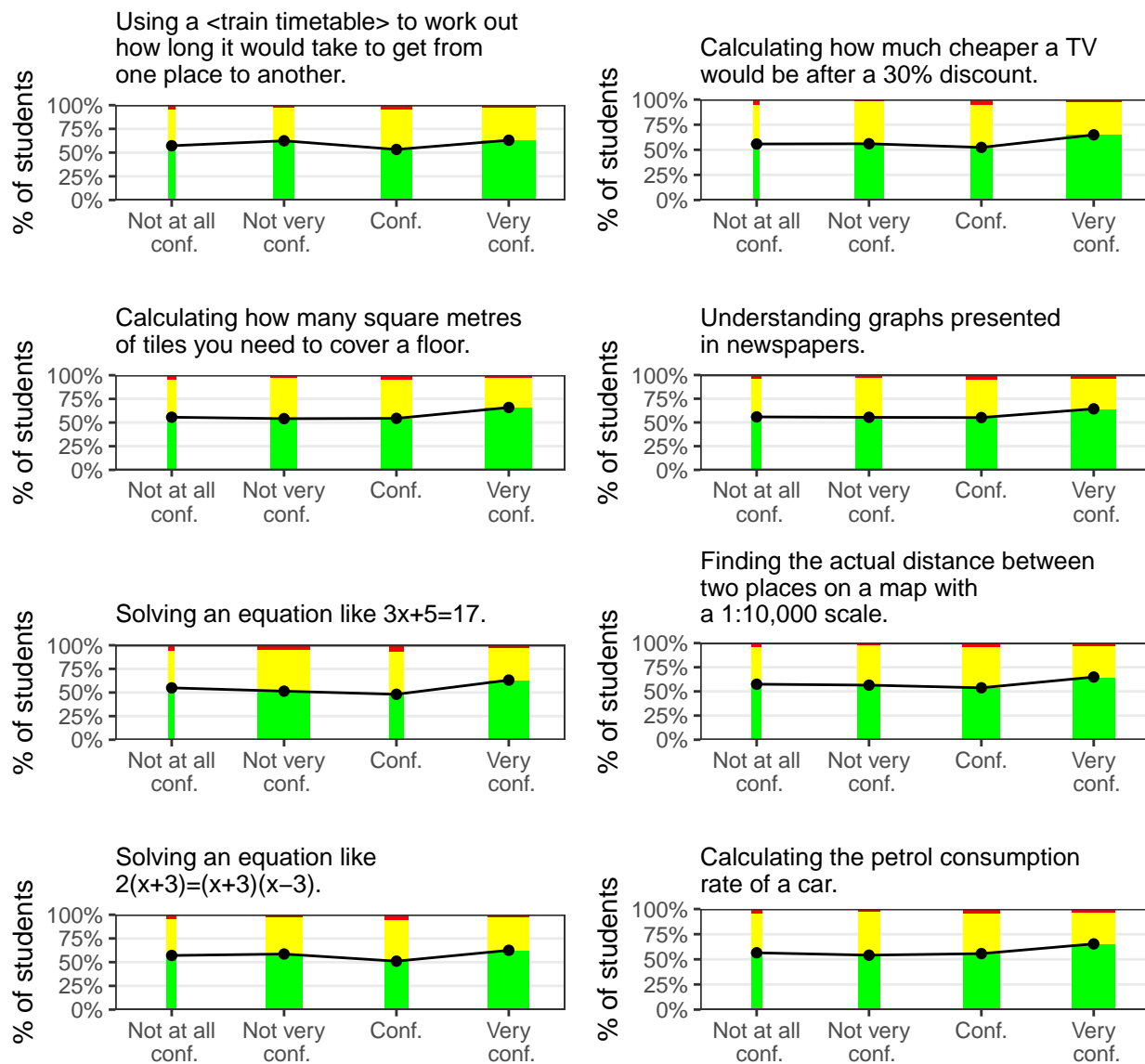
Summary of answers: Macao-China



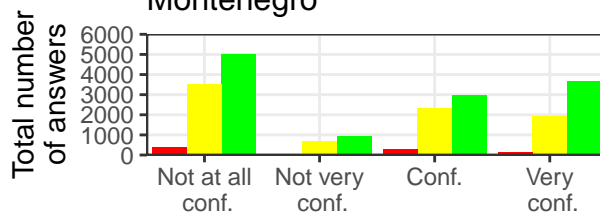
40 Mexico



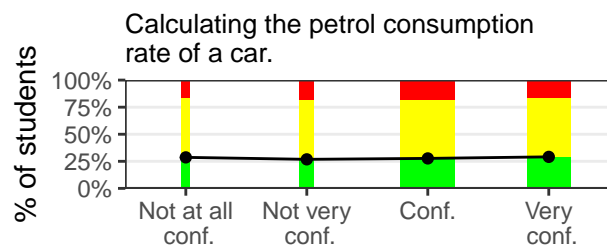
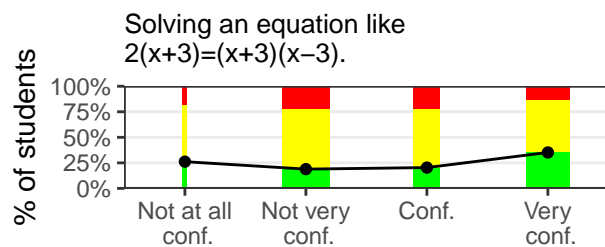
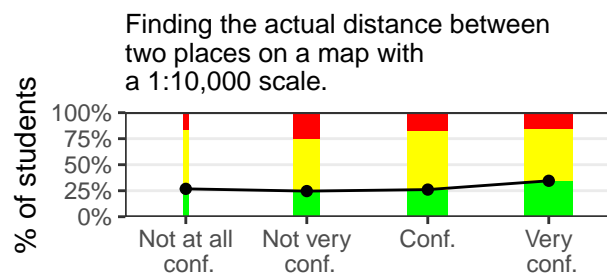
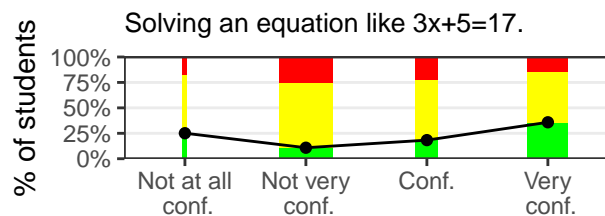
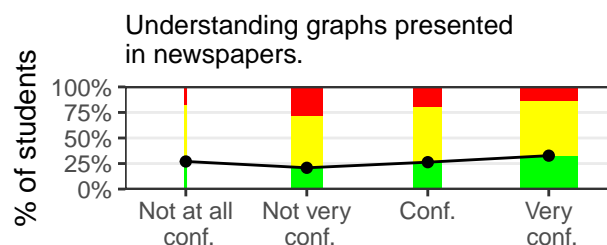
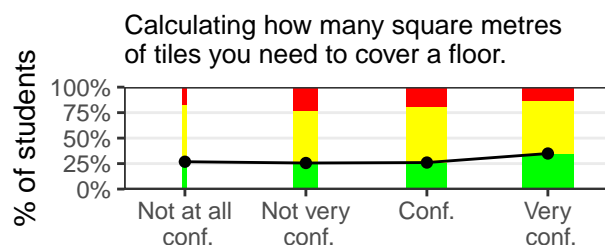
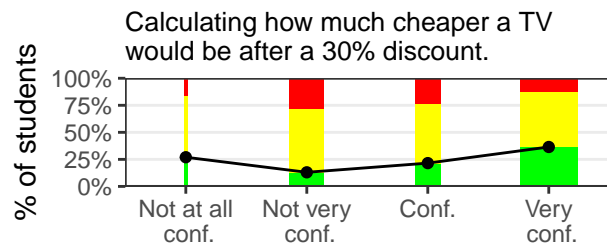
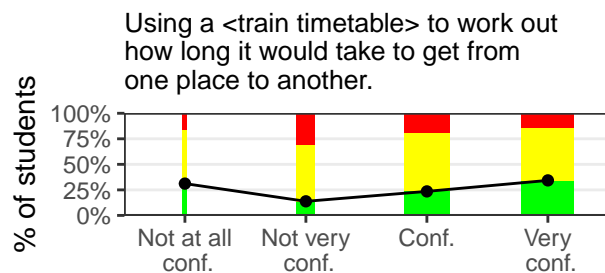
41 Montenegro



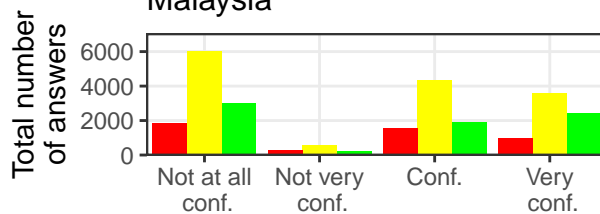
Summary of answers: Montenegro



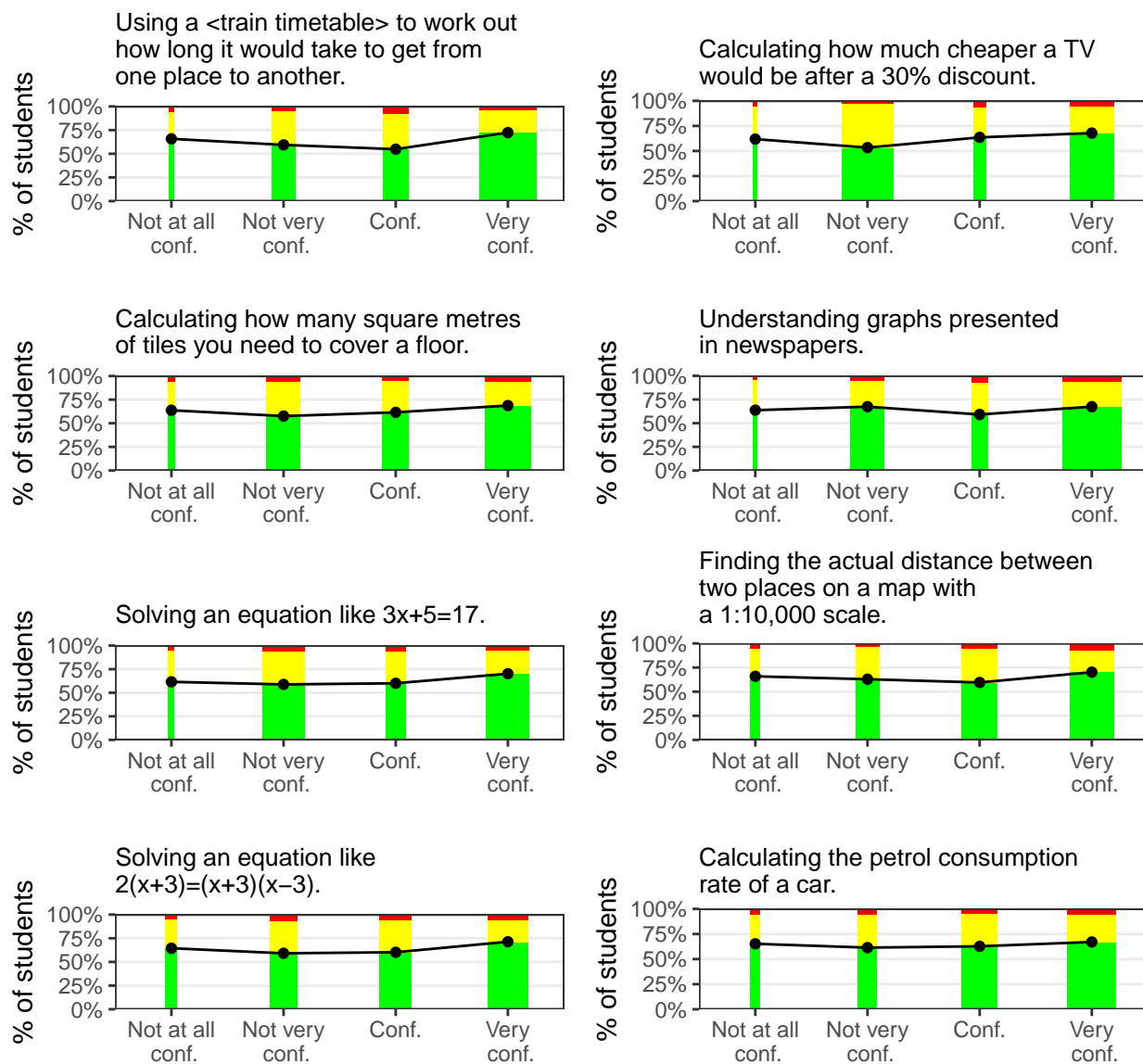
42 Malaysia



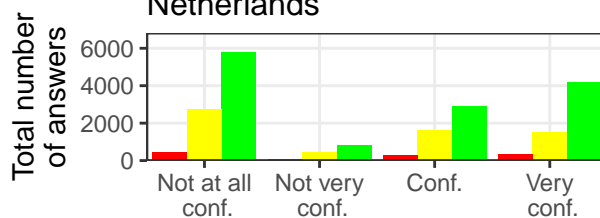
Summary of answers: Malaysia



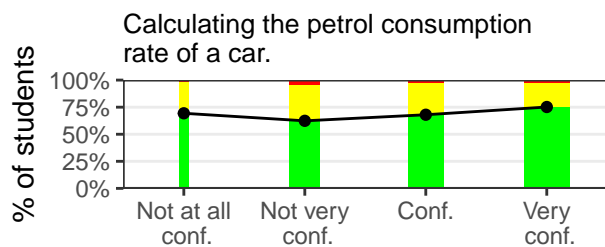
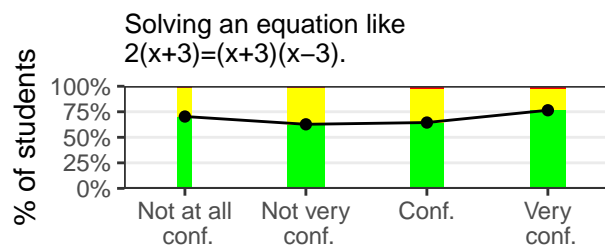
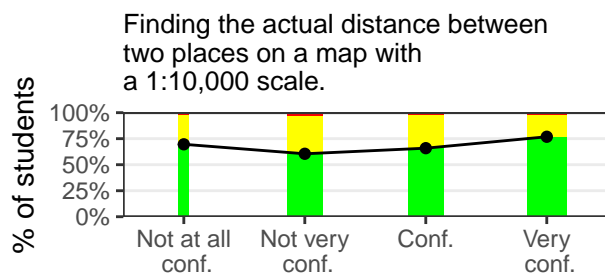
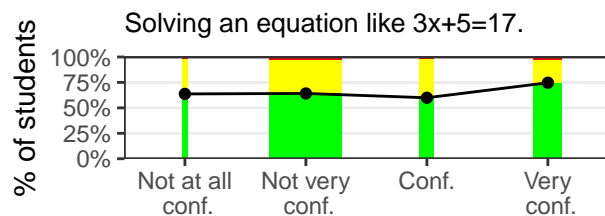
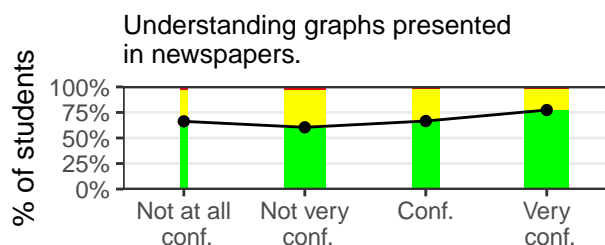
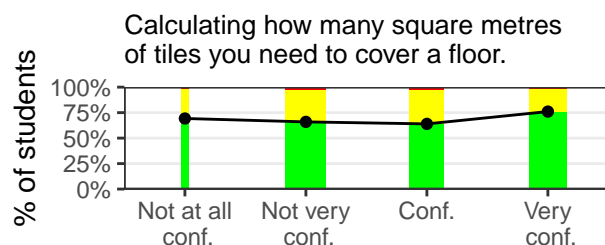
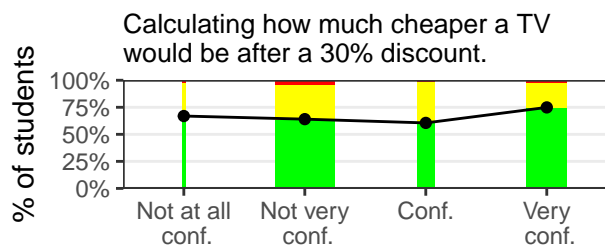
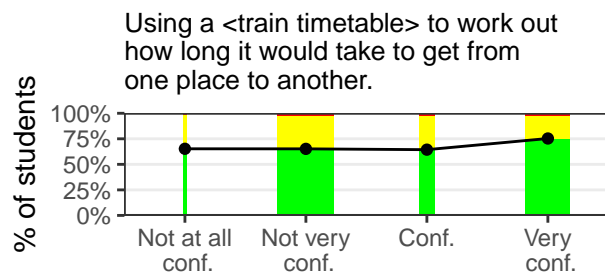
43 Netherlands



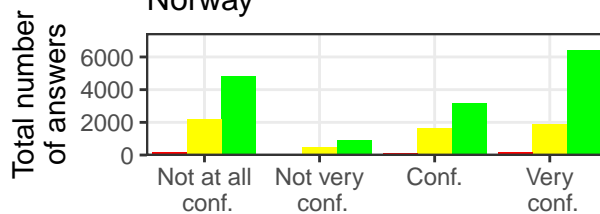
Summary of answers: Netherlands



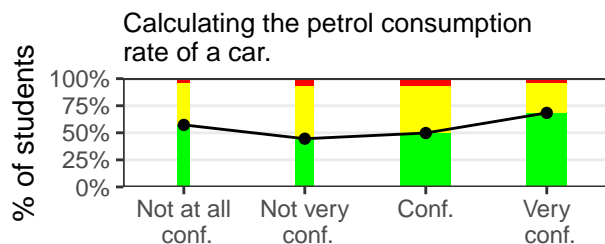
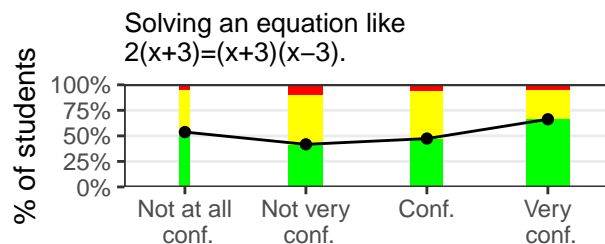
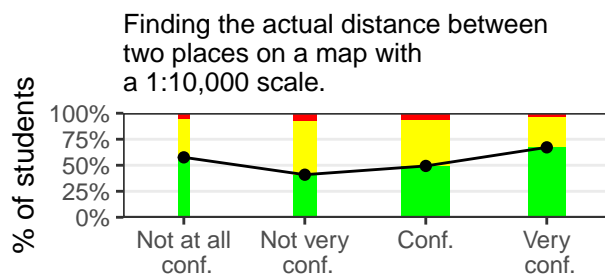
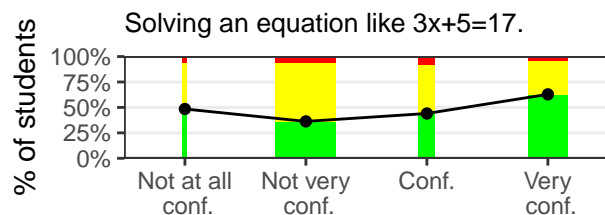
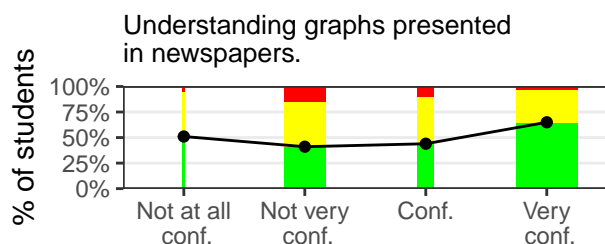
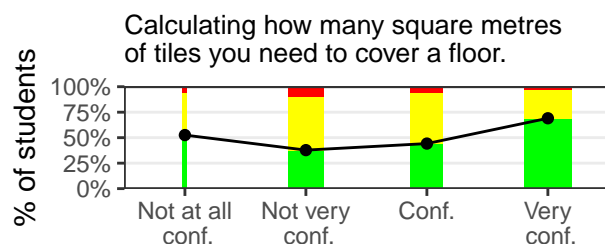
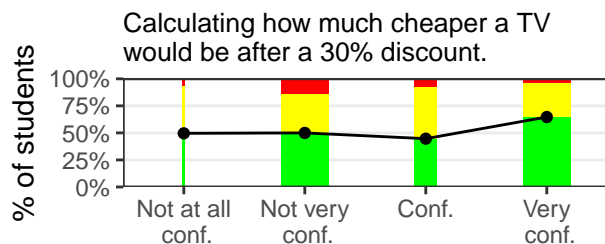
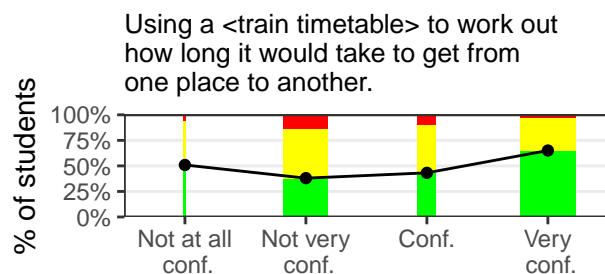
44 Norway



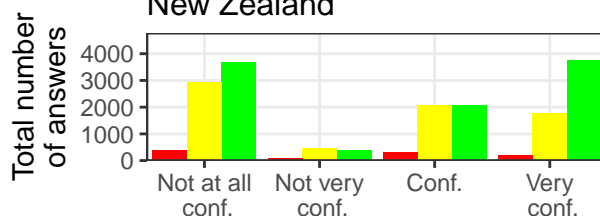
Summary of answers: Norway



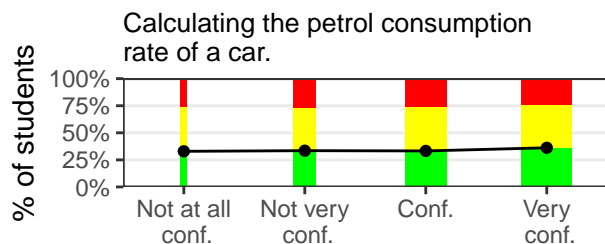
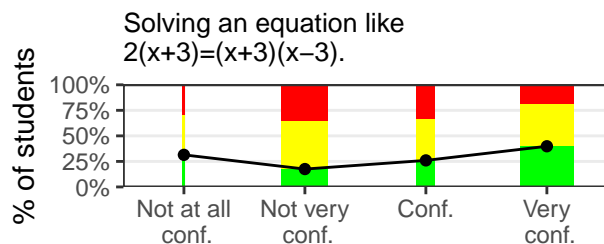
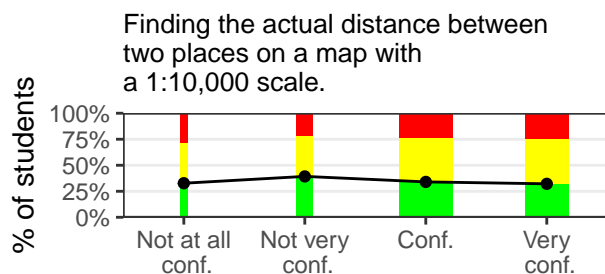
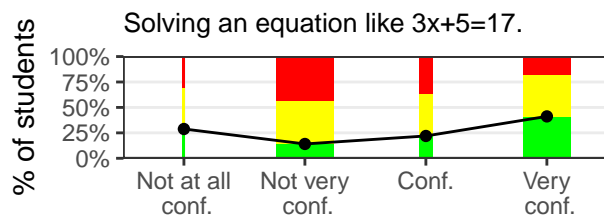
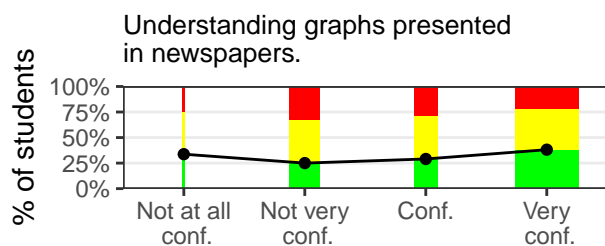
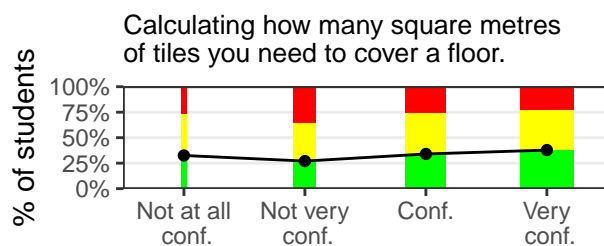
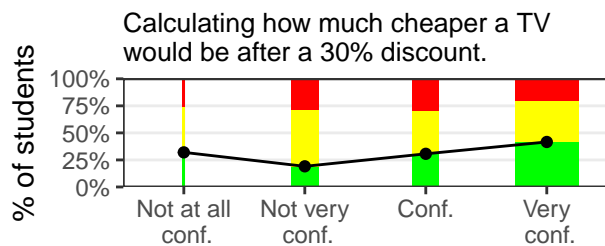
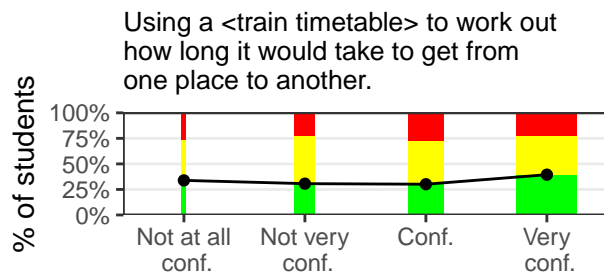
45 New Zealand



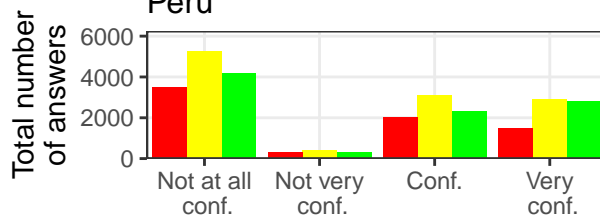
Summary of answers: New Zealand



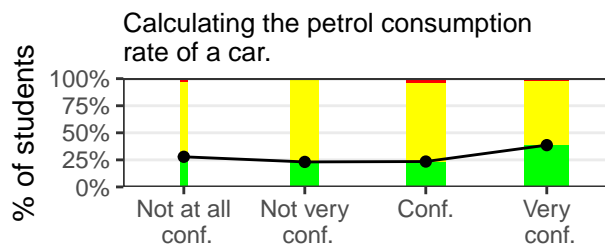
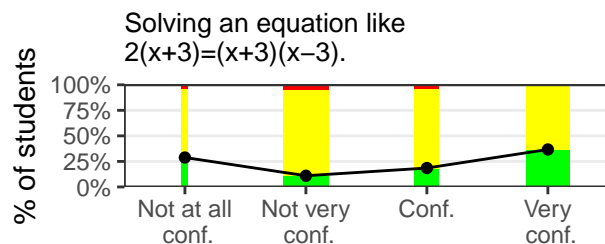
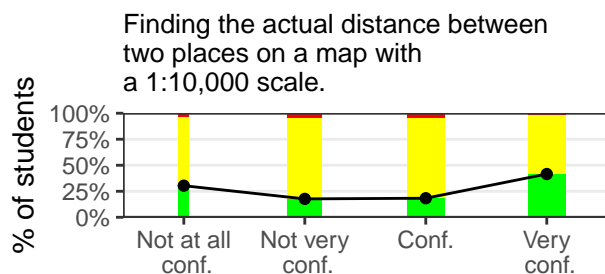
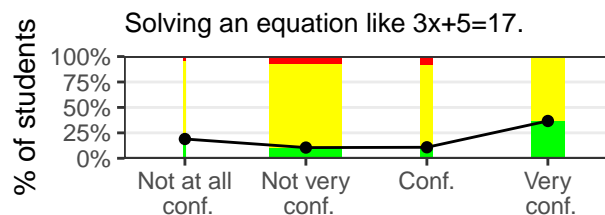
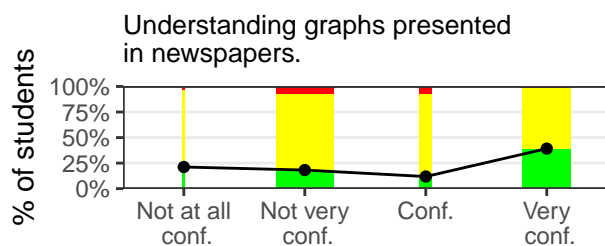
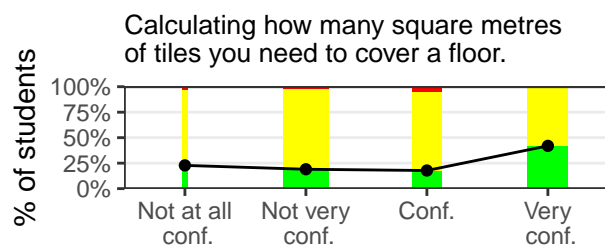
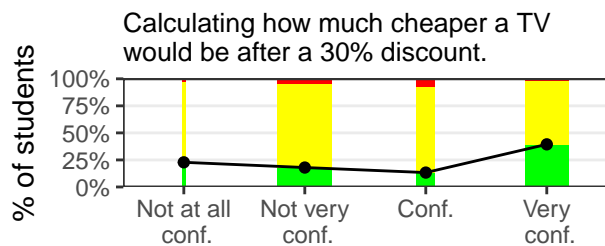
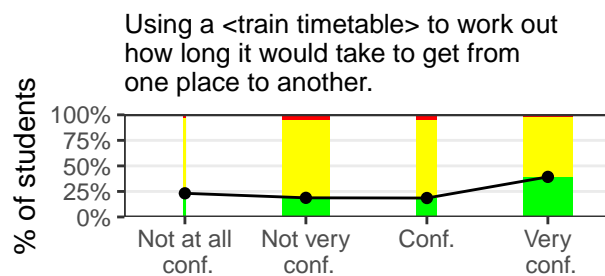
46 Peru



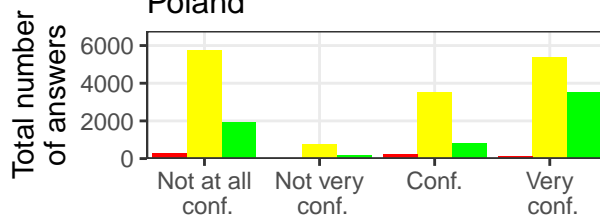
Summary of answers: Peru



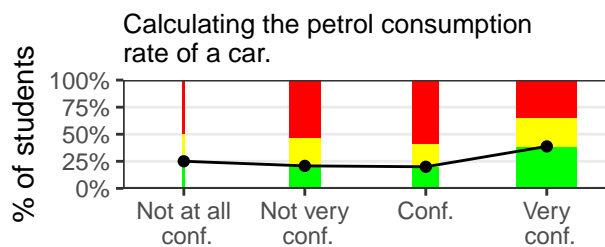
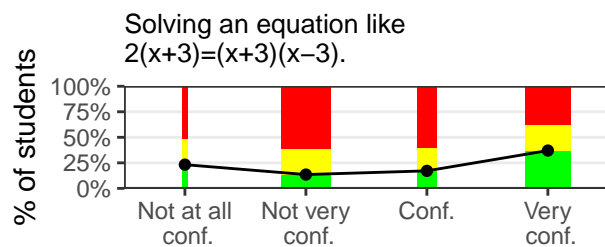
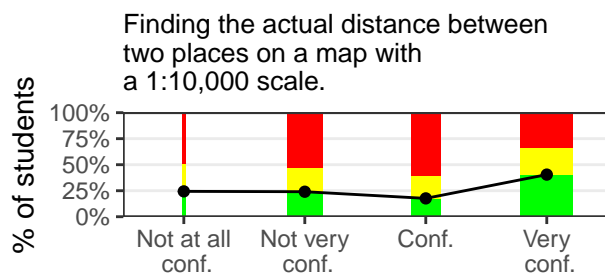
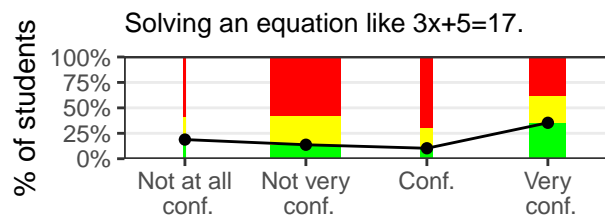
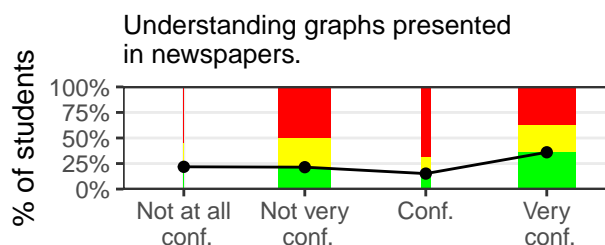
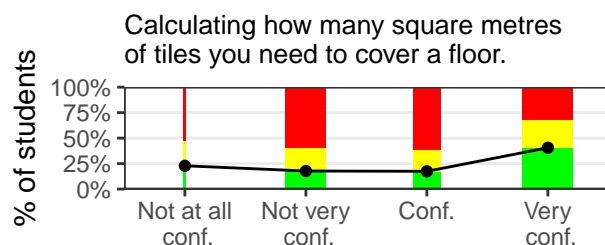
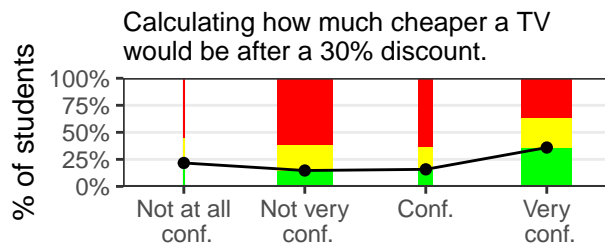
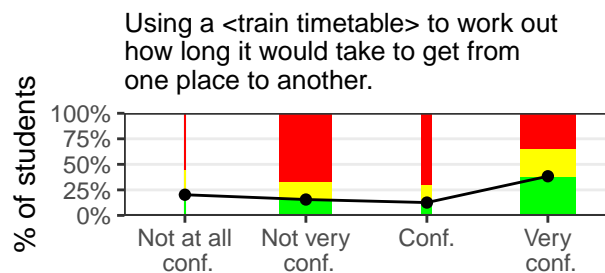
47 Poland



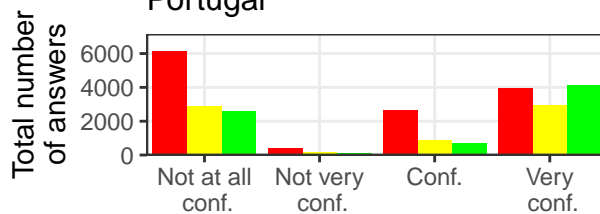
Summary of answers: Poland



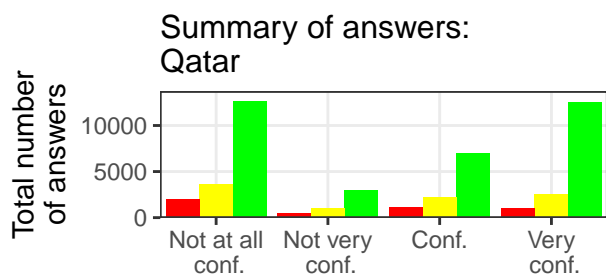
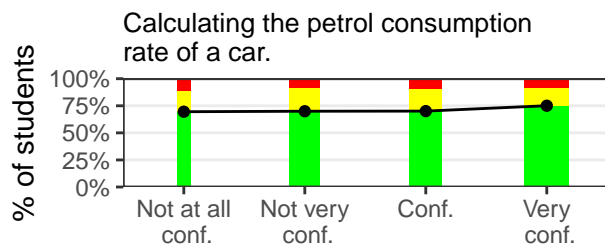
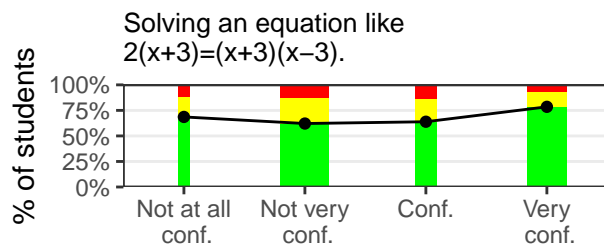
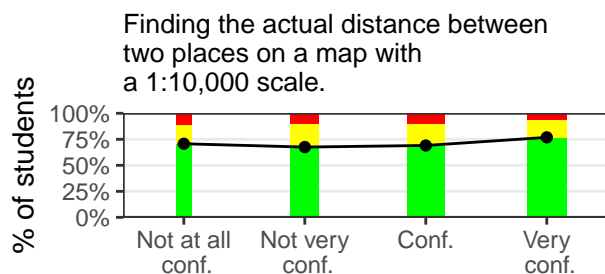
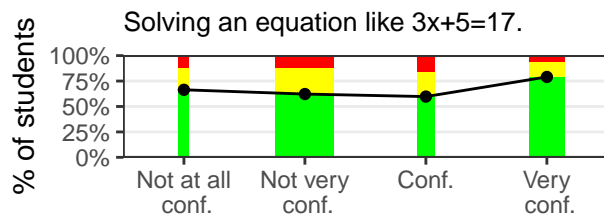
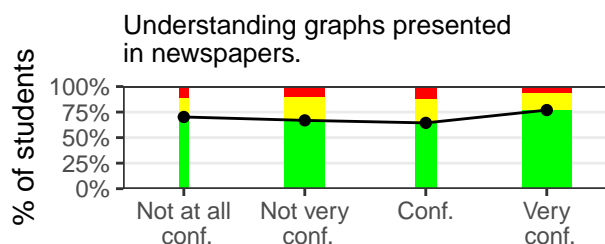
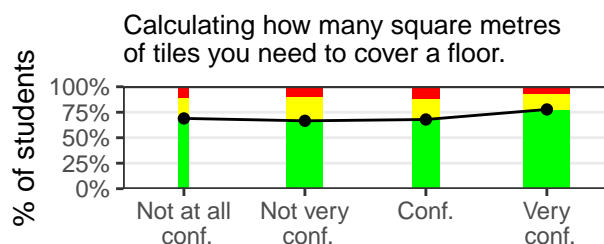
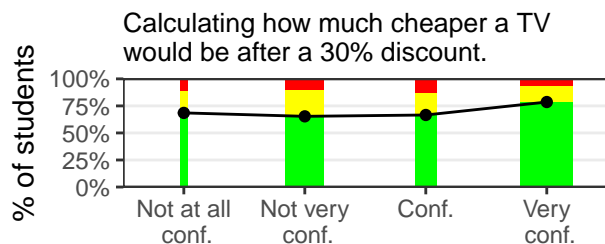
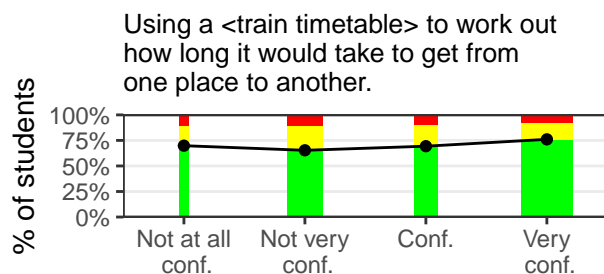
48 Portugal



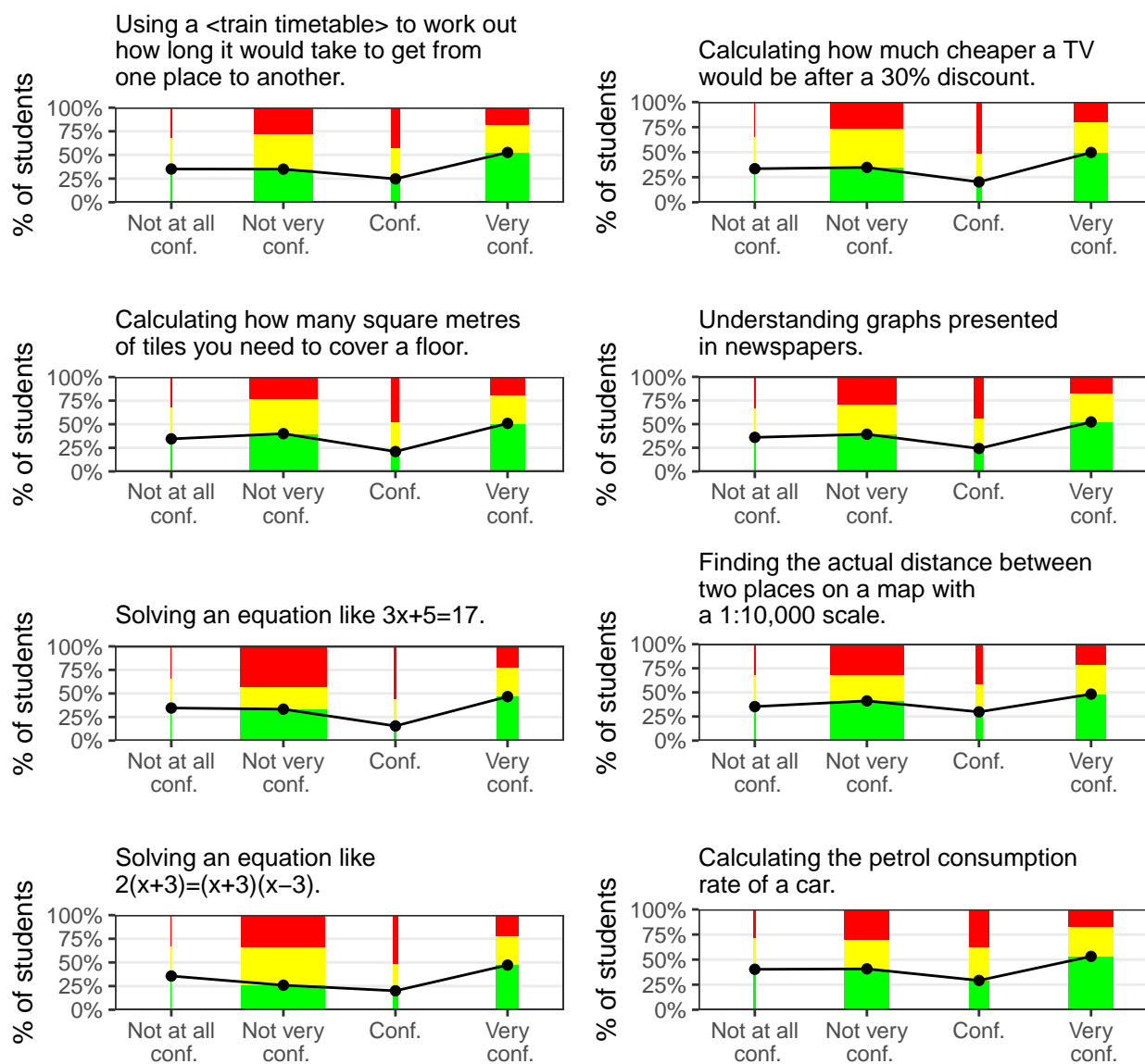
Summary of answers: Portugal



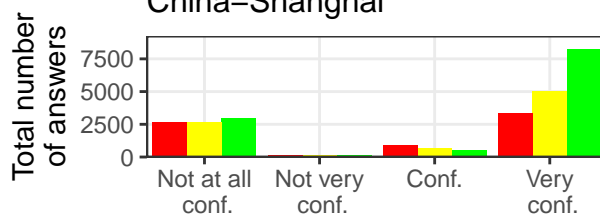
49 Qatar



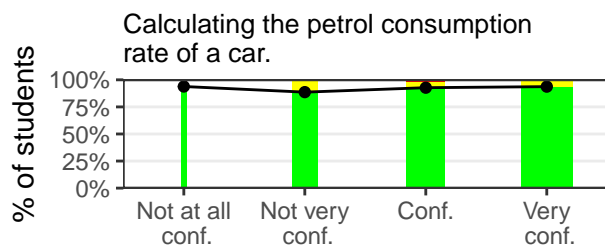
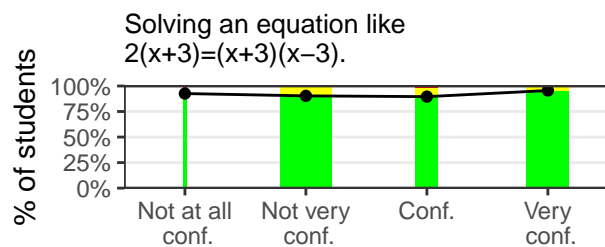
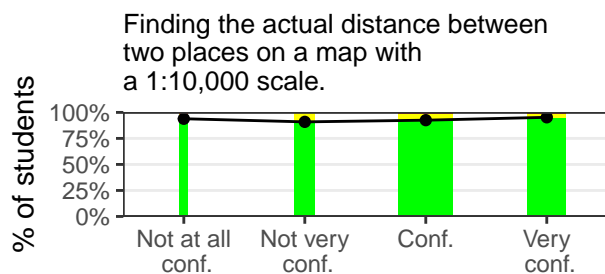
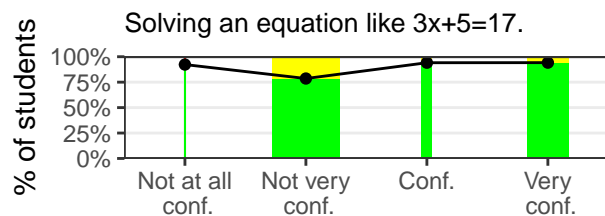
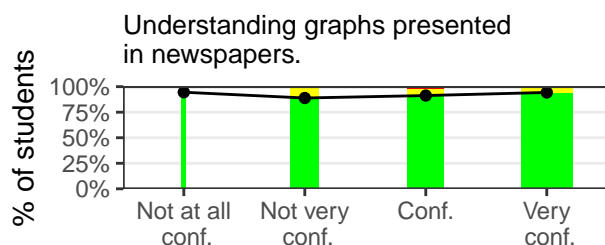
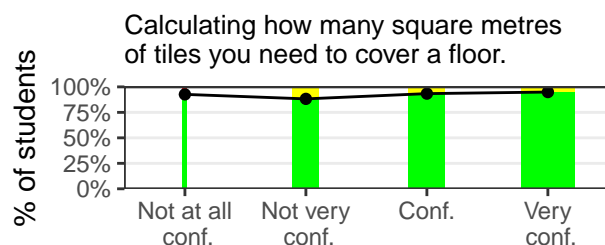
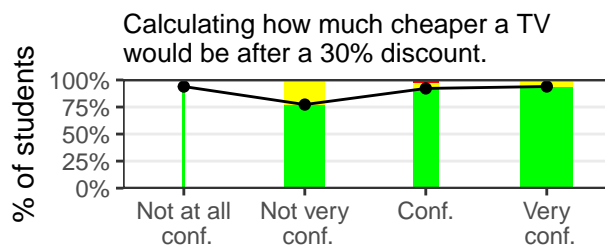
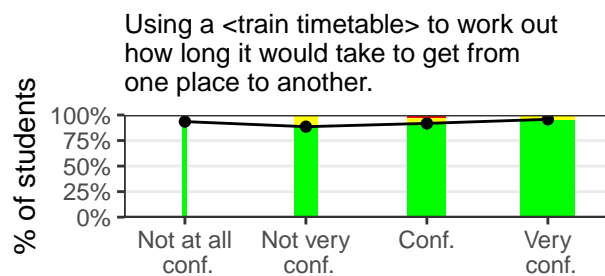
50 China-Shanghai



Summary of answers: China-Shanghai



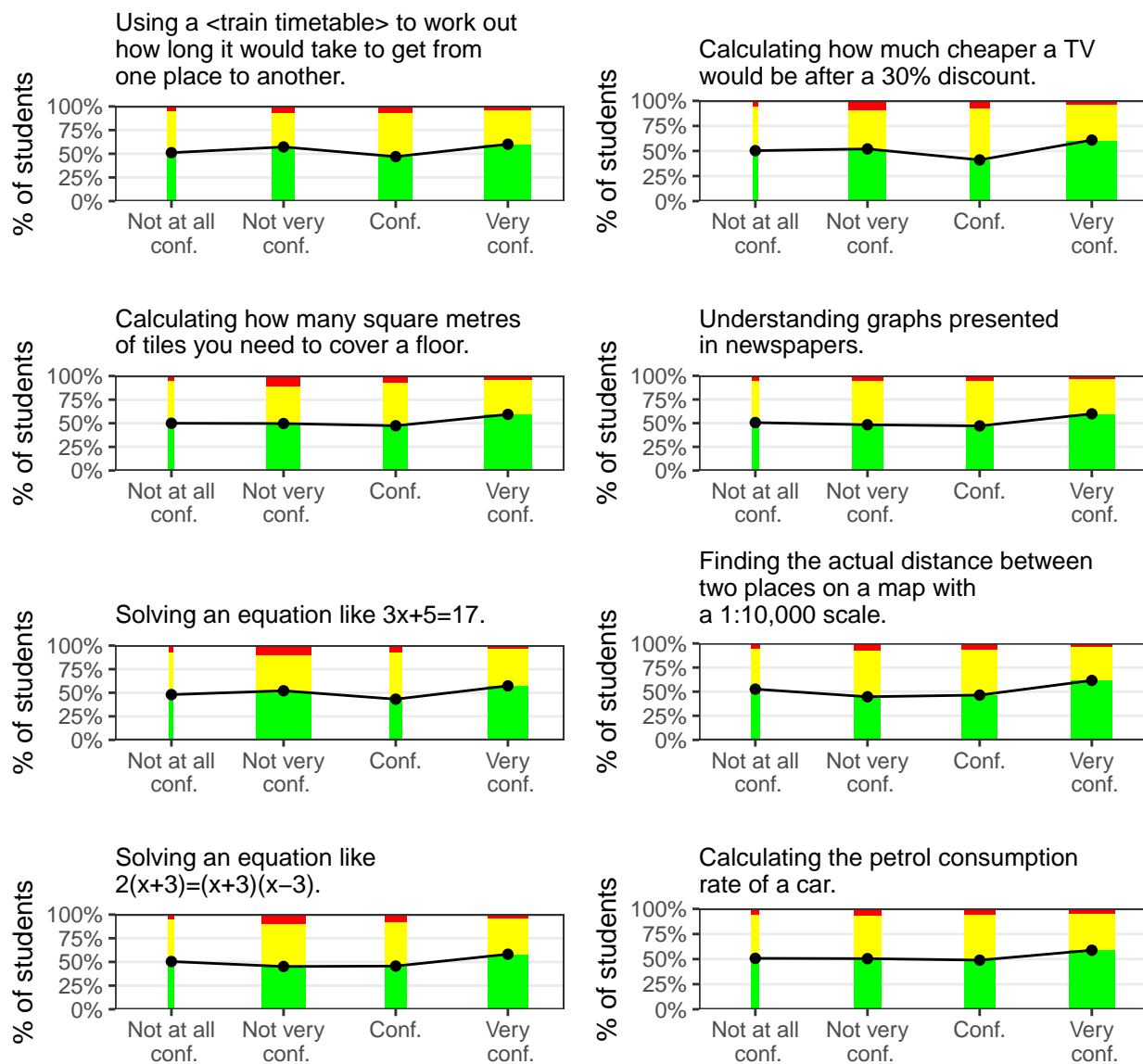
51 Perm(Russian Federation)



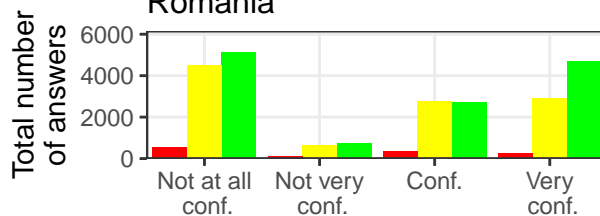
Summary of answers: Perm(Russian Federation)



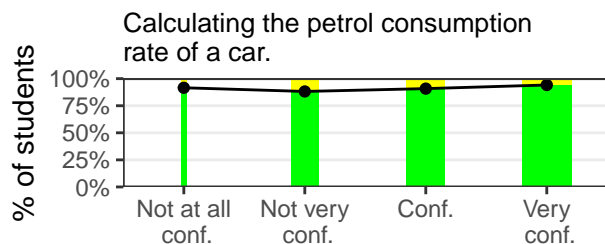
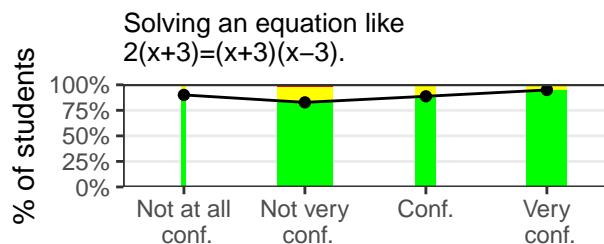
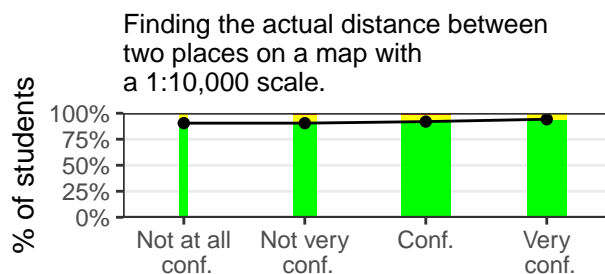
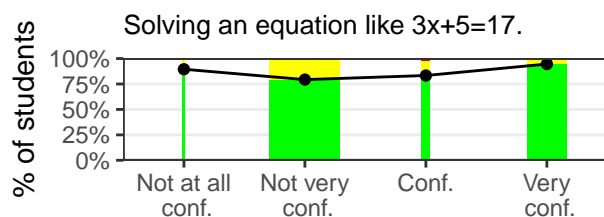
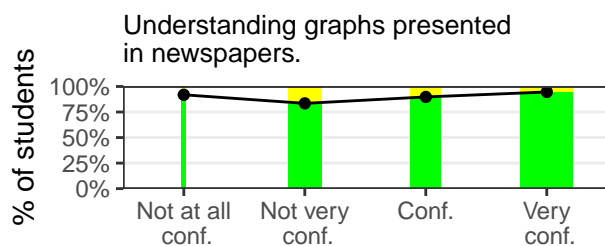
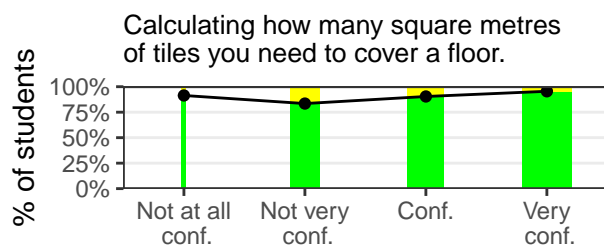
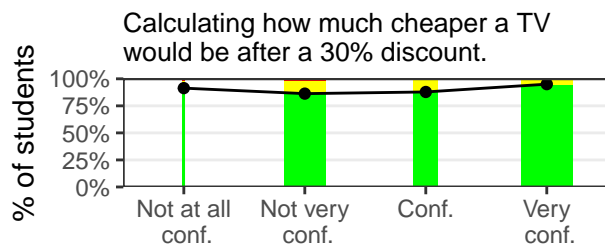
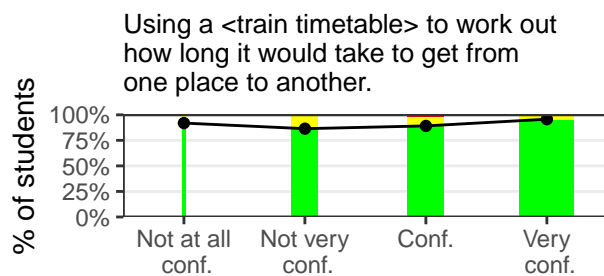
52 Romania



Summary of answers: Romania



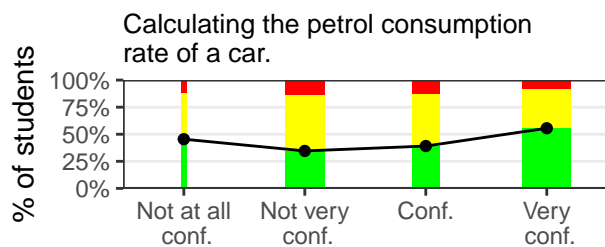
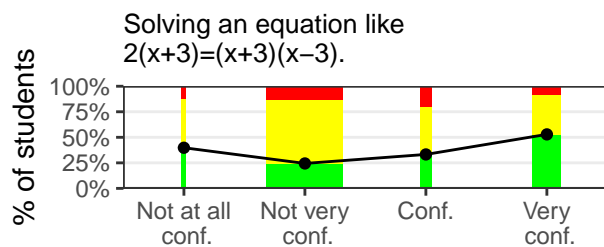
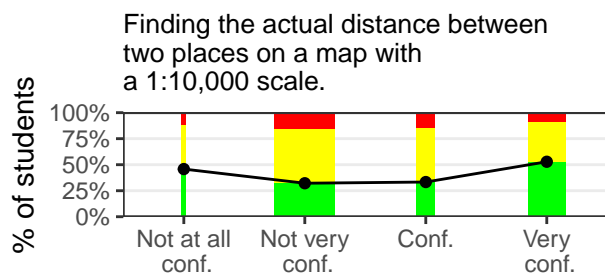
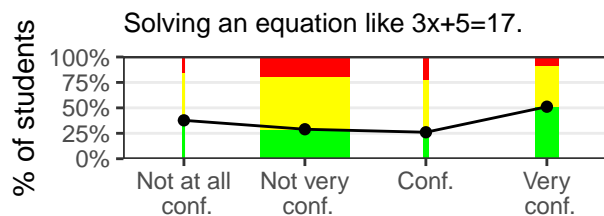
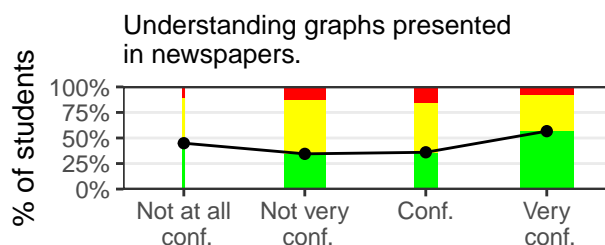
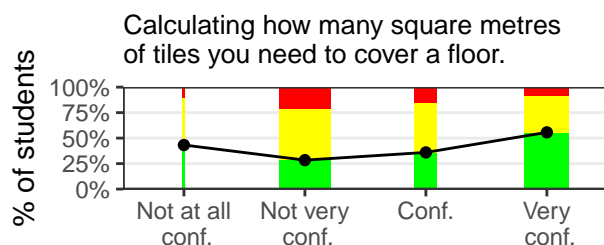
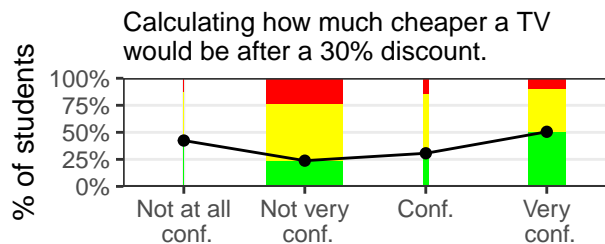
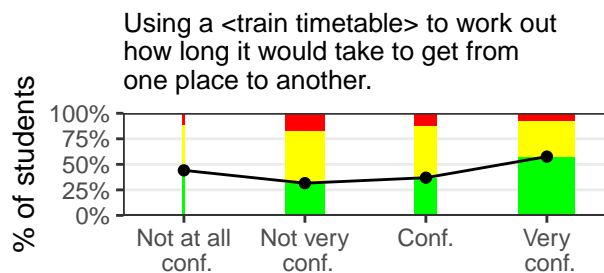
53 Russian Federation



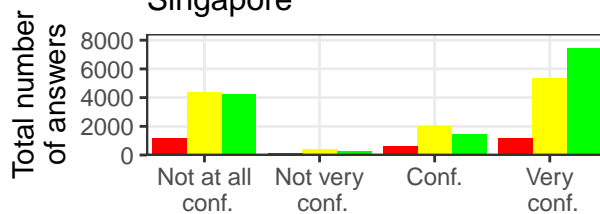
Summary of answers: Russian Federation



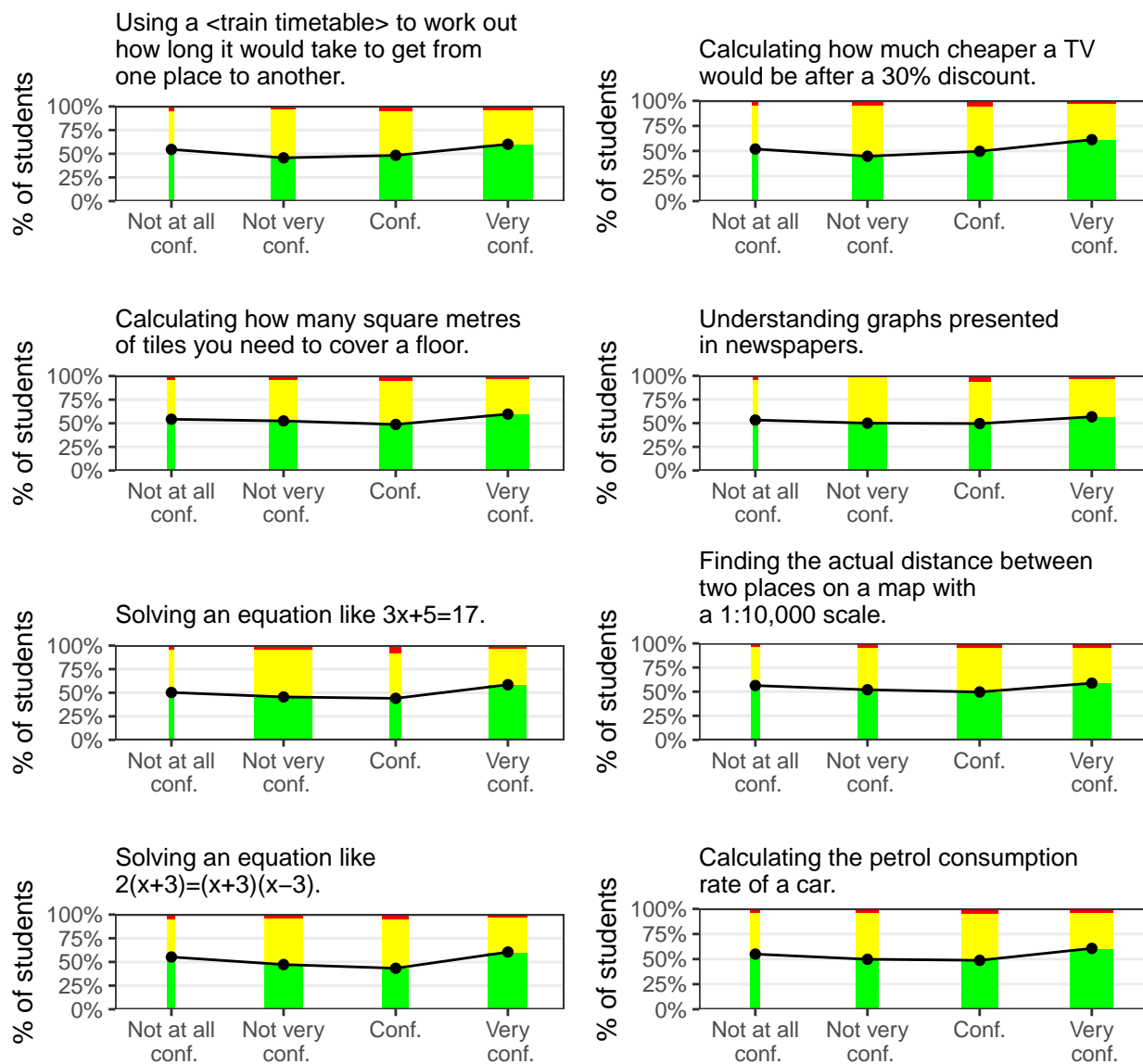
54 Singapore



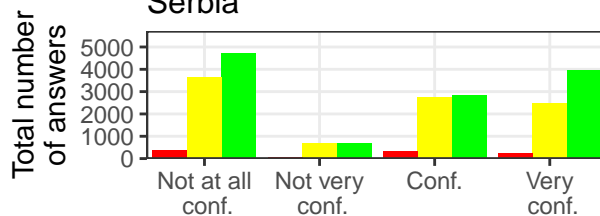
Summary of answers: Singapore



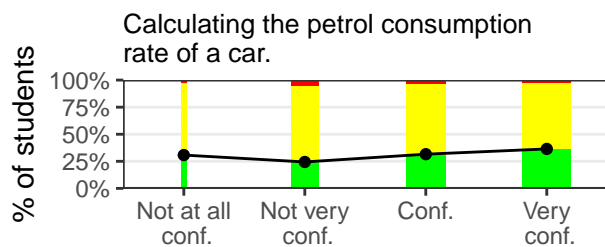
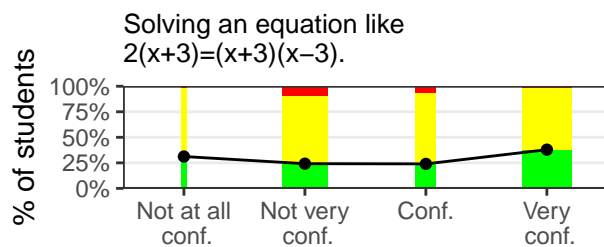
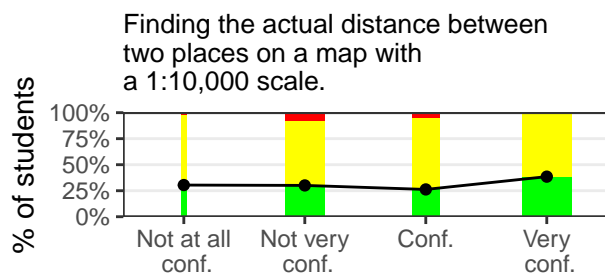
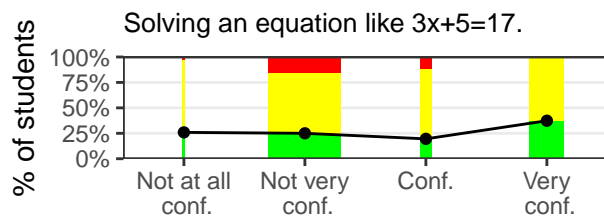
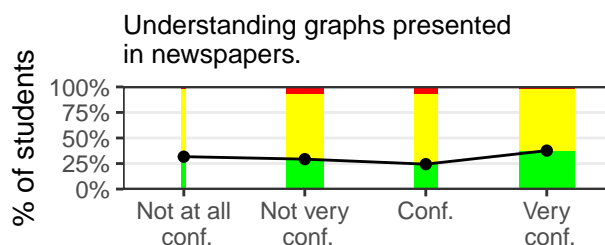
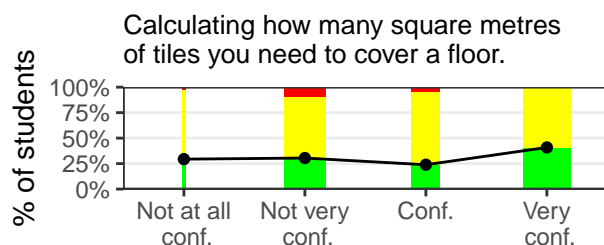
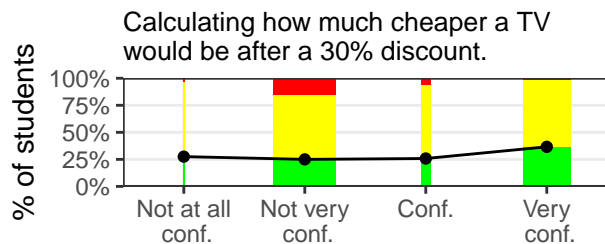
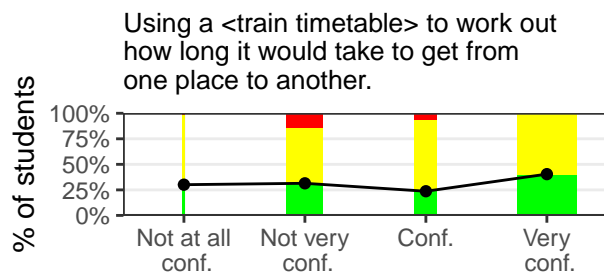
55 Serbia



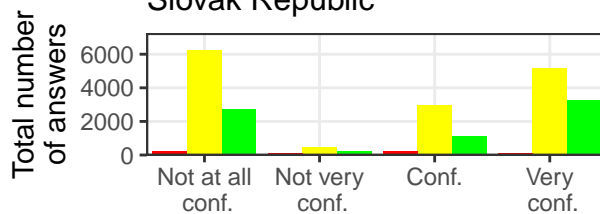
Summary of answers: Serbia



56 Slovak Republic

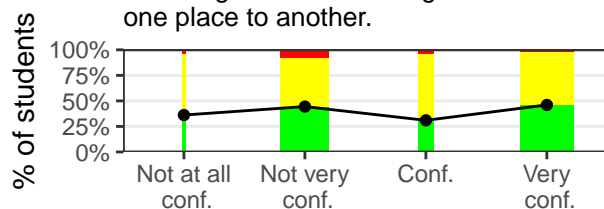


Summary of answers: Slovak Republic



57 Slovenia

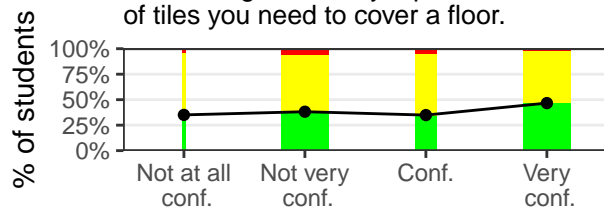
Using a <train timetable> to work out how long it would take to get from one place to another.



Calculating how much cheaper a TV would be after a 30% discount.



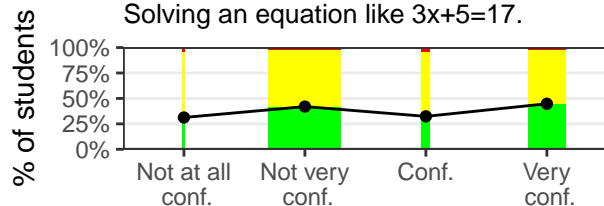
Calculating how many square metres of tiles you need to cover a floor.



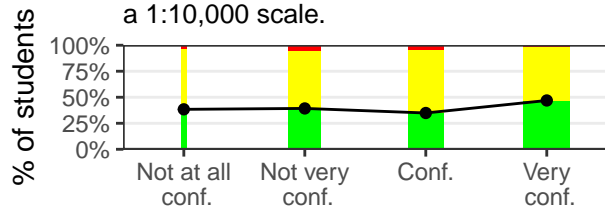
Understanding graphs presented in newspapers.



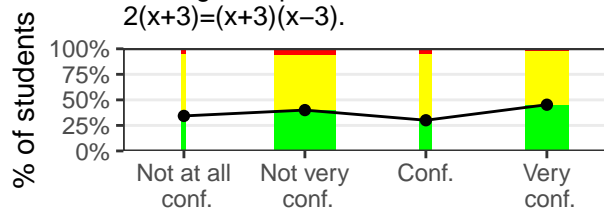
Solving an equation like $3x+5=17$.



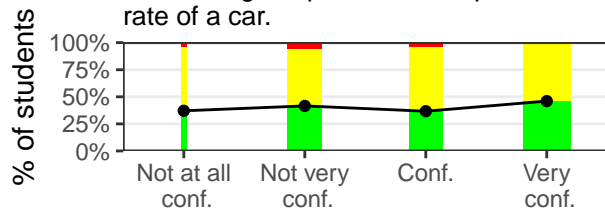
Finding the actual distance between two places on a map with a 1:10,000 scale.



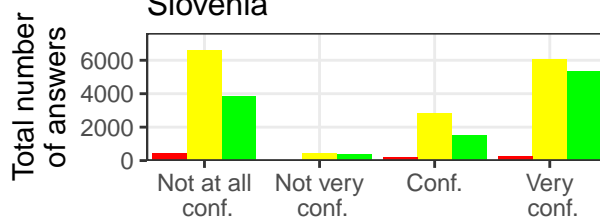
Solving an equation like $2(x+3)=(x+3)(x-3)$.



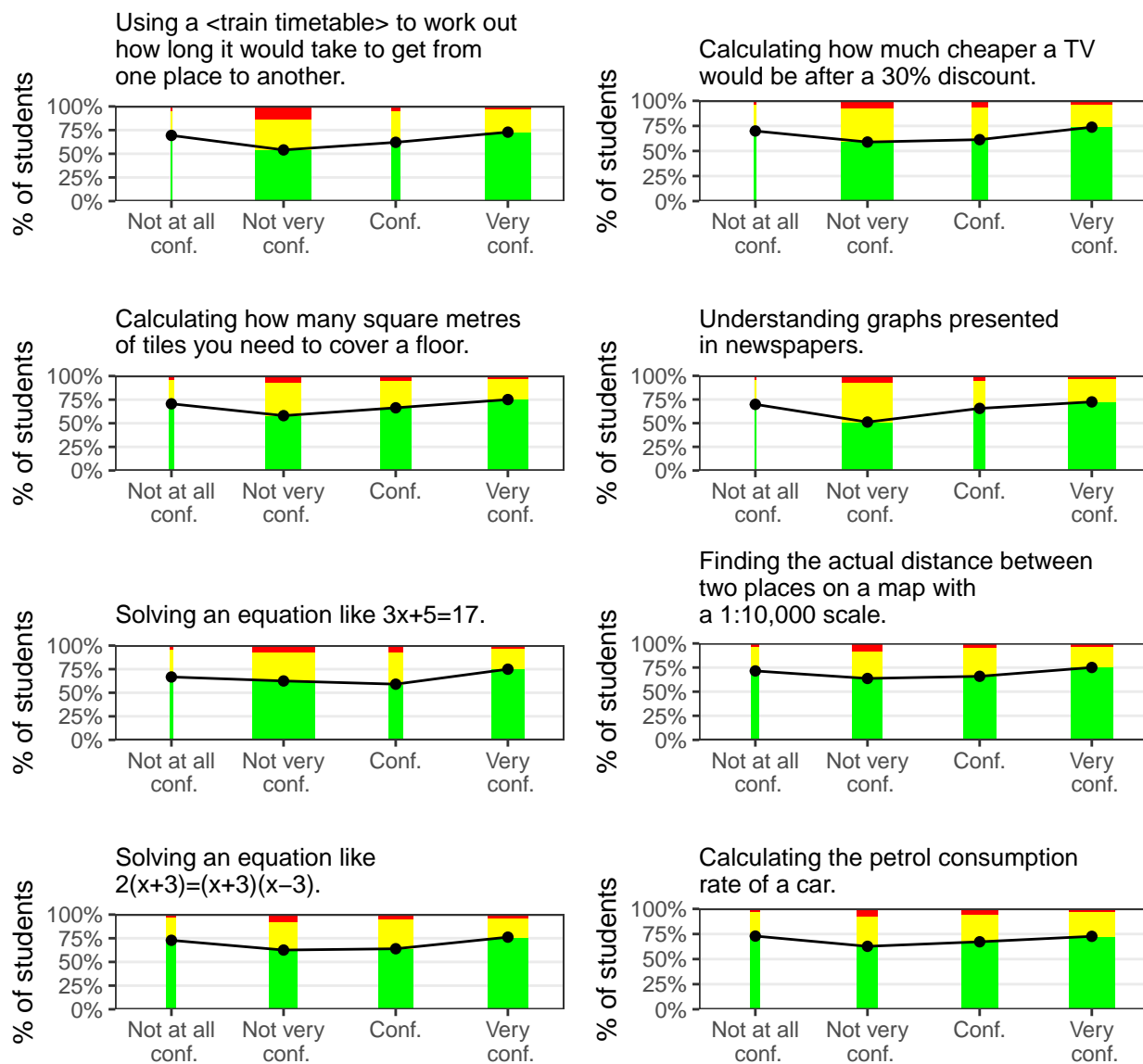
Calculating the petrol consumption rate of a car.



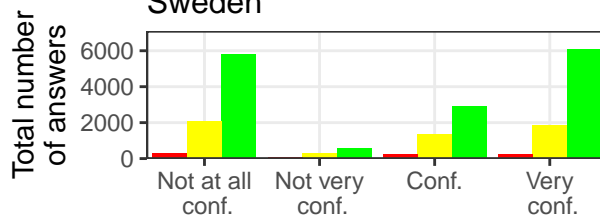
Summary of answers: Slovenia



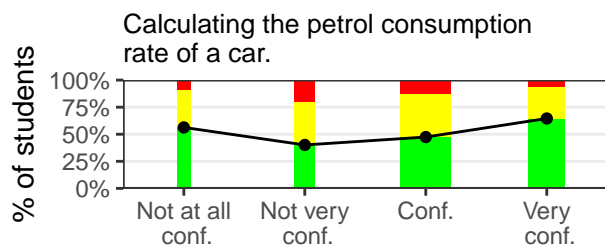
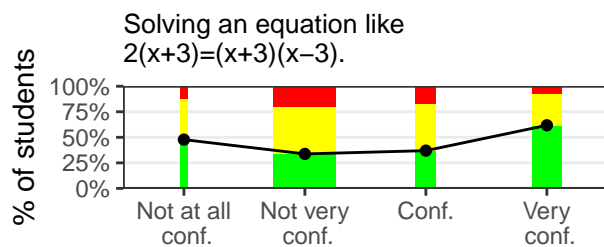
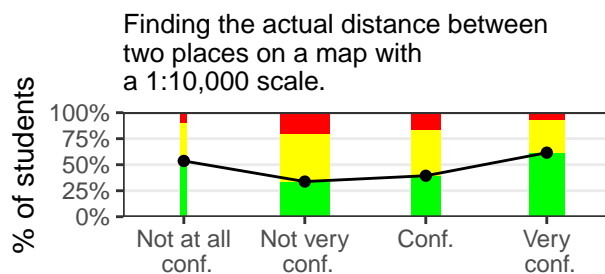
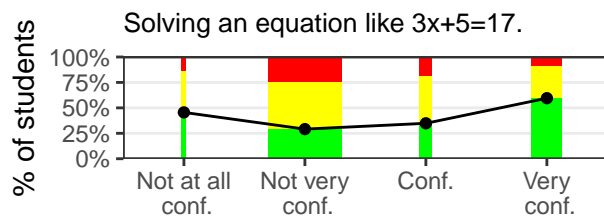
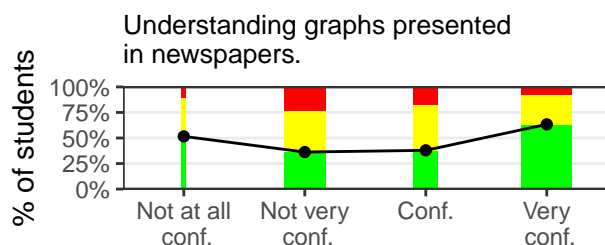
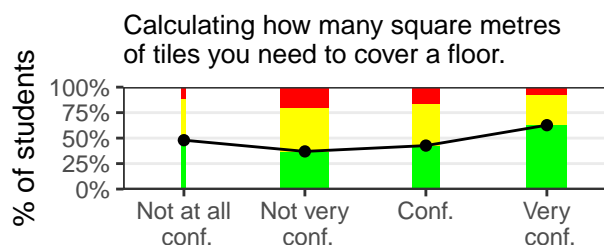
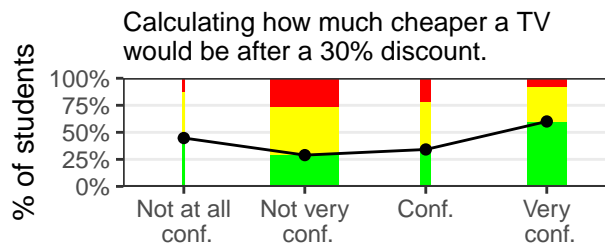
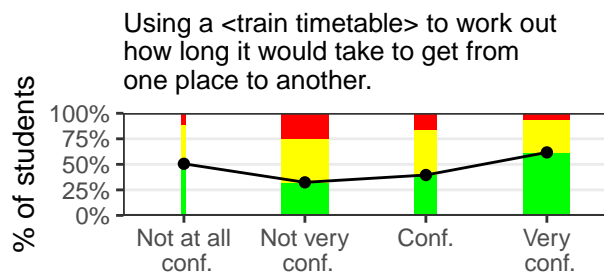
58 Sweden



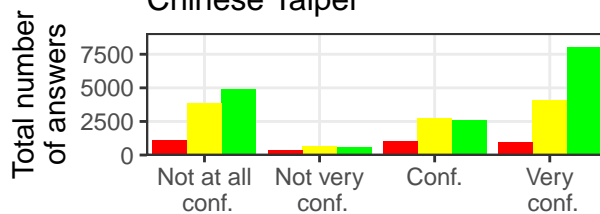
Summary of answers: Sweden



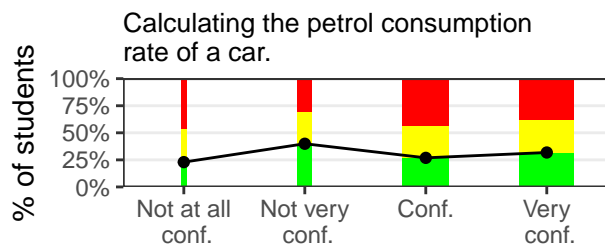
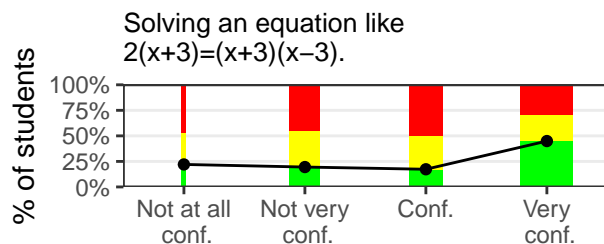
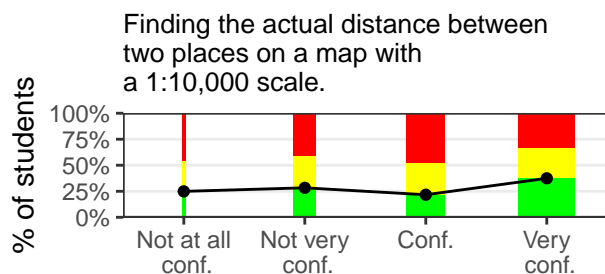
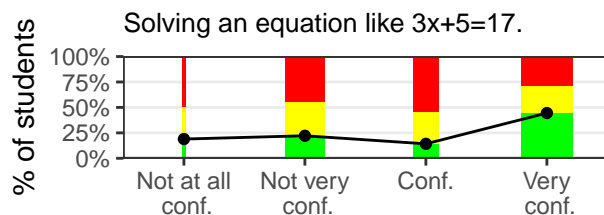
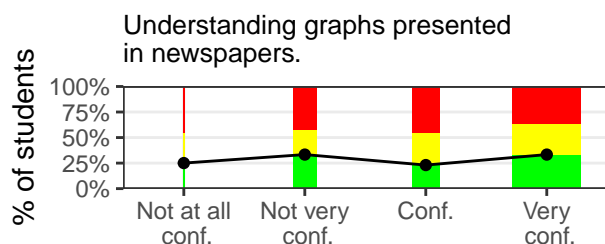
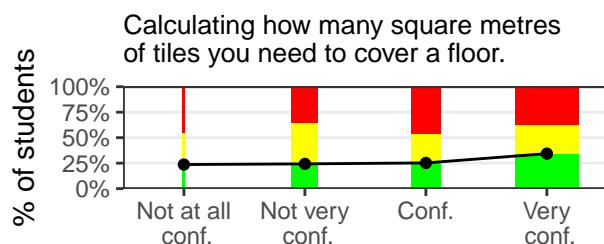
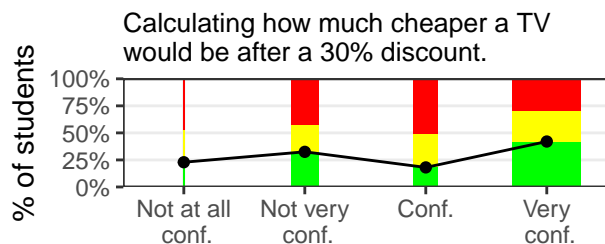
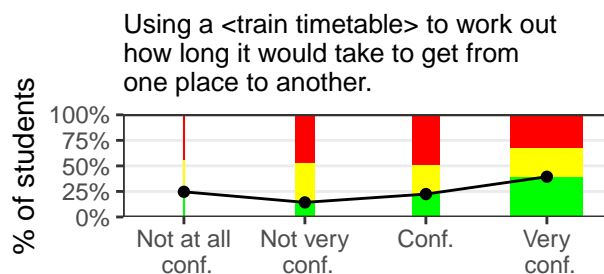
59 Chinese Taipei



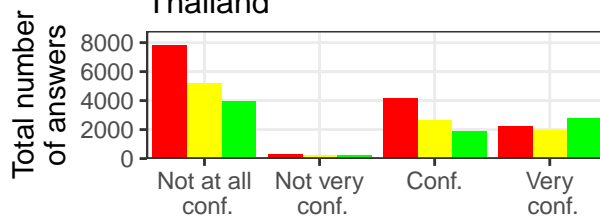
Summary of answers: Chinese Taipei



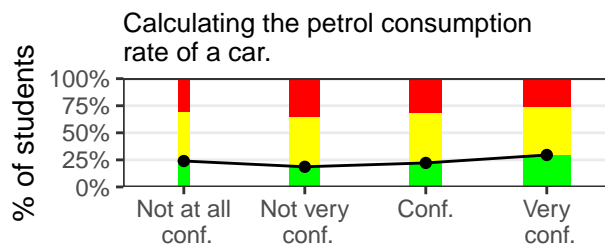
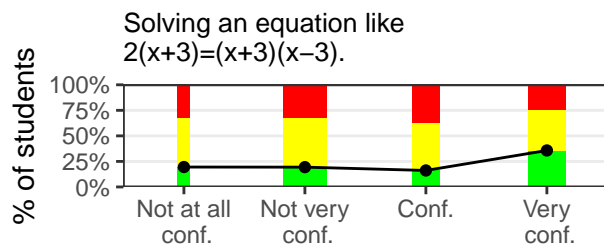
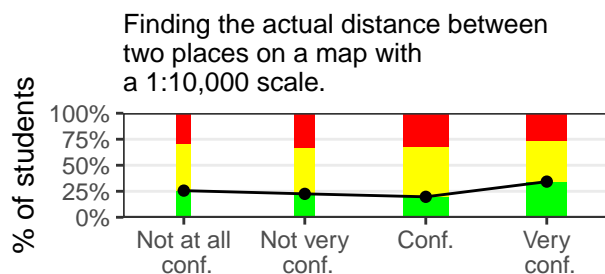
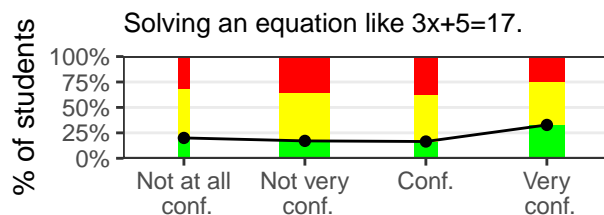
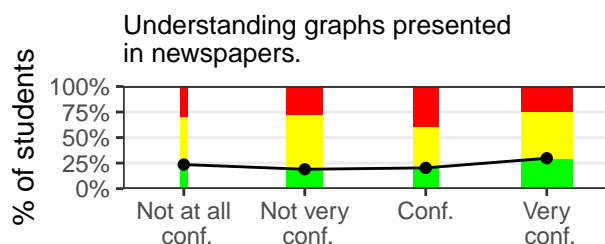
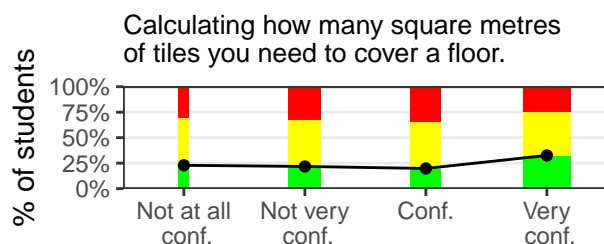
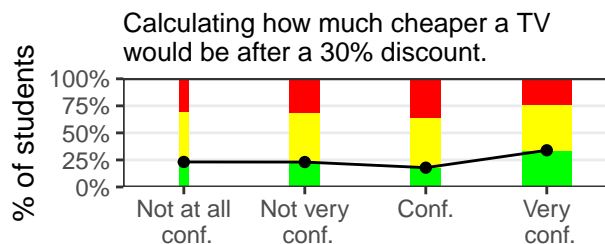
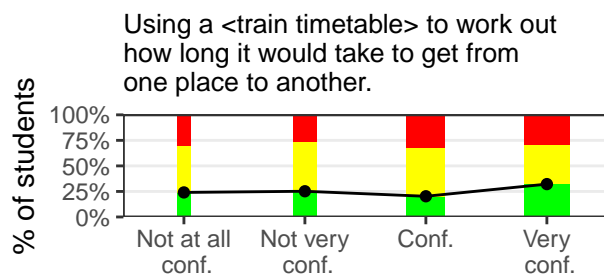
60 Thailand



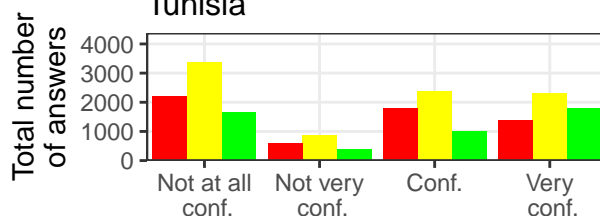
Summary of answers: Thailand



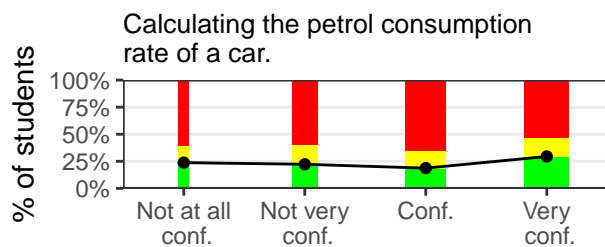
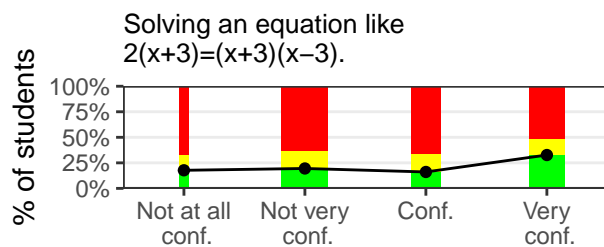
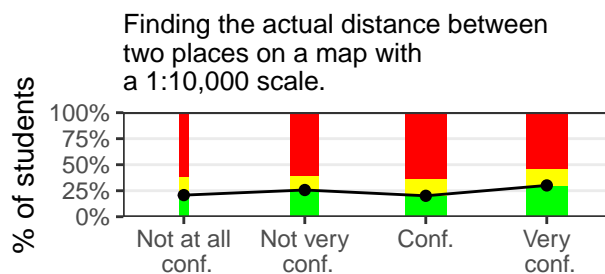
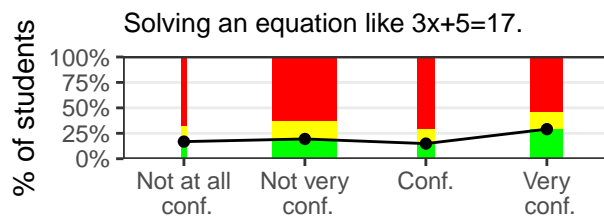
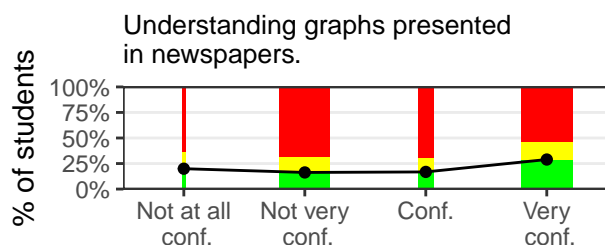
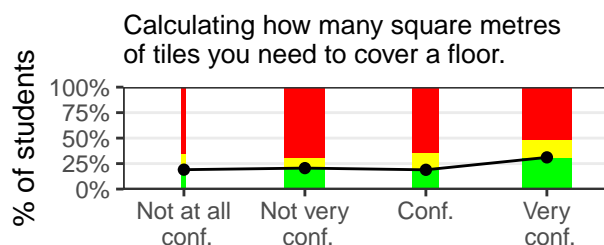
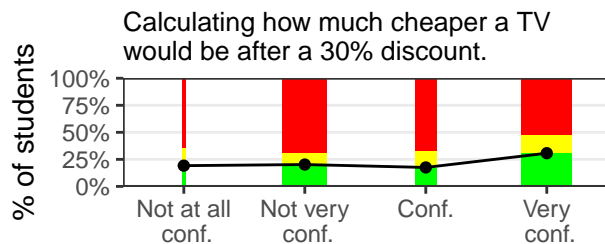
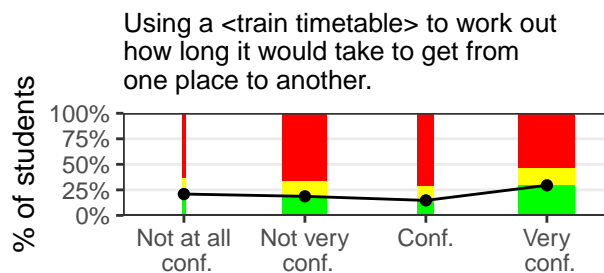
61 Tunisia



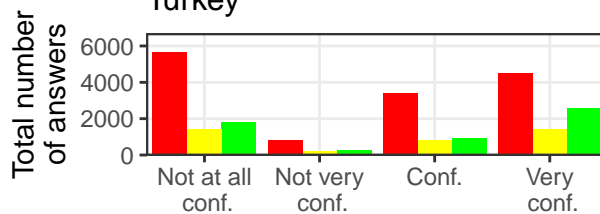
Summary of answers: Tunisia



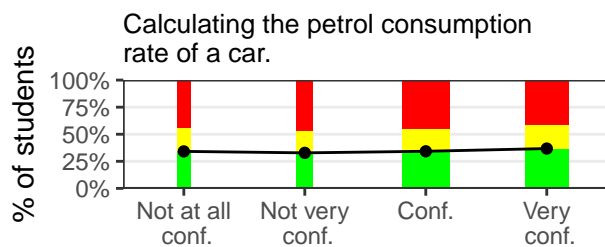
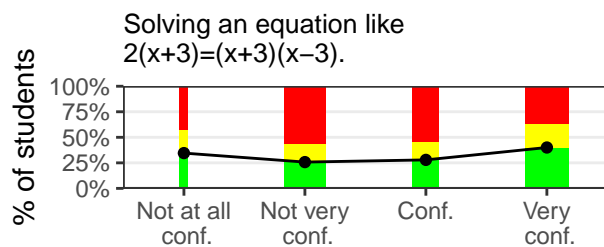
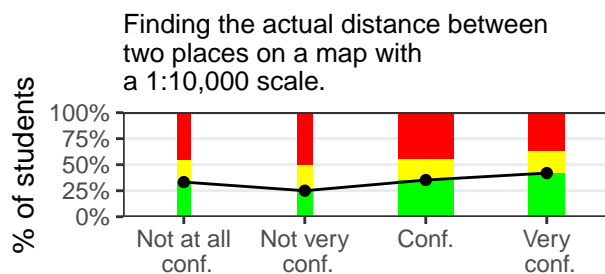
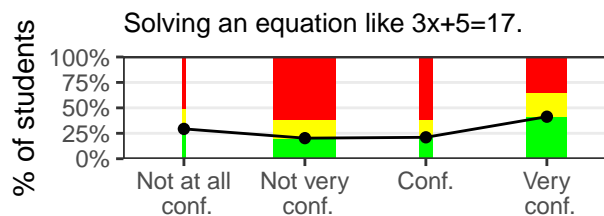
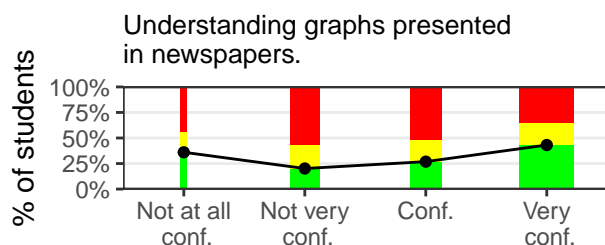
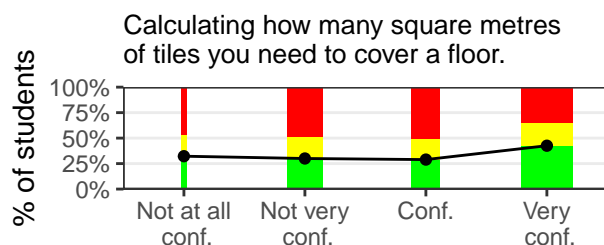
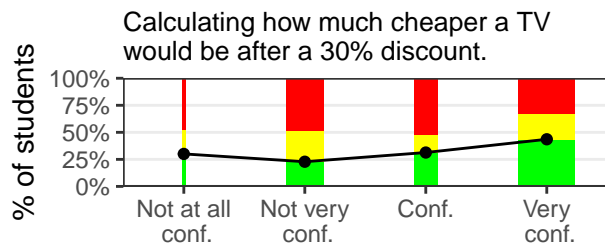
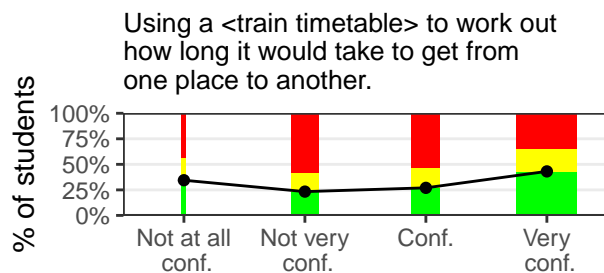
62 Turkey



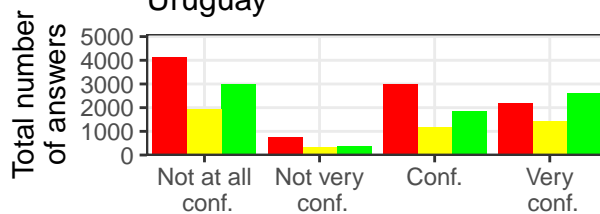
Summary of answers: Turkey



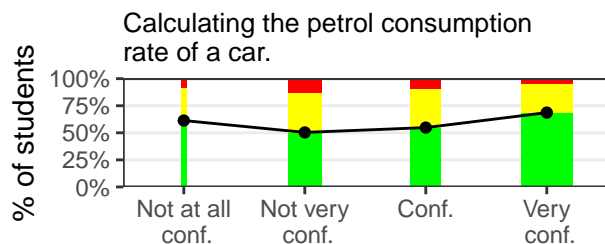
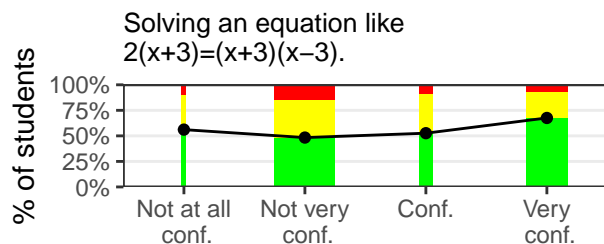
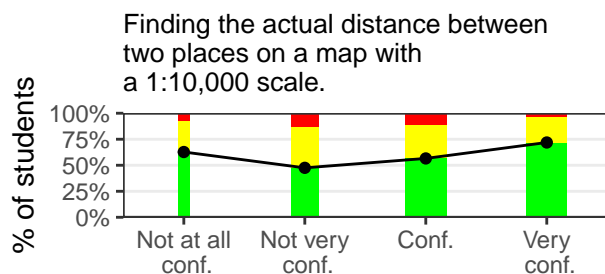
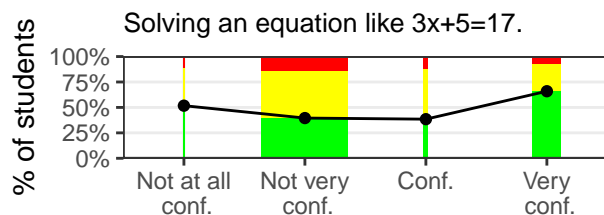
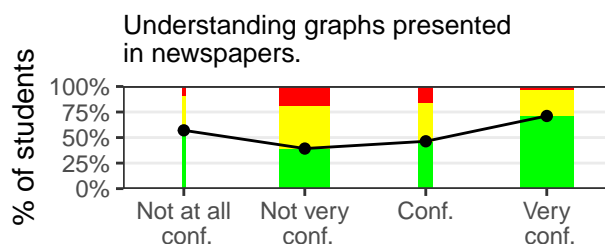
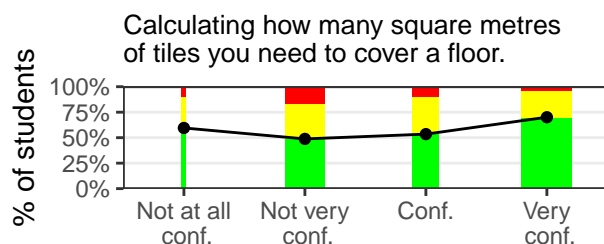
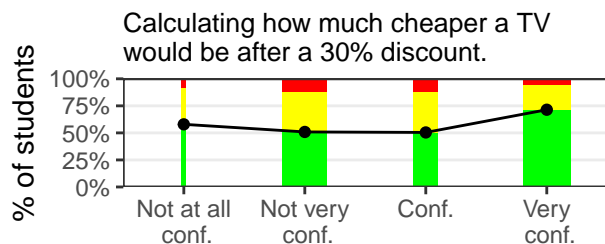
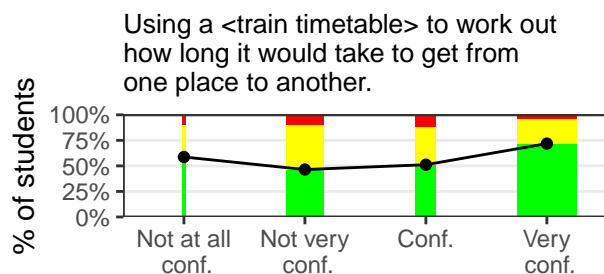
63 Uruguay



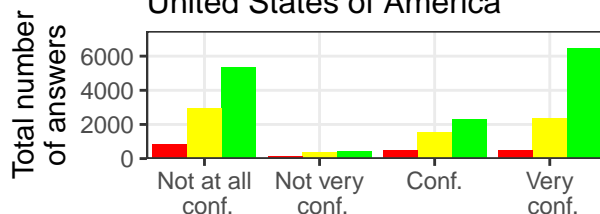
Summary of answers: Uruguay



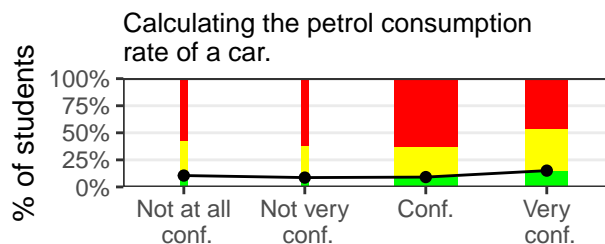
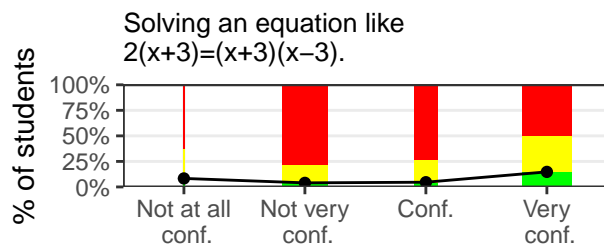
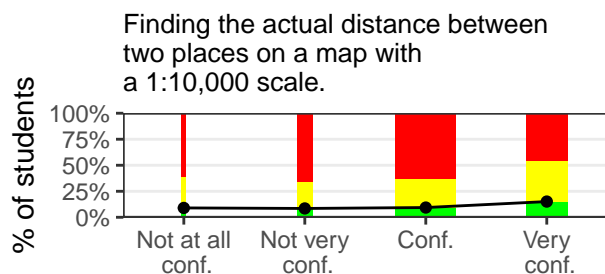
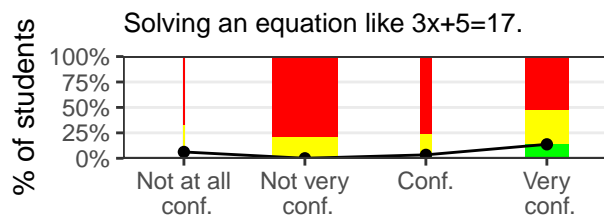
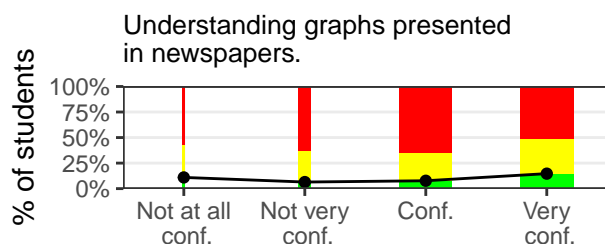
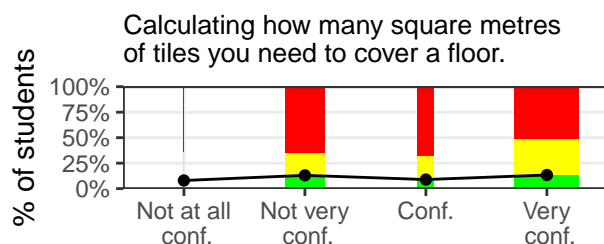
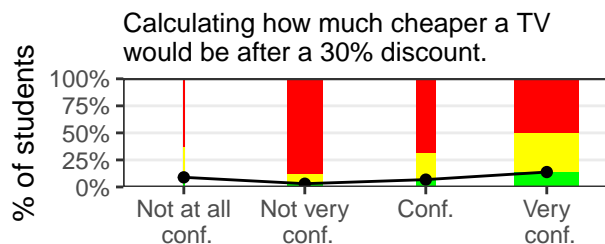
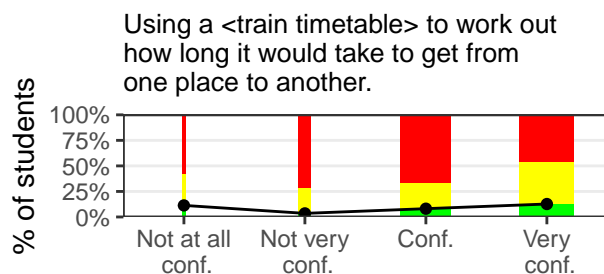
64 United States of America



Summary of answers: United States of America



65 Vietnam



Summary of answers: Vietnam

