

What is lost when face-to-face flipped teaching courses are converted to online-only courses?

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Abstract

Covid-19 restrictions forced a change of teaching to online-only courses. A flipped classroom approach, a good learning management system (OLAT), a virtual meeting software (BigBlueButton) and a tool for automated exams generation (R/exams) allowed this from a technical point of view. However, the total loss of physical encounters in purely virtual teaching remained problematic. An online survey (LimeSurvey) identifies advantages and disadvantages of virtual courses and provides possible solutions for the loss of contact and advice on how virtual components can be effectively integrated into blended learning courses.

Investigated courses

3 courses based on **flipped classroom** approach, weekly exercises have to be performed based on textbooks, papers and videos:

- *Soil Mechanics and Foundation Engineering*, 1.5 ECTS (Bachelor)
- *Material Models in Soil Mechanics*, 2.5 ECTS (Master)
- *Ice, Snow and Avalanche Mechanics*, 2.5 ECTS (Master)

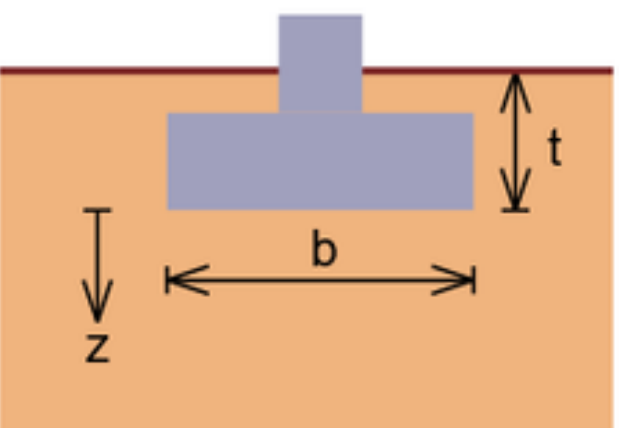
examples for exercises for bachelor course with **R/exams** imported to **OLAT** tests (numerical input values differ for each student)

Question

1 point

Not answered

A single footing with the width $b = 1.5$ m and the length $a = 3$ m is embedded $t = 0.86$ m deep into a soil with $\gamma = 16$ kN/m³. At this depth the footing transfers the bearing pressure $p = 303$ kN/m² (including concrete parts) to the ground. The volume of the concrete parts (footing plus column) inside the ground is $V_b = 2.6069$ m³. The reinforced concrete has the specific weight $\gamma = 26$ kN/m³. For a settlement calculation, the stress σ_p induced by the footing under the center of the footing at the depth $z = 0.375$ m should be calculated.



a. How large is the reduced bearing pressure in kN/m²?

b. How large is the stress σ_p in kN/m²?

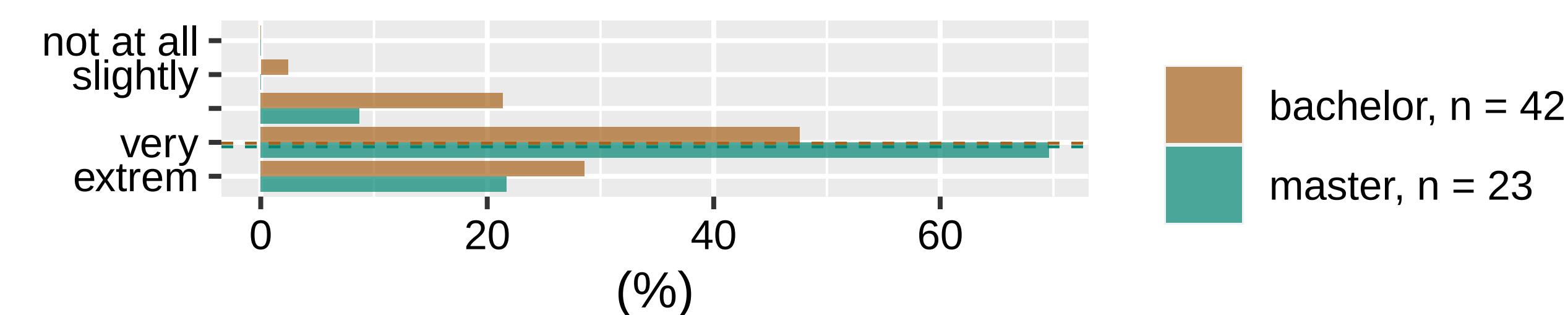
Submit answer

- Bachelor course: R/exams exercises solved at home, voluntary participation in weekly virtual office hours to clarify questions about the examples two days before the deadline of each OLAT test, (anonymous) forum in OLAT for online discussions
- Master courses: Paper and pencil or programming exercises (Matlab) solved in small groups in break out rooms of weekly virtual classroom meetings.

Loss of face-to-face contact and social interaction

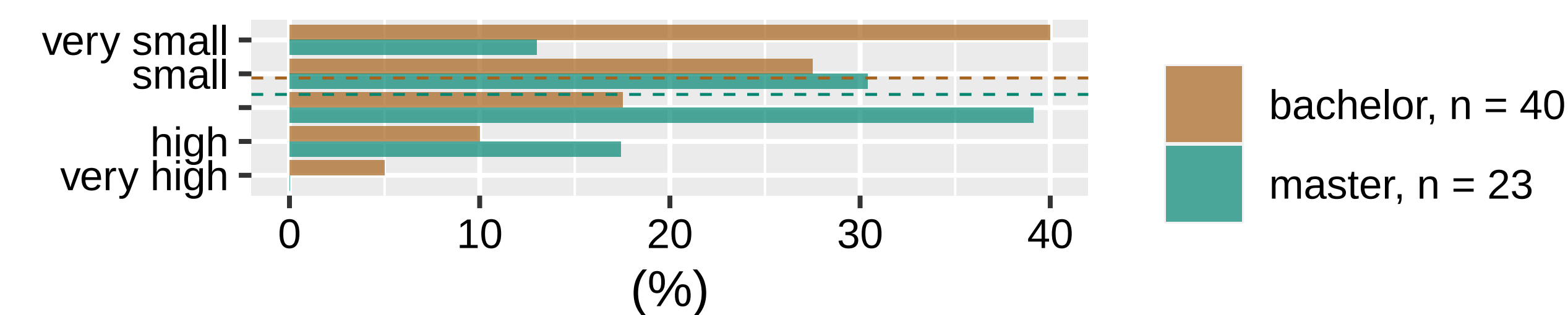
Students **missed face-to-face contact with fellow students a lot** and found virtual meetings a weak substitute. That fits in with the fact that the majority of students prefer to learn in pairs. Students missed physical contact with the teacher a little less and the virtual substitute worked a little better. No significant difference between bachelor and master students is evident.

How much did you miss the face-to-face contact to your fellow **students**?

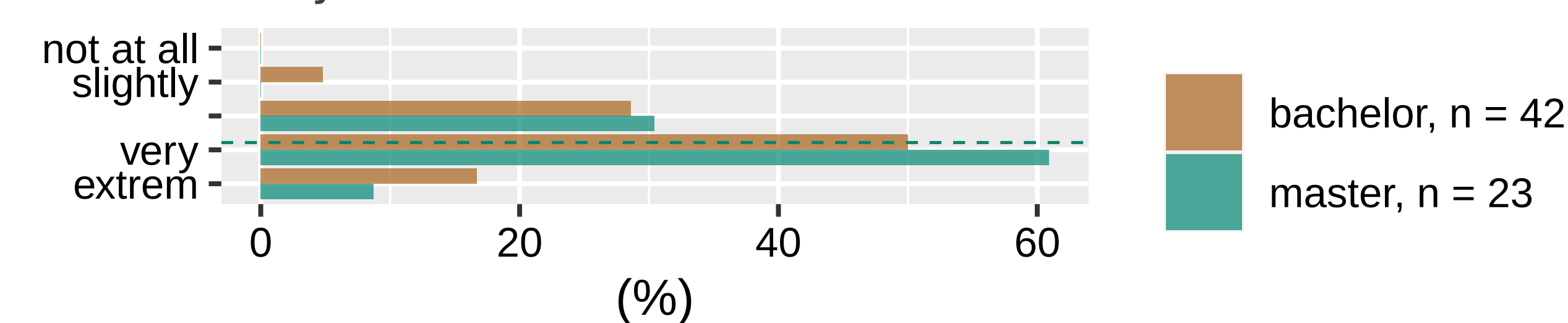


n: number of replied answers of 122 invited Bachelor students and 30 invited master students

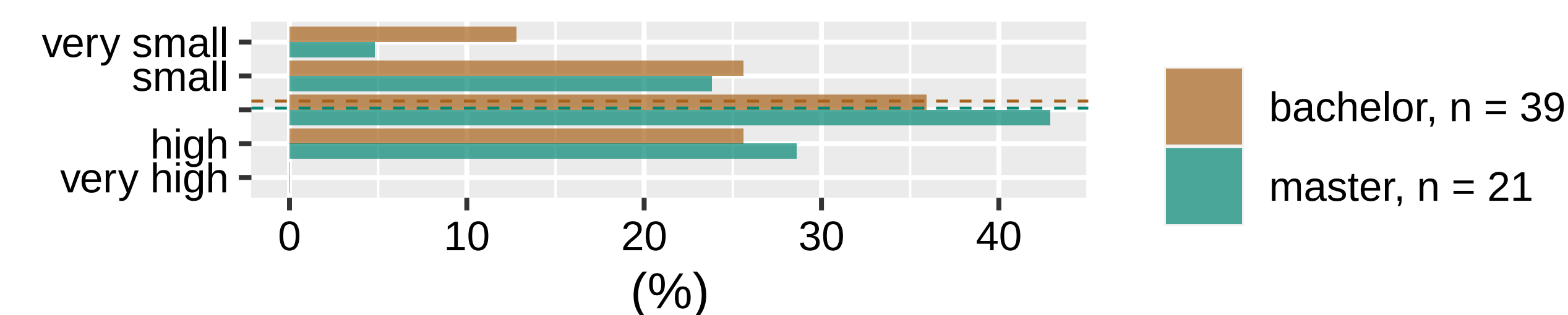
To what degree were virtual meetings able to replace the lack of this contact?



How much did you miss the face-to-face contact to the **teacher**?



To what degree were virtual meetings able to replace the lack of this contact?

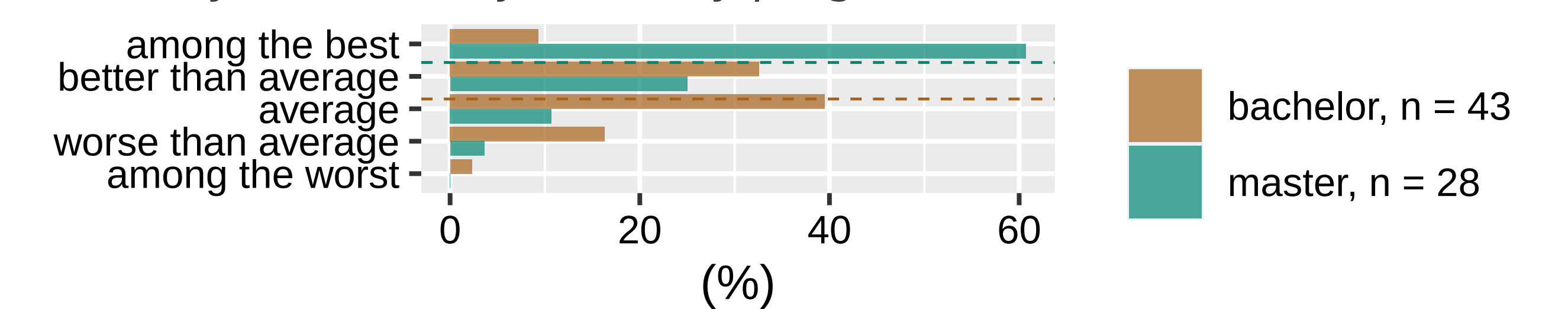


Text comments of students reveal: They **miss the exchange with colleagues and simple possibilities to ask questions**. Too much interpersonal contact is lost, interaction and communication are restricted and made more difficult in virtual formats.

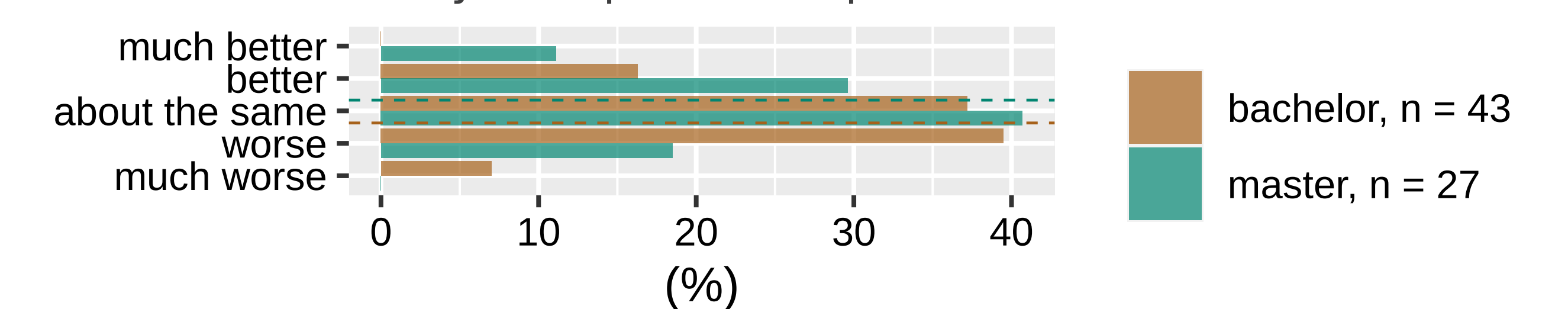
The only real **advantage** of virtual teaching is **flexibility** in terms of **time** and **location** (2/3 of respondents). Home office is also perceived as pleasant by some.

Rating of courses

How would you rank this virtual-only course compared to other virtual-only courses in your study program?



How did you find this virtual-only course compared to the average of face-to-face courses you experienced prior to Covid-19?



Main differences between bachelor and master courses:

- bachelor course is compulsory, master courses are elective
- bachelor course with voluntary virtual meetings (consultation hours) – rarely visited by students, master courses with group work in breakout rooms in weekly meetings

In addition: Some bachelor's students had great difficulties with the final online exam for which R/exams was used. The master's students did not report such difficulties.

Valuable online tools for blended learning

- 1 weekly R/exams exercises, however, with supplying a brief outline of the solutions in addition to the numerical values of the results
- 2 OLAT-Forum (asynchronous communication, learning from other questions/answers, kind of "reference book")

Take Home Message

- 1 flipped classroom is suitable for online lectures
- 2 hybrid form (blended learning) is preferable to online-only setting
- 3 in purely virtual settings: **keep in touch with students** by regular meetings in virtual classrooms and use breakout rooms for working in small groups

Resources:

R/exams: Automatic generation and evaluation of exams www.r-exams.org/
OLAT: The OpenOlat learning platform www.openolat.com/
Soil mechanic videos (german) <https://tinyurl.com/p92na5rp>

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