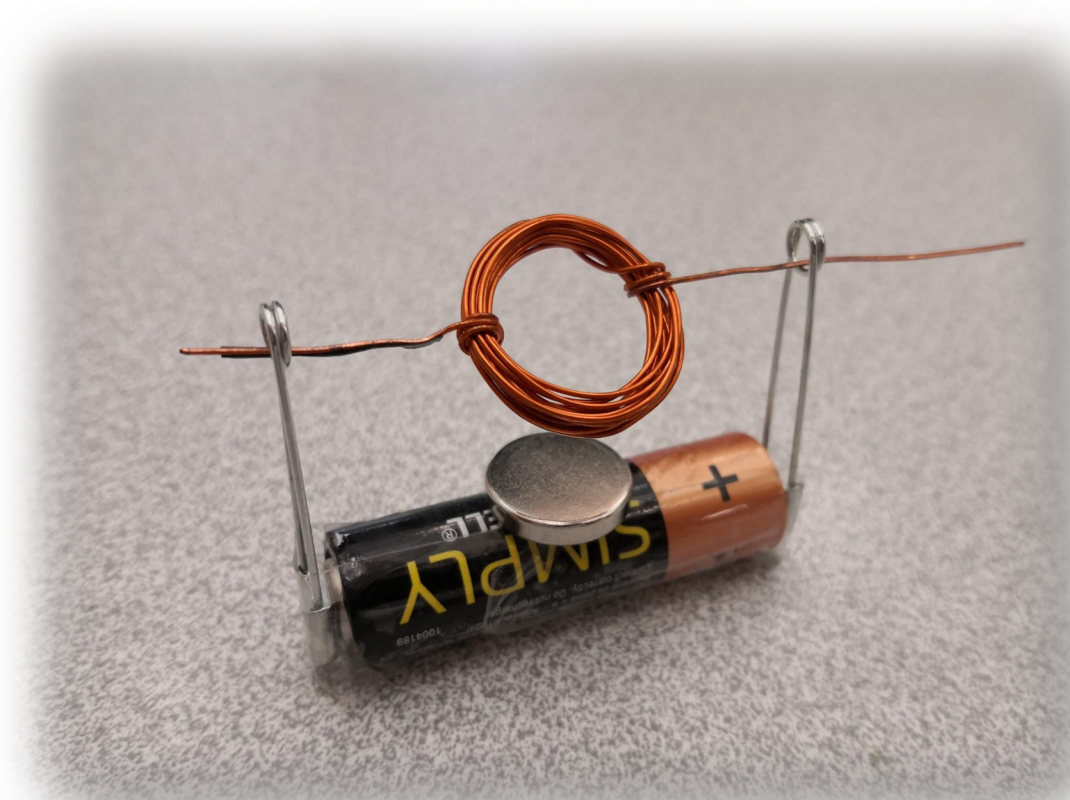


AggiornaMenti: an INFN Project for the Education of Junior High School Science Teachers

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Background

- Junior high school (middle school) represents the **weakest sector of the education system** in Italy and perhaps in other countries
- Science teachers usually do not receive specific training in physics
- They tend to avoid addressing important aspects of physics
- They usually use a **traditional lecture** approach
- No practical and experimental activities are usually proposed to the students
- Most schools have very little or no laboratory equipment
- Laboratories are rarely used** for experimental learning of STEM disciplines



Target

- Direct target:** Middle school teachers
- Final target:** Students aged 11-13
- They make important choices for the rest of their life
- The discovery of science can have a strong social impact
- We turn to teachers to reach more students



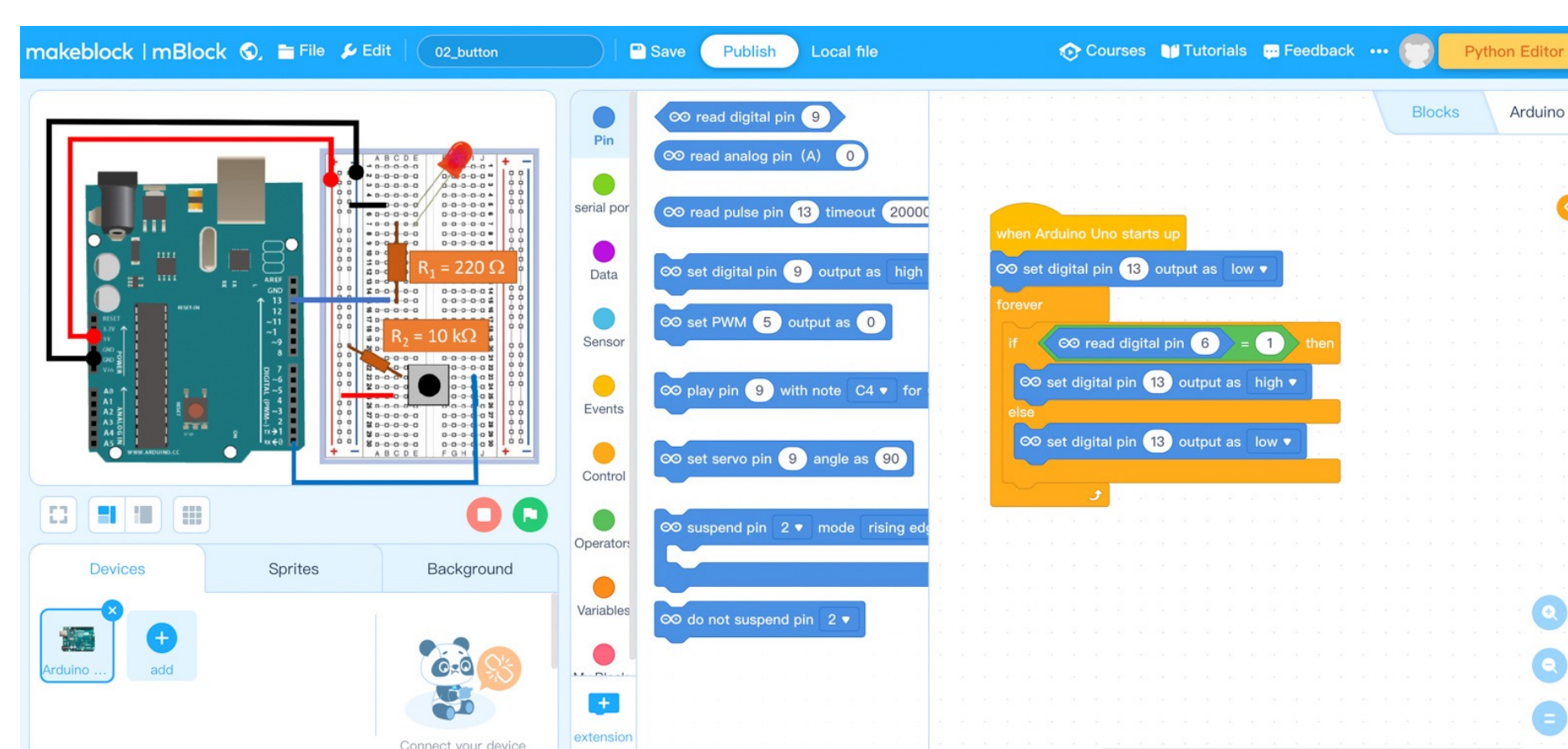
Methods

- Experimental activities** which can be carried out in any contest
- Use of cheap materials which can be found at home
- The teachers:
 - they are **trained in the labs** by the researchers
 - they are provided with a series of objects to be used in the classroom
 - they **gain confidence** in their own abilities
 - they **change their teaching approach**
- Students discover how they can experiment with science and learn that physics enters every aspect of daily life



Editions

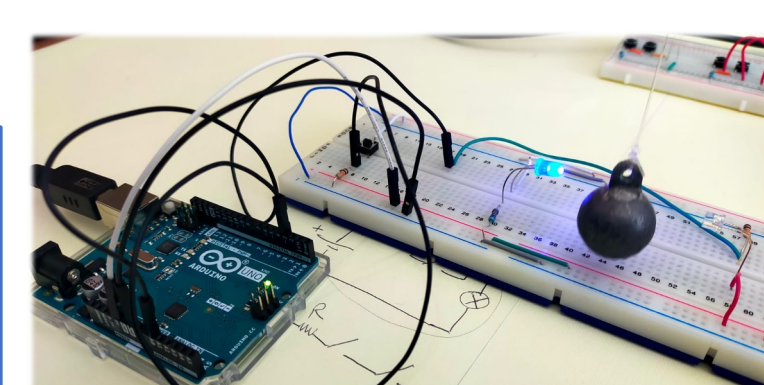
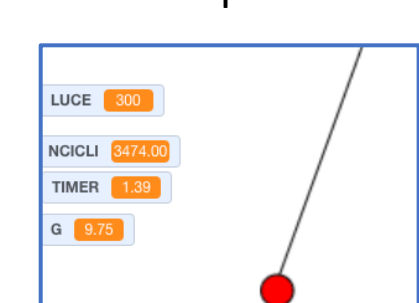
- First edition** in Turin in 2017 with a cooperative "learning-by-doing" approach to science teaching
- Since 2018, AggiornaMenti has spread throughout Italy and today involves **10 local INFN sections**
- It is now a national project supported by the **INFN third mission** commission



Outcome

- So far, around **500 science teachers** have attended our educational program
- The practical activities covered many aspects of classical physics: mechanics, fluid dynamics, thermodynamics, acoustics, optics, electromagnetism ...
- During the pandemic**, the activity was carried out mainly in an online format
- Experiences linking physics with life and earth sciences have been proposed
- From 2021 INFN-Ferrara offers an **online programming school** on Scratch and Arduino (about 30 participants / year)

G measurements with pendulum

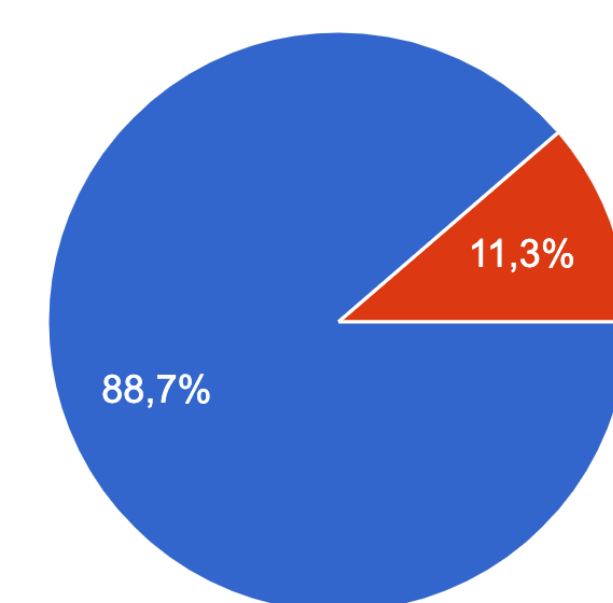


Collaborations

- The activities are carried on in close collaboration with **Universities** of Cagliari, Ferrara, Genova, Perugia, and Pisa
- Fruitful collaborations with **social and educational agencies** have also been established: Fondazione Golinelli (www.fondazionegolinelli.it), Next-Level (www.next-level.it) and Laboratorio Scienza (www.laboratorioscienza.it)

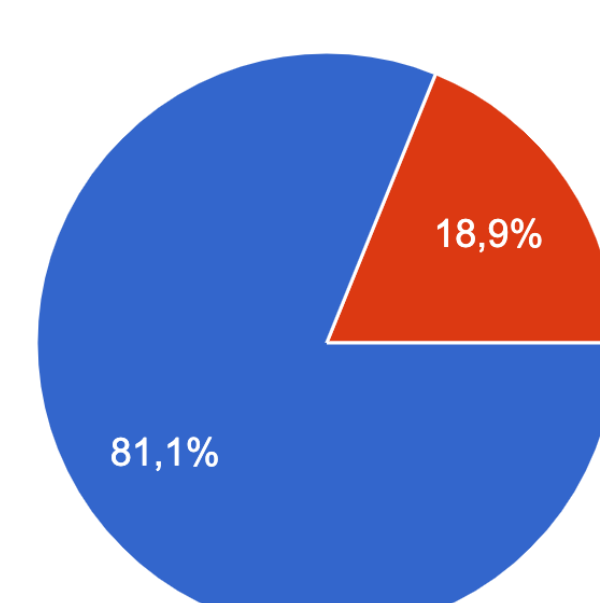


Feedback from the Teachers



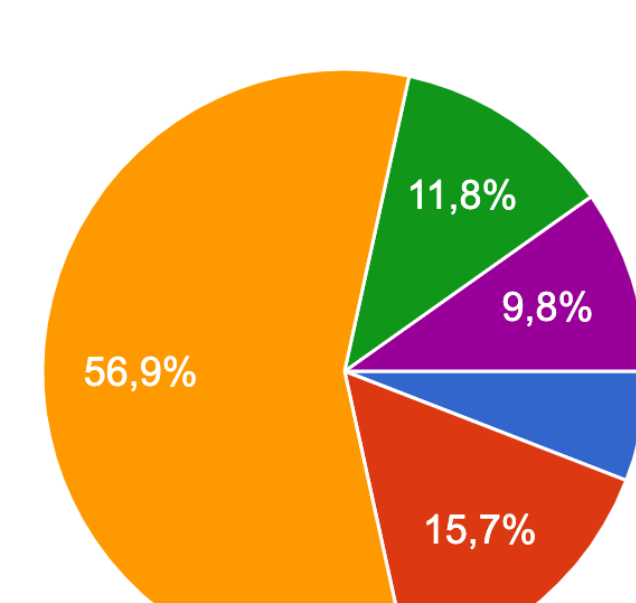
Did you put into practice what you learnt in the course?

YES NO



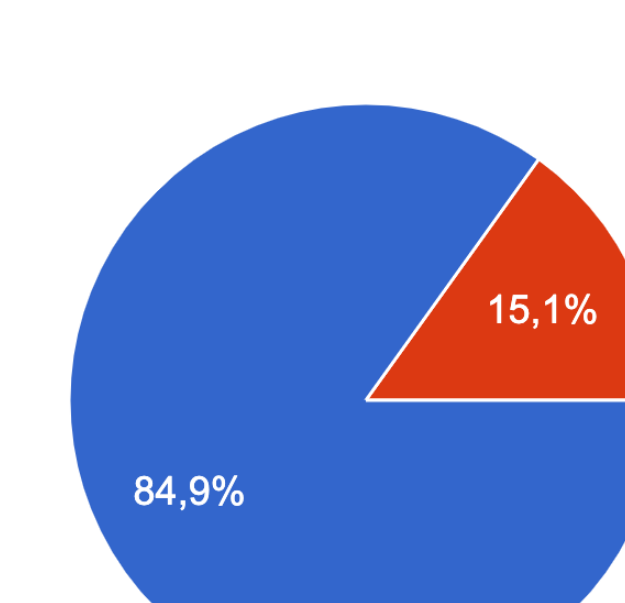
Did you use the supplied material?

YES NO



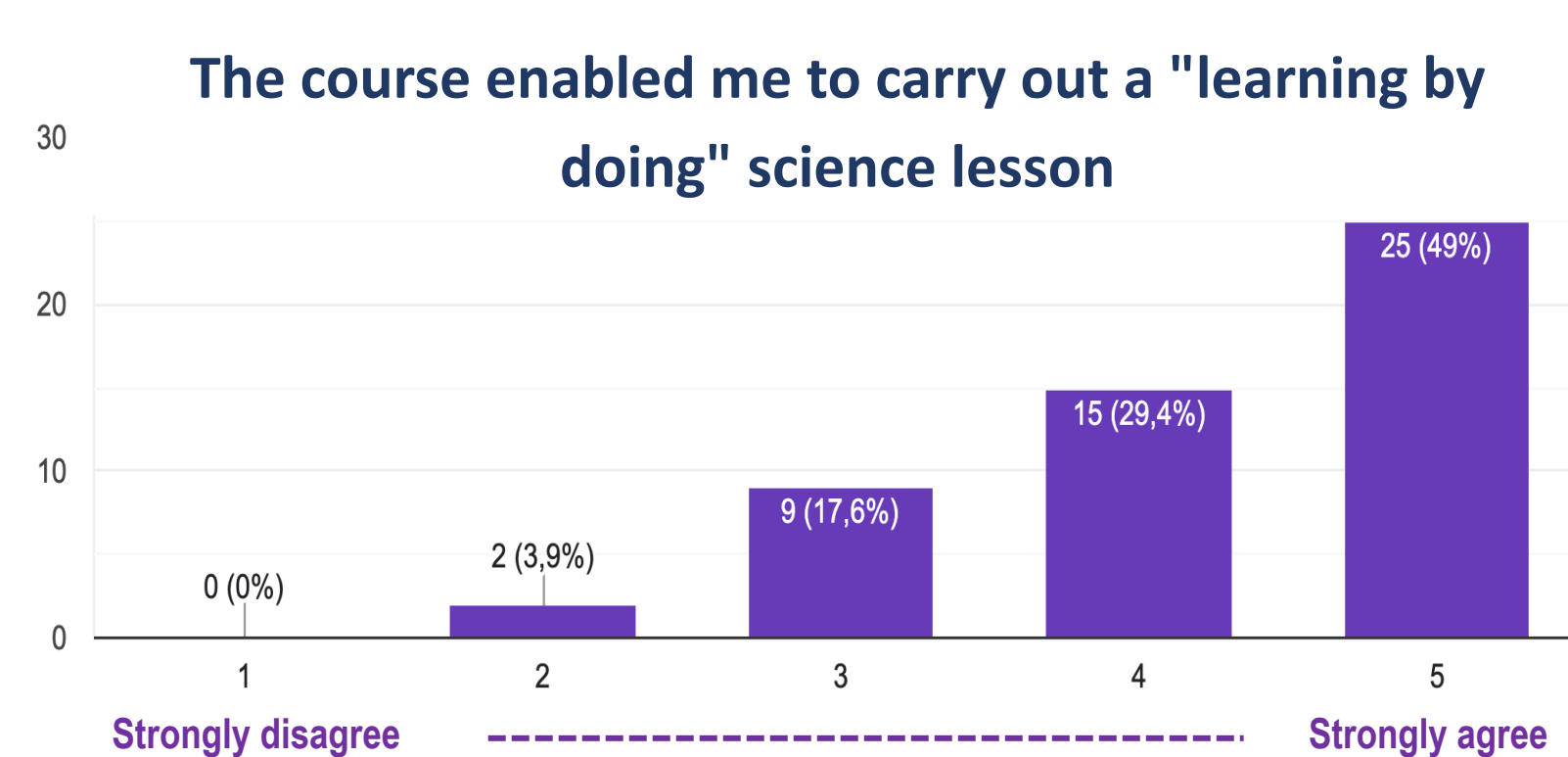
How many students have benefited from this way of teaching?

0
<20
20-50
50-100
>100

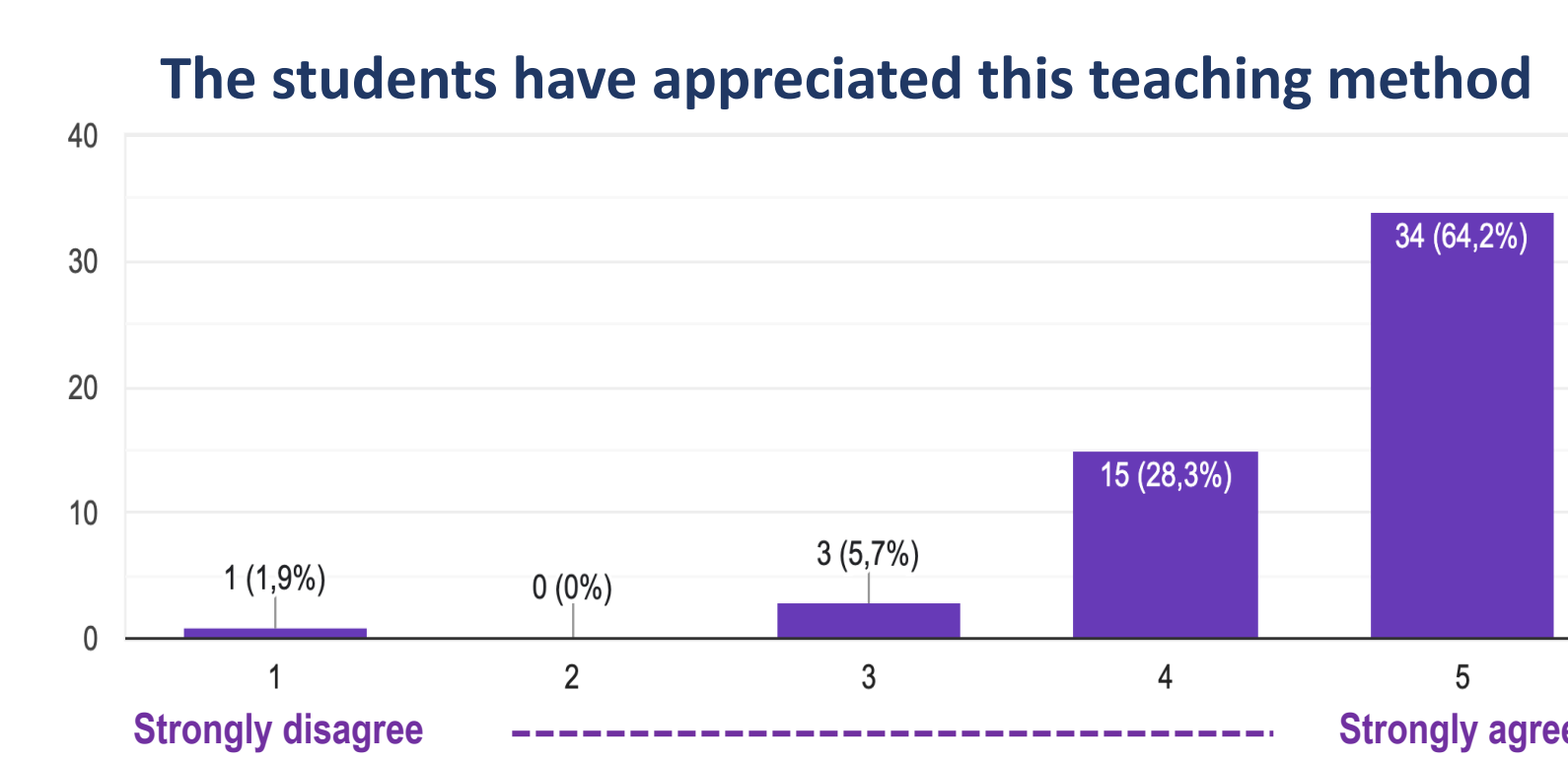


Have you changed the way you evaluate learning outcomes?

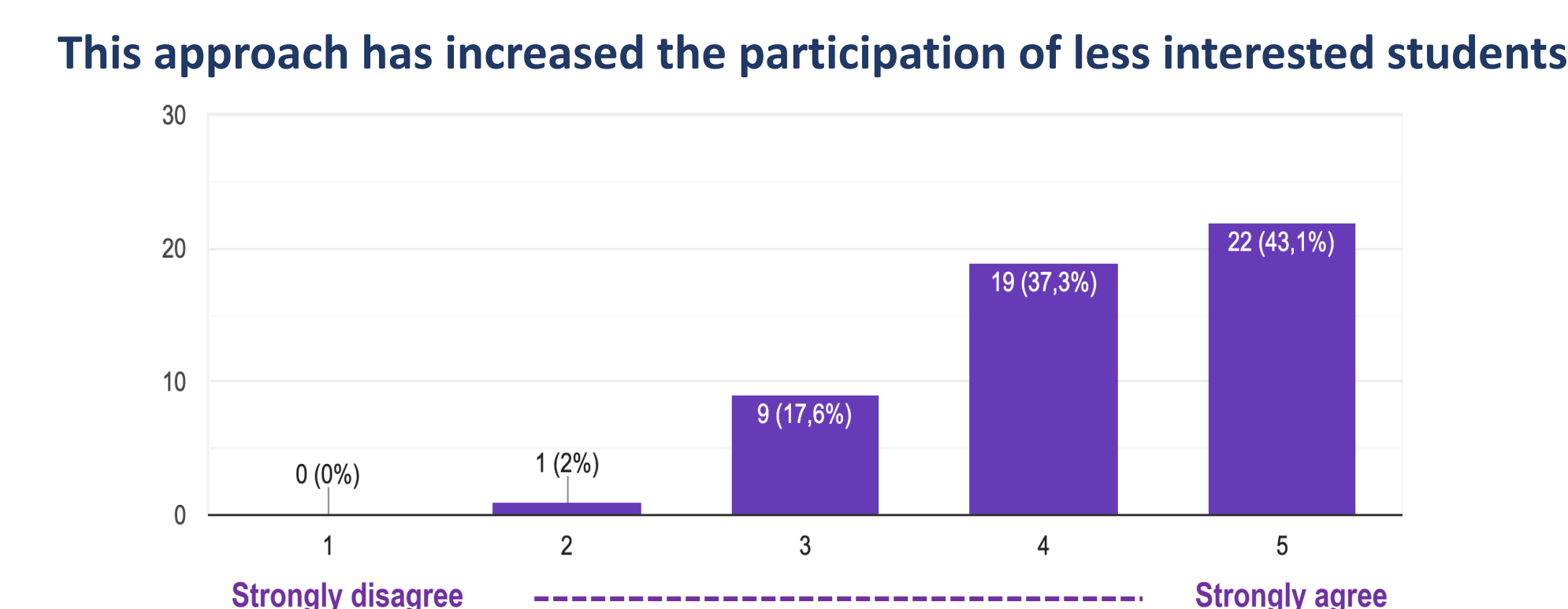
YES NO



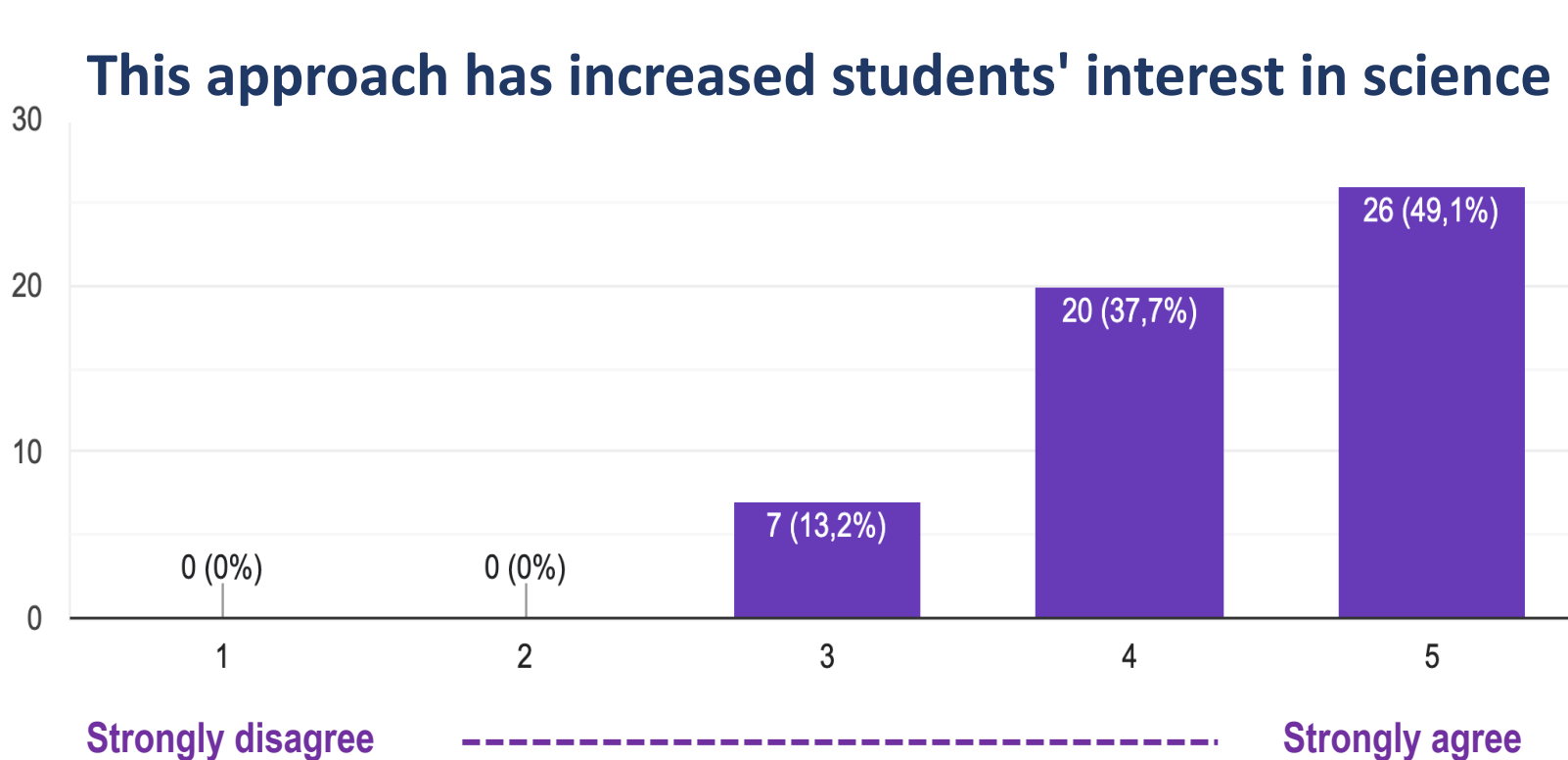
The course enabled me to carry out a "learning by doing" science lesson



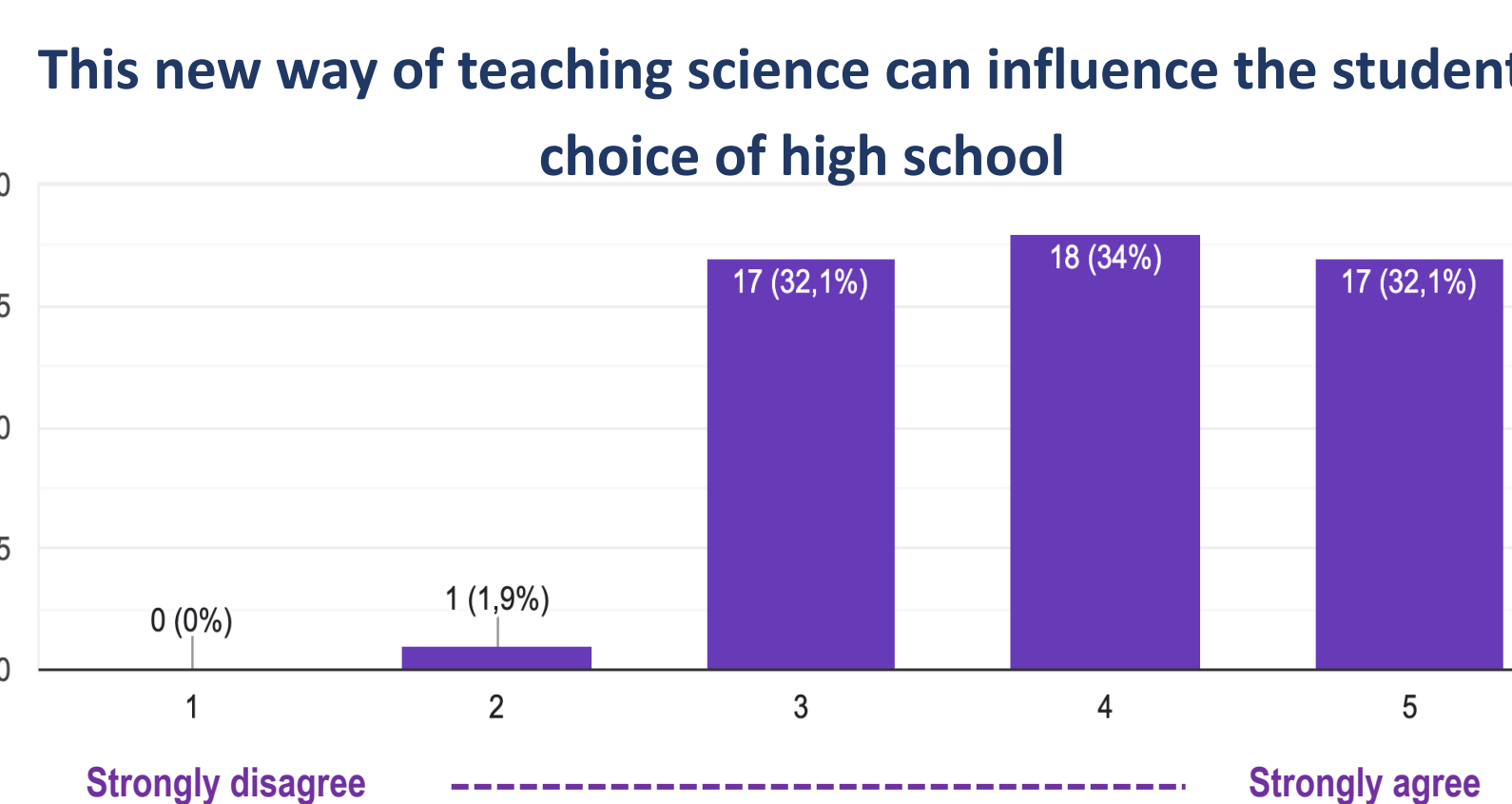
The students have appreciated this teaching method



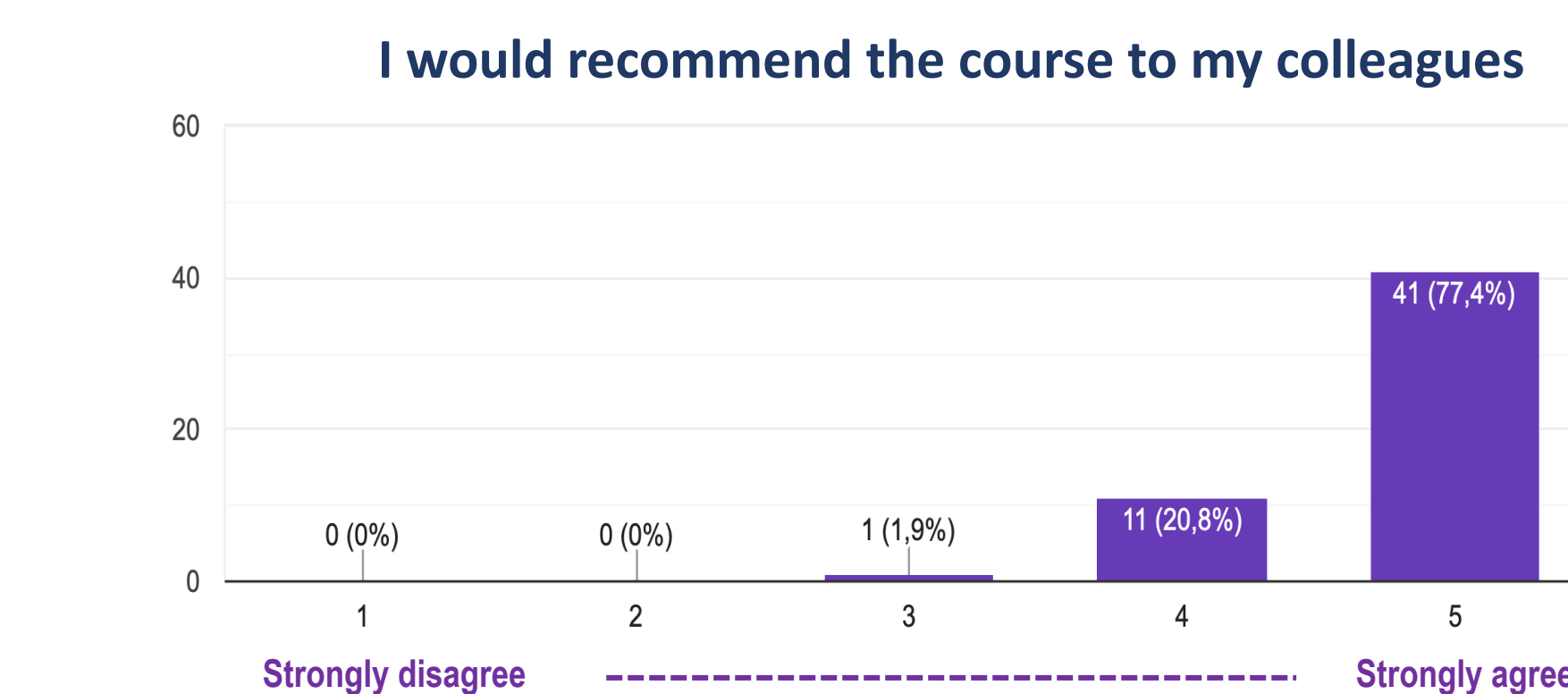
This approach has increased the participation of less interested students



This approach has increased students' interest in science



This new way of teaching science can influence the students' choice of high school



I would recommend the course to my colleagues