

Providing accessibility through implementation of electronic laboratory notebooks

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BACKGROUND

Electronic Laboratory Notebooks (ELNs) have recently gained popularity in academia and industry while paper laboratory notebooks (PLNs) are becoming obsolete from the digital world. This is due to the many benefits of ELNs such as efficiency, accessibility, and data integrity^{1,2}. In tertiary education, ELNs have been implemented to help students develop skills that are easily transferrable and prepare them for a technological rich workplace. Learning and understanding students' and teaching staff perceptions' of their experience with using ELNs, particularly during the COVID-19 pandemic, is key to successful implementation.

RESEARCH QUESTIONS

- What are student and postgraduate demonstrators' perceptions of ELNs and PLNs?
- What were the factors influencing student and demonstrators' notebook preferences?
- Did the perceptions change for students' and demonstrators' change during COVID-19?

METHODOLOGY

A mixed methods approach was used in 2020-2021. Researchers gathered perceptions use of PLNs and ELNs and the software platform, LabArchives.



SAMPLE

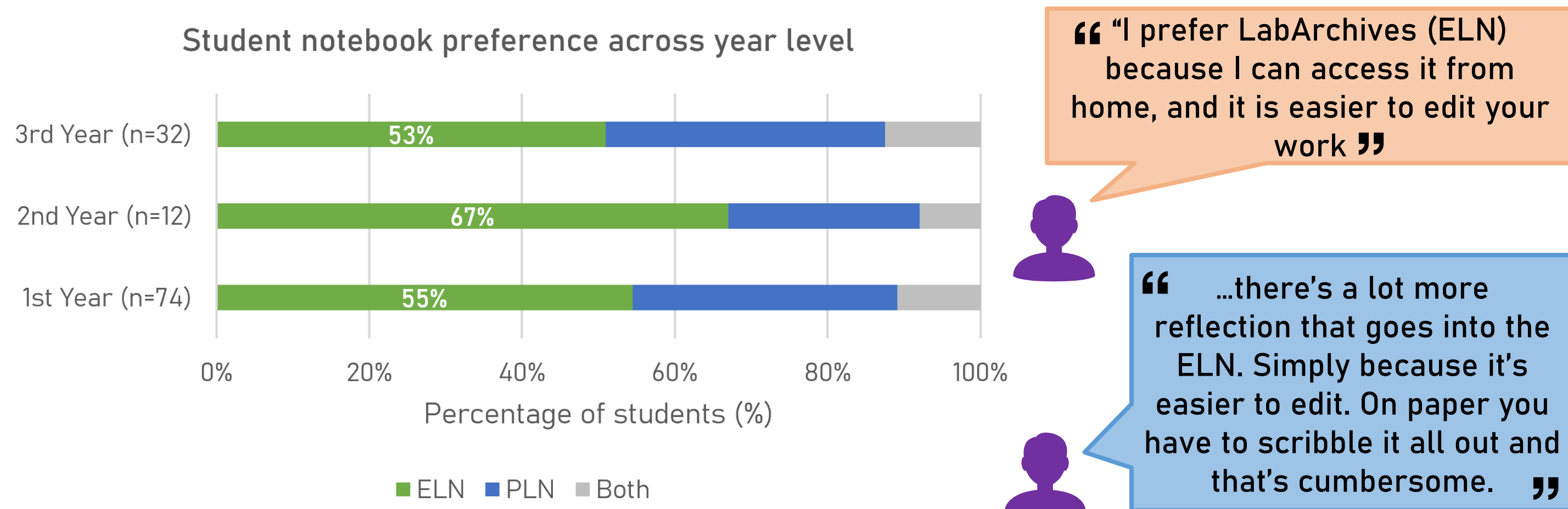
Undergraduate students

Teaching staff

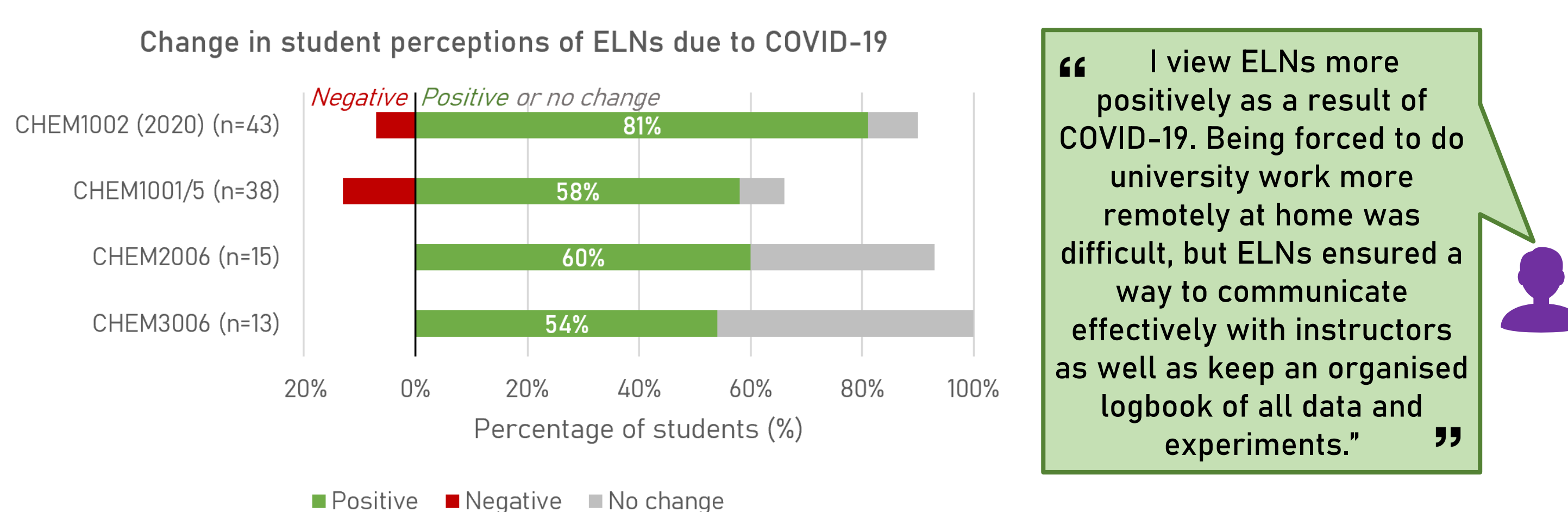


RESULTS - 2020

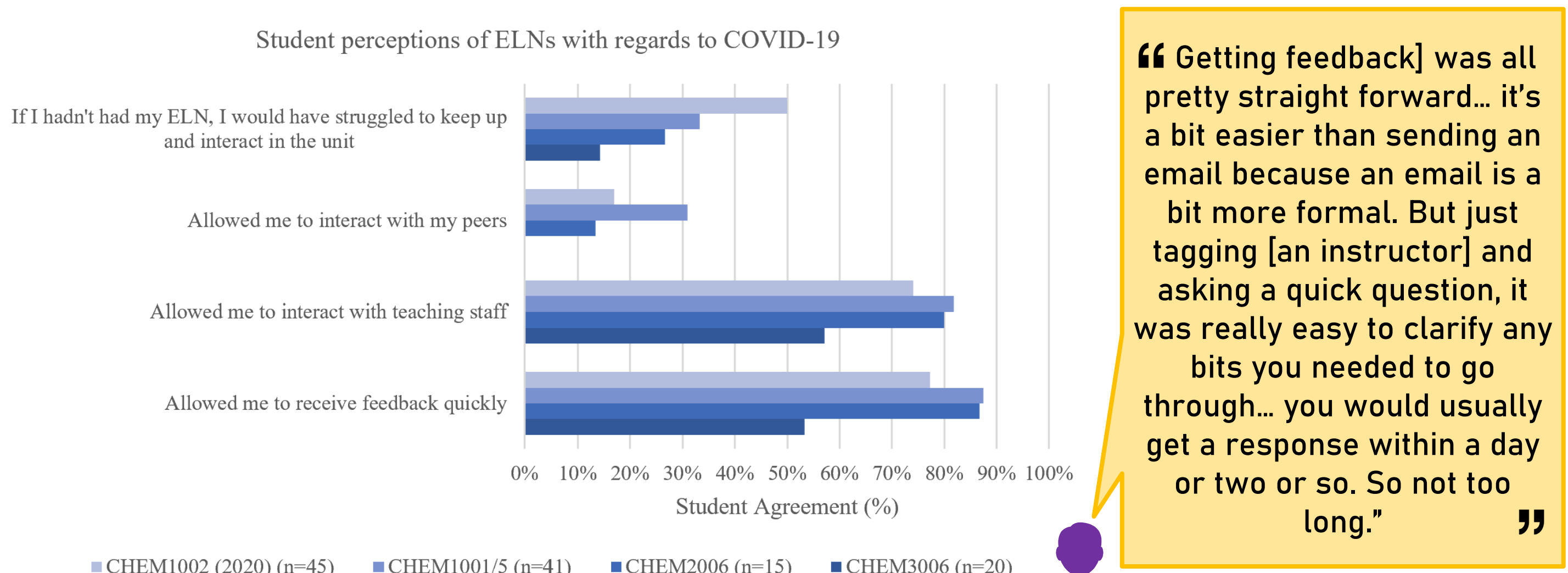
- ELNs received higher rates of agreement on average than PLNs attributed to improved confidence with using the notebook over the semester, being less time consuming, allowing a flexible way of recording, easy organisation and structure, creativity in data and results presentation, and helping to prepare students for their future profession.
- The most frequently mentioned benefit of the ELN was accessibility.



- Most students experienced a positive change in perceptions of ELNs regarding COVID-19, most commonly due to ELN accessibility and the ability to work from home.



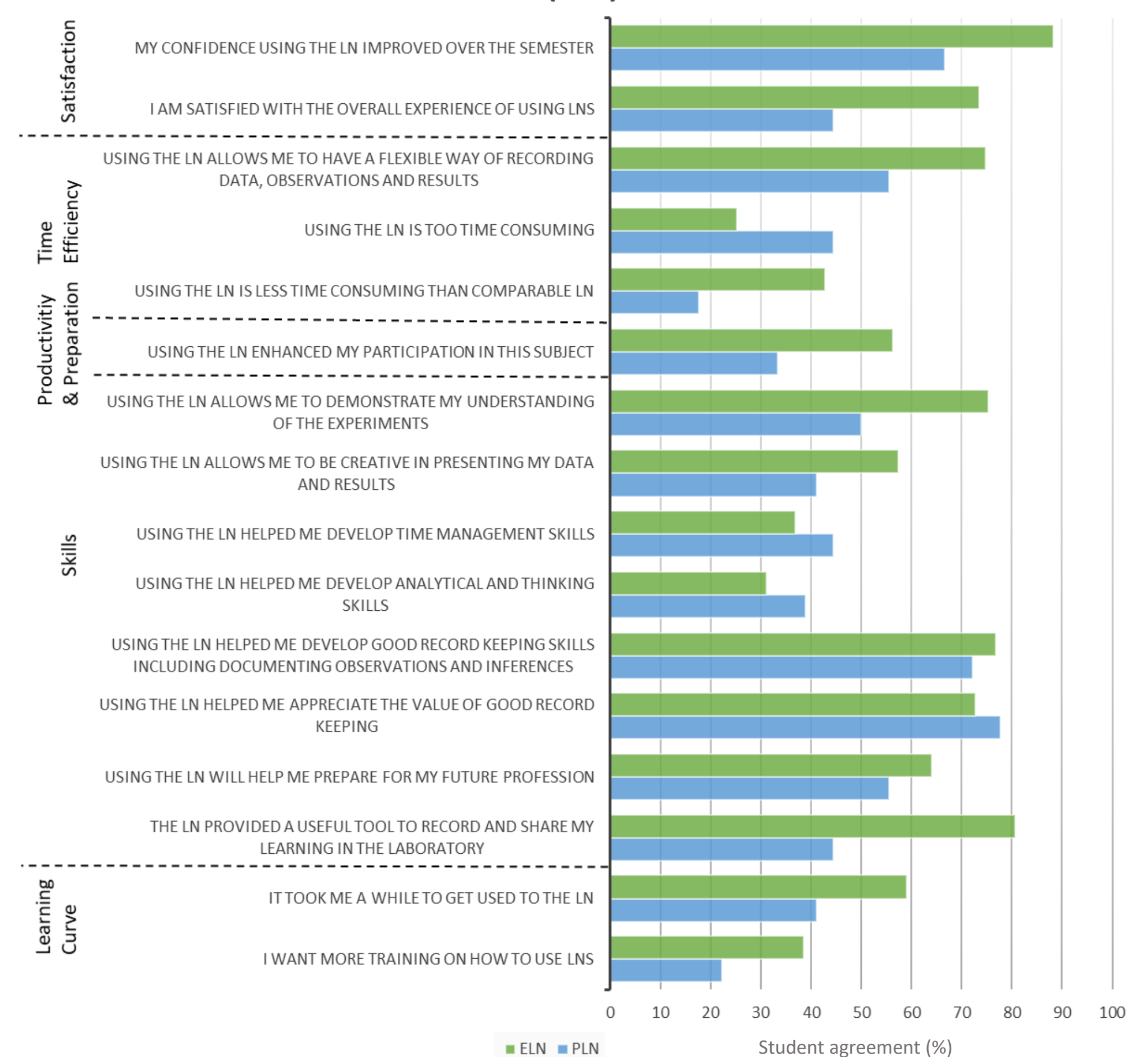
- The majority of students across units agreed that ELNs allowed them to receive feedback quickly and interact with teaching staff during COVID-19.



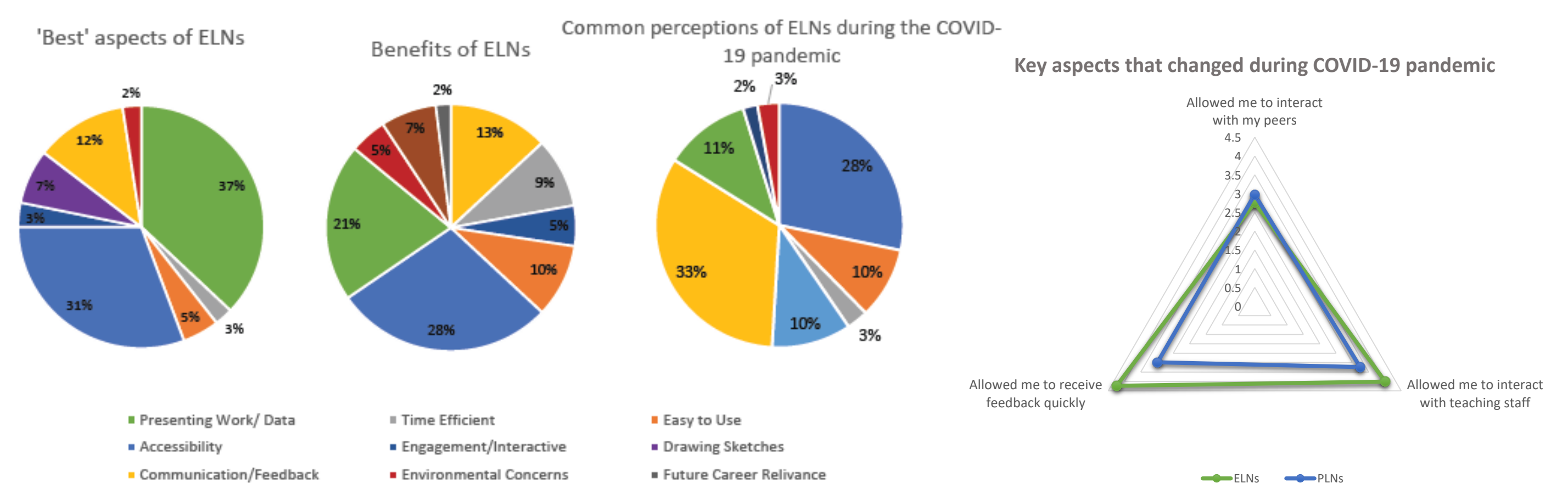
RESULTS - 2021

Unit Code	#Responses
CHEM1002	71
CHEM1001/5	33
CHEM2005	8
CHEM2006	18
CHEM3001	11

Comparison of student perceptions of using laboratory notebooks (LNs)



- Students found the ELNs to be more beneficial compared to the PLNs, particularly ways to present work and accessibility.
- Using ELNs during COVID-19 provided students a way to receive feedback and maintain communication.



- Teaching staff's comments were consistent with students' perceptions that ELNs support greater communication compared to PLNs.

“significant difference in the mode of feedback between the two (ELNs and PLNs)”

Teaching staff

“easier to encourage the students to actually consider the fact that they are receiving feedback in the electronic notebooks”

Teaching staff

“Overall, with convenience, communication with the demonstrator and just the layout of it. I do prefer ELNs overall... anything that can be done on PLNs can be done on ELNs but better”

Student

CONCLUSIONS AND FUTURE WORK

- Students perceived that ELNs have a higher learning curve to overcome. LabArchives training is given to overcome this.
- The COVID-19 pandemic is associated with a positive student perceptions for using ELNs such as features to enable increased communication and accessibility.
- Further investigation can be done to investigate students' perceptions based on year group level, as well as different chemistry majors

ACKNOWLEDGEMENTS

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REFERENCES

- ¹Bird, C. L., Willoughby, C., & Frey, J. G. (2013). Laboratory notebooks in the digital era: The role of ELNs in record keeping for chemistry and other sciences. *Chemical Society Review*, 42(20), 8157-8175.
- ²Colabroy, K. & Bell, J. K. (2019). Lab eNotebooks. In *Biochemistry Education: From Theory to Practice*, 1337, 173-195. American Chemical Society.