Should virtual learning mean on-screen learning?
What are the implications of providing virtual learning entirely through on-screen learning resources?

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A study was carried out looking at how Open University distance learning STEM students use on-screen and paper-based learning resources on a range of Stage-2 (second year undergraduate) modules. 1198 students were invited to participate, and 18.8% responded.

Data from this study is used to investigate the impact of having to move to entirely on-screen study for second year undergraduate Physics students, taking advantage of the introduction of a new entirely on-screen Stage-1 module to make comparisons. Based on this, the importance of including paper-based resources in the design of a course for virtual study is considered.

What do students say they want?
Most students still prefer book-based resources, and this is not dependent on age.

![Number of students from a range of STEM Stage-2 distance learning modules who expressed a desire for more books or more digital online content, by age](chart)

What do students think causes them problems?
Students perceive that moving to entirely on-screen study causes them issues.

![Chart showing percentage of OU students who said they had to change their approach when they started their Stage-2 module, based on whether Stage-1 study included an entirely on-screen module.](chart)

What does the data show?

b) Students suddenly expected to switch to entirely on-screen study seek alternative paper-based study resources.

In the OU study students were asked what methods they used to study their distance learning modules. Online quizes and computer marked assignments were the most used on-screen method, doing exercises/taking notes on paper was the most common off-screen method. This was true regardless of whether the module was entirely on-screen, or a combination of books and on-screen material.

The results also indicated that those suddenly expected to study entirely on-screen compensate primarily by:

- increasing their use of printed pdfs of the on-screen content
- making more use of books acquired from elsewhere
- and to a lesser extent by using more external digital resources

Students do not react by taking more notes digitally, or by annotating digital resources more.

**Conclusions**

- Students of all ages need time to learn how to study online
- Paper based resources are an important part of a Physics virtual learning package.

**Next steps**

In 2019 the OU chose to provide printed copies of all the module material for the Stage-2 Physics module. Covid-19 will have an impact on the final results, but preliminary indications are that doing this increased retention and grades in module assignments. This will be monitored again in 2020.

**References**

4. Rockinson-Szapkiw, CoudUFF., Carter & Bennett (2013), ‘Electronic versus Traditional Print Textbooks’
5. Jidi, Shipgelman, Zalmanov, & Ackerman, (2017), ‘Understanding metacognitive inferiority on screen by exposing cues for depth of processing’