THE INSIDERS' GUIDE TO UK UNIVERSITY DIGITAL ESTATES

Insight, Trends and Analysis
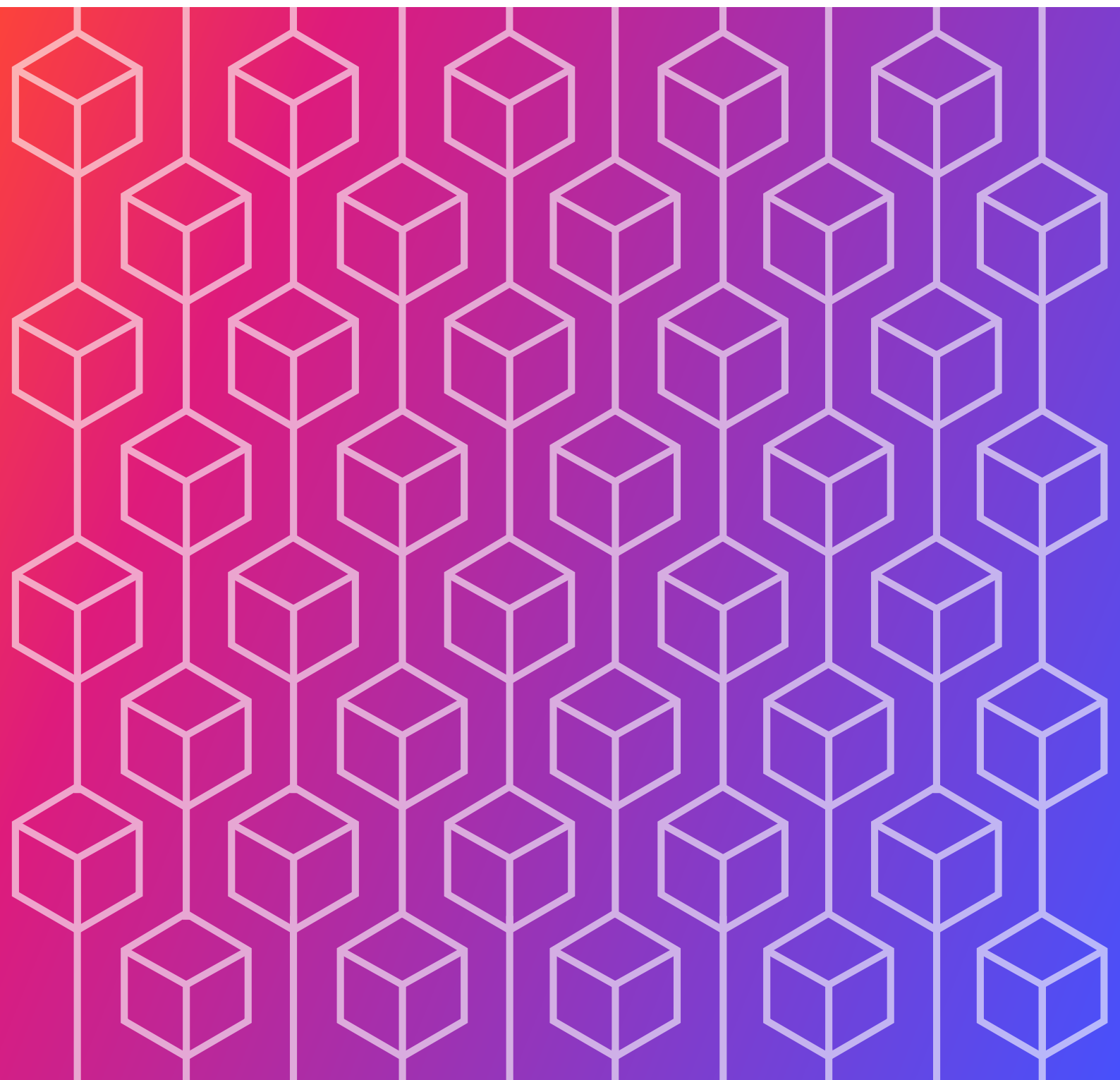
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Thankyou for taking the time to read this report. At Intel, we recognise that sharing community insights, ideas and learnings is a critical component to helping build impactful and effective digital strategy. Thankyou to those that contributed to this research and we look forward to continue to explore ways we can help.

Stuart Walker
Head of Education
Intel

There had never been a quicker move to digital space than during the COVID-19 pandemic. Students, families, and the workforce were forced into a new digital era of online working, studying, and living. Universities faced multiple challenges, shifting decades of in-person teaching entirely online. Other challenges linked to cybersecurity quickly posed a threat to the digital domain of universities, and tested the reliability of their existing digital systems. In turn, this shift also created an opportunity for universities to expand and develop their present digital estates to support both continuing student learning and wider business transformation.

Our research into the circumstances of current digital estates in the UK revealed several major findings. Essentially, there was a gap between what Chief Information Officers aspired to deliver, and the experience in the classroom and staffroom. We uncovered a digital estate landscape of unprecedented complexity produced by a range of factors including sheer scale of operation, technical debt, contradictory institutional requirements, limited budgets, and university governance issues. These factors were constraining Chief Information Officers' ambitious transformative strategies to become trusted business partners within their institutions, to make life easier and better for staff and students alike. Meanwhile, academics were struggling with insufficient or outdated technology and inadequate IT support, and with digital poverty and digital illiteracy amongst their students.

This report sheds light on the key themes and opinions of those who manage technology – and ultimately, business transformation - in universities, including the key priorities and major challenges the sector currently faces.

Phil Baty
Chief Global Affairs Officer
THE

THE VIEW FROM ACADEMICS

51% agreed that they had received sufficient support to use online learning technologies

12% claimed their university didn't provide them with any technology to support the delivery of teaching and learning.

Only 23% were provided with learning management systems

Contrasting Views on AI

"The greatest threat is the advent of AI..If AI becomes mainstream, any notion of pedagogy will become redundant."

"I'm actively encouraging the use of AI and other tools in my teaching. It really needs to be embraced as this really is the future of working"

THE VIEW FROM THE C-SUITE

"Business transformation is in three parts:
1. get the foundation right
2. build the environment, and then start to utilise the data and the insights that you've actually got to drive the business and;
3. make informed decisions"

"Cybersecurity is a FTSE 100 company sized problem but without a FTSE 100 company sized budget**"**

Contrasting Views on AI

"At the moment the focus is on stopping people cheating, less on the opportunities"

"We need to think how we use AI to measure knowledge gain, not be frightened by it"

"How can AI help us to be quicker and more responsive?"

INTRODUCTION

A university's digital estate has multiple branches that embody its online presence from learning management systems to administrative functions. There are many benefits to the development of a university's digital space such as student engagement, student support, and digital investment[2]. The use of collaboration tools and engagement online becomes more inherent within higher education, reimagining the meaning of belonging to a university community[3].

As universities continue to grow and develop their online presence through virtual learning and communication platforms, there are several challenges institutions face. Cybersecurity is a great concern in the digital space, with The University of Manchester being one of the latest institutions to be targeted by a cyber-attack (June 2023)[4]. The UK government suggests that higher education institutions are more severely affected by cyber-attacks than schools, as 6 in 10 institutions victim of a cyber-attack have reported stolen data and money, alongside jeopardised personal accounts[5], with cybersecurity expected to be a continuing problem for universities across the UK[6].

Universities are always looking for ways to increase their sustainability and reduce their carbon footprint as we move towards net zero targets. A HESA Estates Management report revealed that 59% of the higher education sector failed to meet carbon reduction targets[7] set out in a joint strategy by Universities UK, GuildHE and Higher Education Funding Council for England (Hefce). Digital space can be the key to this transformation[8]; it is vital for business sustainability and for strategies set in place to achieve net zero by 2050.

[2] https://www.universitiesuk.ac.uk/what-we-do/policy-and-research/publications/lessons-pandemic-making-most
[3] https://beta.jisc.ac.uk/guides/reimagining-digital-learning-in-higher-education
[4] https://www.manchester.ac.uk/discover/news/cyber-incident-statement/
[5] https://www.gov.uk/government/statistics/cyber-security-breaches-survey-2023/cyber-security-breaches-survey-2023-education-institutions-annex
[6] https://www.timeshighereducation.com/news/cyberattacks-target-uk-universities-weekly-survey-reveals
[7] https://www.hepi.ac.uk/2023/01/20/the-majority-of-uk-universities-have-failed-their-carbon-reduction-targets-reducing-ambition-and-embracing-offsetting-is-not-the-solution
[8] Mohamed Hashim, M., Tlemsani, I. & Duncan Matthews, R. A sustainable University: Digital Transformation and Beyond. Educ Inf Technol 27, 8961–8996 (2022). https://doi.org/10.1007/s10639-022-10968-y

ABOUT THE RESEARCH

The study consisted of nine in-depth qualitative interviews (x 45 minutes online) in August 2023 with Chief Information Officers (or equivalent) based at a range of universities in the UK including Russell Group and post-1992, and a subsequent quantitative online survey[9] of 336 faculty with involvement in teaching or lecturing in the UK.

[9] Quantitative fieldwork dates: 5 October - 1 November 2023. Average length of interview: 5 minutes

UK UNIVERSITIES AND THE BRAVE NEW WORLD OF AI

Typically, the Chief Information Officers (CIOs) we spoke to were too senior to know specific numbers and types of digital assets; they were more likely to indicate the scale of operations by giving an idea of numbers of staff, students, and business partners for example. One described the numbers of devices as "in the high 20,000s", and explained the scale and complexity as being akin to that of "a small city" with some Faculties larger than other entire universities. Further complexity is added by multiple campuses (sometimes abroad) and/ or transnational education ventures (TNE), and mergers with other institutions.

Inevitably this brings huge legacy challenges and worrying levels of technical debt[10] (not least because legacy code is often not secure). There can be tens of thousands of access points, and hundreds of niche or specialist applications, with single sign-in or MFA. In addition, older devices may not receive the latest security updates or benefit from the latest functionalities in terms of both processors and operating systems.

> **Older devices may not receive the latest security updates** or benefit from the latest functionalities in terms of both processors and operating systems.

[10] Technical debt is accrued work that is "owed" to an IT system, and it is a normal and unavoidable side effect of software engineering. Teams "borrow" against quality by making sacrifices, taking short cuts, or using workarounds to meet delivery deadlines. These sacrifices eventually cause the software to deviate from its prescribed nonfunctional requirements, and in the long-term, they can impact performance, scalability, resilience or similar characteristics of the system. Technical debt can also accrue when teams delay performing regular maintenance on the system. Eventually, technical debt can accrue into a critical mass where the software becomes unstable, and customers become dissatisfied. Delayed maintenance can also result in significantly higher support costs when the software or its infrastructure reaches "end-of-life". Definition of Technical Debt - Gartner Information Technology Glossary

Looking at the digital landscape from the academics' point of view (see Fig 1), laptops are the most frequently provided hardware to support the delivery of teaching and learning, with basic performance desktop computers not far behind. Interactive whiteboards were provided to just over a quarter of respondents, with tablets (10%) and VR/AR headsets (4%) way behind. Over one in ten respondents (12%) claimed that their university did not supply them with any technology to support the delivery of teaching and learning.

Hardware Technologies University Provides to Support with the Delivery of Teaching and Learning   Figure 1
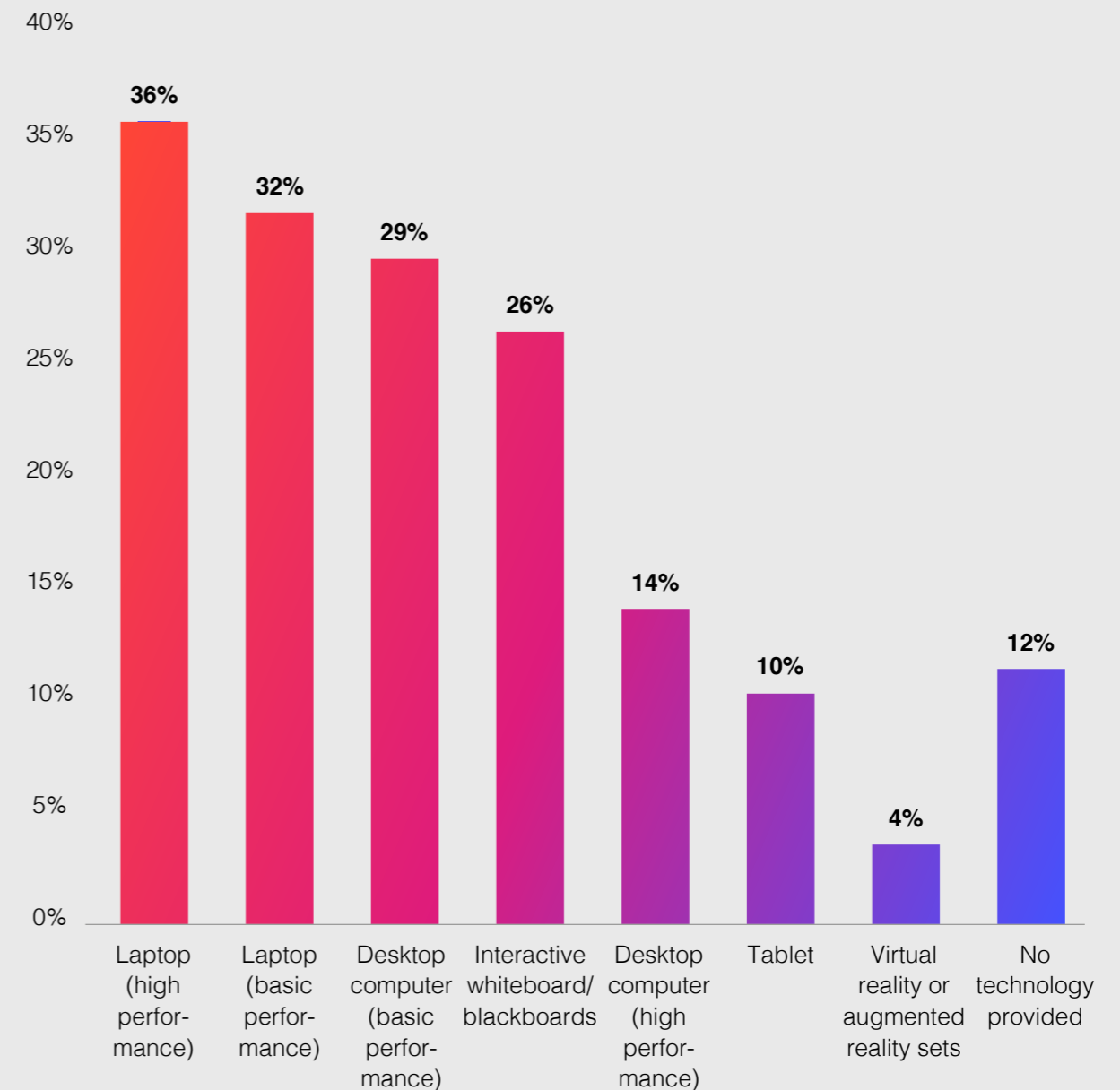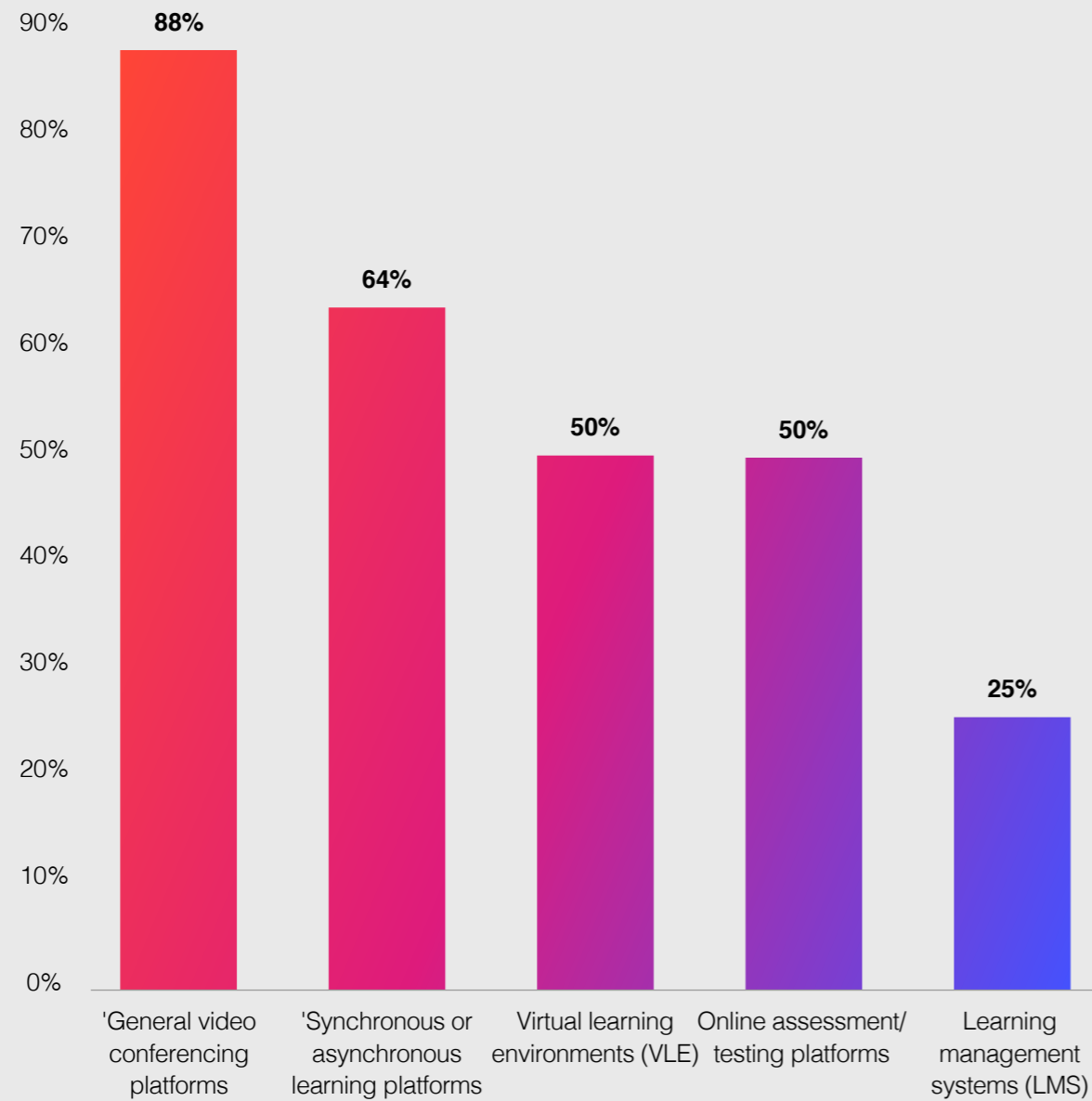
Question: What hardware technologies does your university provide you with to support the delivery of teaching and learning? Please select all that apply. Base: 336

Figure 2

Software Technologies University Provides You with to Support the Delivery of Teaching and Learning

- General video conferencing platforms: 88%
- 'Synchronous or asynchronous learning platforms: 64%
- Virtual learning environments (VLE): 50%
- Online assessment/testing platforms: 50%
- Learning management systems (LMS): 25%

Question: And what software technologies does your university provide you with to support the delivery of teaching and learning? Please select all that apply. Base: 336

In terms of software provided (see Fig 2), video conferencing platforms are almost universal (88%), and most academics had access to learning platforms such as Class, Blackboard or Canvas, VLEs and online assessment platforms. Only a quarter were provided with learning management systems.

As we have seen from earlier sections of this report, COVID-19 made changes to the way online teaching is delivered and how communication happens, with CIOs being enabled to lead developments of unprecedented scale and scope. However, as might be anticipated, the picture is not entirely positive now from the CIOs' point of view, with increased pressure typically reported on helpdesks:
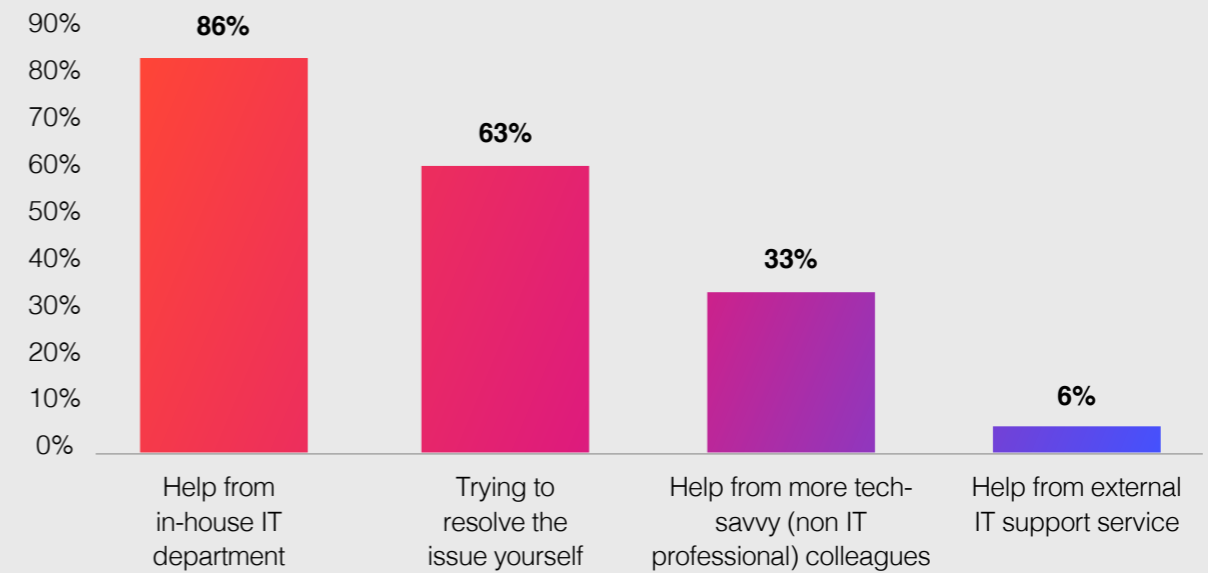
"
…with a 300% increase in student numbers there is a strain on network environments. As more people are connecting from off campus and concurrently, there is more of a strain on legacy infrastructure."

Chief Digital Transformation Officer, established university

We found this problem reflected in our survey with academics also (see Fig 3). Whilst most academics (86%) resolved IT issues with help from their in-house IT department, almost two thirds (63%) resorted to trying to sort them out on their own and a third asked more tech-savvy (but not IT support staff) colleagues for help:

How IT or Technology Issues are Typically Resolved at the University

Figure 3

- Help from in-house IT department: 86%
- Trying to resolve the issue yourself: 63%
- Help from more tech-savvy (non IT professional) colleagues: 33%
- Help from external IT support service: 6%

Question: How are IT or technology issues typically resolved at your university? Please select all that apply. Base: 336

Moving back to the strategic level, a further complication for Chief Information Officers can be in terms of asset management and budget holding: one Russell Group university explained that they have no centralised budget but are funded by the individual colleges. This means that some colleges can afford a regular refresh, whereas others cannot. In addition, there is no central asset management system, and so no way of knowing what devices there are or how much technical debt, and yet:

"

With the changes in technology now and solutions that are coming through, we need to keep replacing [devices] because anyone knows nowadays that if you buy a device, in 3 to 4 years it's extremely slow and doesn't keep up with the current services…So we need to keep that investment going to make sure people have the kit that provides what they need on a day to day basis."

*Chief Technology Officer,
post-1992 university*

The CIOs typically had only partial responsibility for hybrid/online learning, usually technical support only, with academic colleagues doing the rest. Complications include the fact of students using their own devices (BYOD) and staff usually using laptops; in both cases, working needs to be agile and remote, and IT departments need to support that flexibility.

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Cybersecurity is a huge concern: some of our respondents had moved to large, well-known universities in the last few years and found that there were no cybersecurity strategies or measures in place, and so addressing this had been a major priority. One institution had been the victim of a major cybersecurity attack. It is now 'business as usual' to build in cybersecurity when constructing or upgrading networks. Typically, on or offshore Security Operations Centres (SOC) are created to keep log files and monitor activity 24 hours a day every day, cybersecurity teams on campus have been expanded, and endpoint anti-virus software implemented which will both diagnose and block problems (described as "anti-virus on steroids"). One respondent described cybersecurity as *"a FTSE 100 company sized problem we have but without a FTSE 100 company sized budget."*

For respondents who do not have centralised ownership of infrastructure (for example, in a collegiate university) cybersecurity is even more of a worry:

"

Some of the [non-IT team] owners of bits of infrastructure are aware, and some much less aware, of cybersecurity issues…there is a lot of stuff I don't have visibility of…"

*Chief Digital and Information Officer,
established university*

We have noted elsewhere in this report that the COVID pandemic allowed what our respondents generally saw as an unprecedented rate of change. In a similar way, one of the universities we spoke to had been the victim of a massive cyberattack, which is not something anybody would want, but which *"accelerated some things we wanted to do anyway"* and enabled a root-and-branch review of infrastructure replacement: *"how do we want it to look?"* In addition, *"The advantage of the disaster of the cyberattack is that is has made for much easier conversations around cybersecurity."*

In addition, one crucial judgement call required of all universities is to achieve the right balance between open access and meeting curriculum requirements for subjects such as engineering and graphic design where there can be complicated and sometimes quite old hardware and software involved.

All institutions seemed to be working to very similar strategies, essentially building foundations of people, processes and tech., and then aiming for *"transformation"*:

"

There are three parts: get the foundation right, build the environment, and then start to utilise the data and the insights that you've actually got to drive the business and make informed decisions."

*Chief Digital Transformation Officer,
established university*

It was generally felt that IT had developed hugely over recent years from 'just' dealing with on-site computing to a role which is much more strategic and business-focussed, a "trusted business partner", reflecting the changing nature (and often, massive growth) of universities and their more business-like mindset. Some of the respondents' job titles reflected this, most were 'Chief Information Officers' but others had wider titles, including Head of IT Business Partnering, Chief Digital Transformation Officer, or Director of Digital Strategy and IT. The role is now thought to be much more about enabling and 'joining up' across a huge range of tasks, processes, and assets, than 'just' doing IT support. A crucial part of this is providing all sorts of business intelligence (BI) and data to the different functions of the university to aid better decision making based on evidence. The headline aim is essentially to improve staff and student experience, *"to make life easier and better for everyone."*

Many of the digital estates strategies are visionary and ambitious: one respondent expressed his aim to put in major initiatives including a new HR system and a new student information system because then his institution will have *"rich insight on their people, students and outcome of teaching. They will have the means to be able to communicate that effectively which will being more income, more interest and generate their ability to become a world class institution that they aspire to be."*

Brave New World?

The topic of artificial intelligence (AI) came up spontaneously and repeatedly in our conversations with CIOs. There was much uncertainty about the challenges and opportunities presented by AI for staff, students, and institutions as a whole; one Russell Group university told us that *"At the moment the focus is on stopping people cheating, less on the opportunities"* whereas a post-92 university said *"We need to think how we use [AI] to measure knowledge gain, not be frightened by it."* Nobody we spoke to yet had a clear AI strategy.

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There was a range of responses as to how AI was being used or might be used, from the tactical to the more strategic. At the tactical end of the spectrum, there was a desire to use emerging technologies better; *"How can AI help us to be quicker and more responsive?"*. The answer to this question generally seemed to be process automation: for example one university was thinking about a single-service helpdesk which would run on a knowledge base of the most frequently-asked questions about all of the services across the institution. This was in the hope that AI can be harnessed to deal with mundane and repetitive tasks, and/or tasks which there is no (human) capacity to do.

At a more ambitious level, one established university was already experimenting with app development and told us that they were talking to a supplier which designed and built a student record system for them from scratch during a two-hour pitch! (They also said they would not be using the system…) They were working on pilots to use as quick solutions to immediate problems – *"disposable systems…if the pilots work, we might change the business plan for next year."*

AI was less top-of-mind for the academics we surveyed, and those who did mention it had widely differing views, from the pragmatic to the doom-laden, one saying *"I'm actively encouraging the use of AI and other tools in my teaching. It really needs to be embraced as this really is the future of working"* and another that *"The greatest threat is the advent of AI….If AI becomes mainstream, any notion of pedagogy will become redundant."*

"At the moment the focus is on stopping people cheating, less on the opportunities" whereas a post-92 university said **"We need to think how we use [AI] to measure knowledge gain, not be frightened by it."**

CRISIS AND OPPORTUNITY

For most of the institutions we spoke to, core applications were being moved into SaaS, and servers were being moved to the cloud. It was often felt to be a huge task, replacing systems and processes whilst things still have to carry on working. As we have just seen, they were also experimenting with AI at different levels.

The COVID pandemic had an iconoclastic effect on universities' IT provision; one respondent described it as a *"massive accelerator"*. It allowed changes to happen which many of our respondents said would otherwise have taken years to 'get through the system'. Of course it forced courses online (and many now remain hybrid), but in other IT-specific examples, thousands of new laptops were bought: Windows 7 was removed wholesale: in one case it effectively allowed approval for a £76m IT modernisation programme with call-off resources onshore and offshore: and it effectively forced migration from e-mail and Skype to Microsoft 365/Teams. Another non-IT specific change forced or enabled by the pandemic was the huge increase in home/remote working for staff.

Whilst devices to support the transition to hybrid learning were bought hastily in the light of the pandemic, not all may have been fully suitable for the 21st century requirements of modern-day learning.

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The main benefits to institutions from the nature and scale of the changes enabled by the pandemic were described by one Russell Group university as constituting *"tremendous progress."* Another benefit was that:

> **In the cost of living crisis, staff appreciate the flexibility to work from home; it helps retain [IT staff] as IT private sector salaries have stepped up. Also there's a green impact with less travel to work.**
>
> *Chief Information Officer, post-1992 university*

Another advantage of the increase in home-working for one Russell Group university was that they now do not have enough room for all of the staff they have, and would not have had space to recruit more.

The main challenges in implementing major changes have been a mixture of technical debt and 'university governance' (rendered in one case as *"power dynamics"*). Overwhelmingly, respondents felt that their major problem was not any kind of technical or digital issue, but with people: whether dealing with inadequate digital skills or vulnerability to phishing (of staff and students), bringing colleagues and senior management along with them when they see the need for any sort of major change, or *"Self-inflicted over-complication; people are so invested in local ways of doing things...Even when we can see that there are improvements to be made, there is no willingness to directly manage the difficulties...."*

Digital literacy

A further complication emerging in recent years is that the most familiar means of communication with staff and students can be very different; for example, staff are typically very comfortable with using email, but students much less so; conversely, students are very *"social media savvy...but not IT literate"*. The digital skills of both staff and students are sometimes an issue; one CIO mentioned the misunderstanding that can arise when using the descriptor 'digital natives' of students, because he felt that implied that students were familiar with technology and willing to sort out their own problems, whereas his strong view was that they were not. The same theme came up repeatedly in the survey with academics. Whilst a minority of academics asked for more training (although *"it's hard to keep up even if training is available"*), others wanted software and hardware that was more intuitive to use, and for IT support to be proactive, more readily available (ideally in person) and more knowledgeable about the IT resources in the academics' own subject area. They felt that IT was yet another addition to their workload, one academic exclaiming *"The expectation for lecturers to be expert in problem-solving IT issues is mind-blowing!"*

Digital business-related skill shortages will affect 90% of organisations by 2025, costing over $6.5 trillion globally through the year due to delayed product releases, reduced customer satisfaction, and loss of business, according to the IDC Skills Practice report (2022).

The Intel® Skills for Innovation Initiative (Intel® SFI) empowers decision makers and educators in adopting technology to create innovative learning experiences which actively engage students in all learning environments — virtual, on campus, or blended. By inspiring teachers and learners to reach their full potential through a technology-supported, skills-based approach, the Intel SFI Initiative guides them to build their skills to maximize learning outcomes and prepare students for a changing, technology-dominated world.

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Financial constraints are also an issue particularly for smaller universities: and one respondent compared what he described as the typical ratio of revenue spent on IT in HE (5%) compared with other sectors where it can be as high as 25%.

Staff are typically very comfortable with using email, but students much less so; conversely, **students are very "social media savvy...but not IT literate".**

The zero-carbon targets are being integrated into university strategies and policies; institutions typically build sustainability into all policies and when they are putting forward projects and proposals, they include a section on sustainability:

"

You become very creative, but it is a challenge when you want to do new things particularly and want to invest ahead of need...You're forced to make compromises in areas that you wouldn't want to, you would want to invest more in training and support but there is a limit to what you can practically do."

Chief Information Officer, established university

Universities are aiming for zero-carbon targets. One university aims to achieve this by 2035. This is being integrated into university strategies and policies; institutions typically build sustainability into all policies and when they are putting forward projects and proposals, they include a section on sustainability:

"

Historically, decisions around technology and procurement would have been made around cost and technical solutions, but sustainability is now also used to make decisions."

Chief Digital Transformation Officer, established university

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PERSPECTIVES ON ONLINE LEARNING NOW

Our survey with academics showed clearly (see Fig 4) that online/hybrid teaching has become habitual compared with the situation pre-pandemic: then, 63% were doing no online/hybrid teaching, and that figure has dropped to 22%; only 6% were doing the majority of their teaching in this mode then, and this has more than tripled to 20%. Satisfaction levels amongst the academics with the IT/digital infrastructure provided by the university to support teaching were less than resounding, with fewer than four in ten (37%) being satisfied (see figure 5):

Moving back to the strategic level, being heavily reliant on end users' infrastructure means that universities face difficulties that are out of their control. For example, some cities, even in the UK, have poor Wi-Fi speeds. One established university reports that around 80% of problems

## Proportion of Teaching Delivered in an Online/Hybrid Format

Figure 4
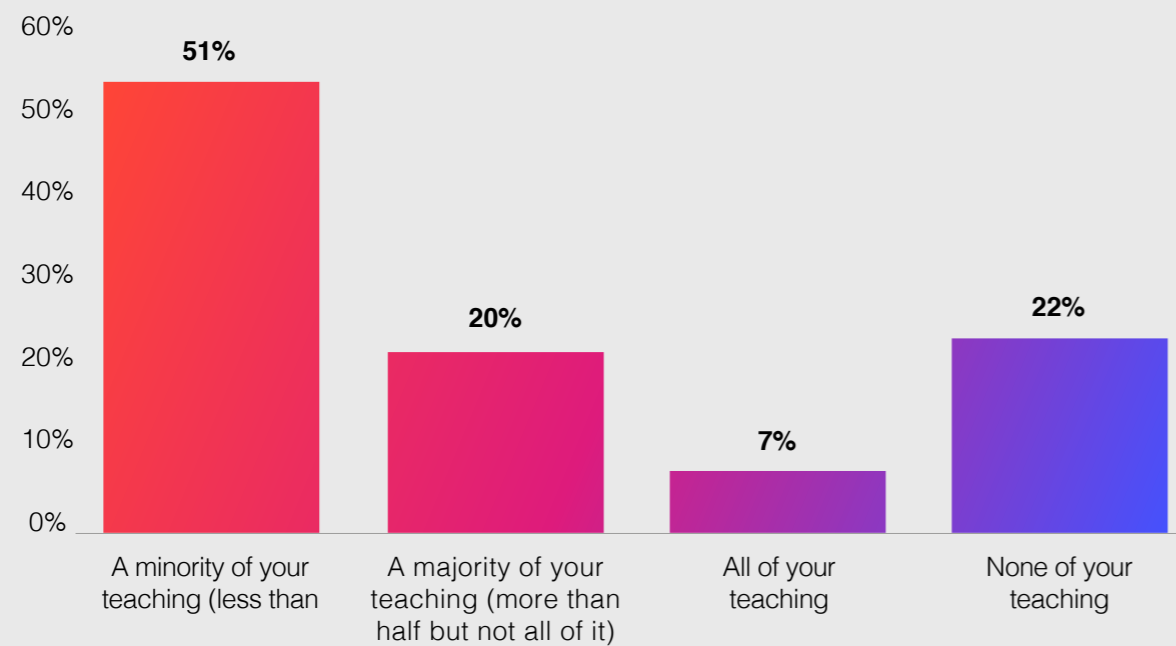
Question: Since COVID 19 restrictions eased and you were able to teach in person again, what proportion of your teaching has been delivered in an online/ hybrid format? Base: 336

Satisfaction with the IT/Digital Infrastructure Provided by the University to Support Teaching Particularly Online/Hybrid Teaching

Figure 5
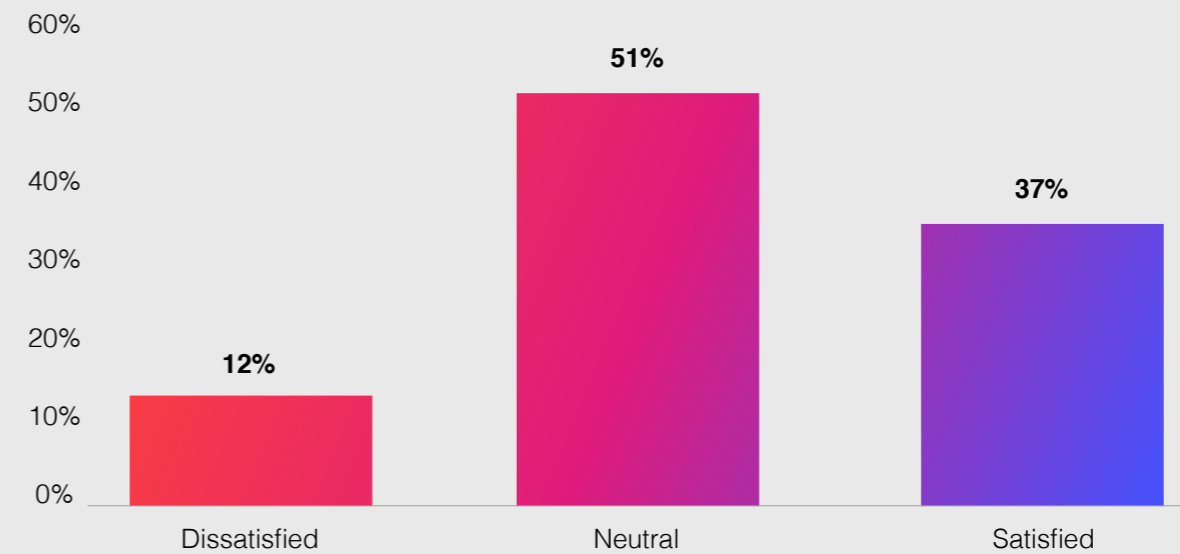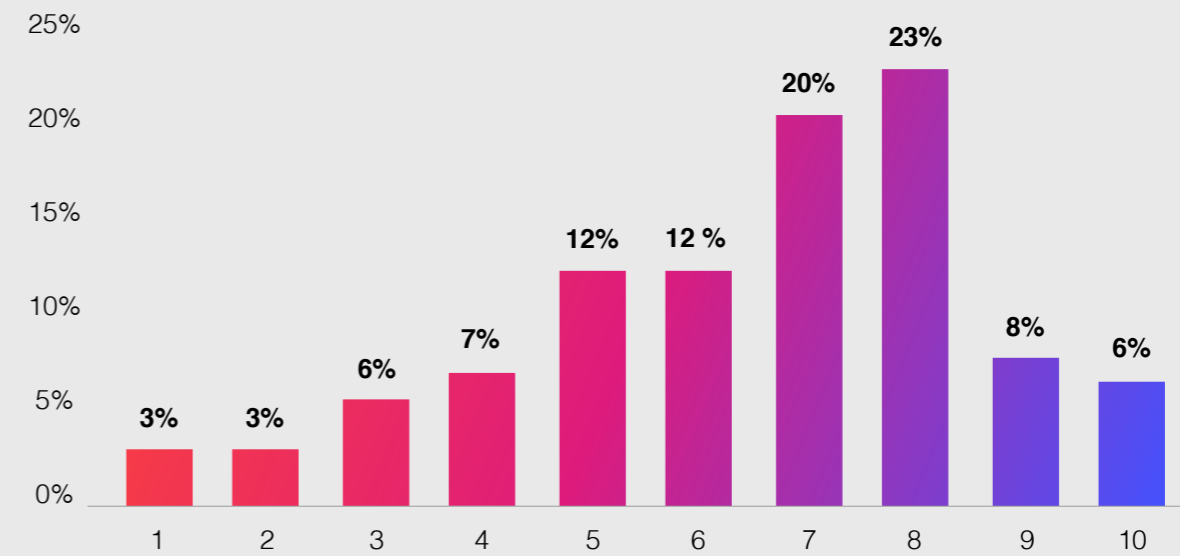
Question: How satisfied are you with the IT/digital infrastructure provided by your university to support teaching particularly online/hybrid teaching? Please answer on a scale of 1 to 10, where 1 means not at all satisfied and 10 means very satisfied. Dissatisfied (1 3) / Neutral (4 7) / Satisfied (8 10). Base: 336

are at the student end. Many live in houses in multiple occupation (HMO) where there are only basic internet connections. (Rich learning resources require bandwidth and to achieve this, the university is in talks to support 5G provision).

Another university mentions that equipment can be more of a challenge, such as setting up audio in the room and creating an immersive experience. While the systems and solutions are available, it is now about trying to *"work seamlessly with students and staff so it does become an opportunity for academics to deliver in different ways instead of technology limiting whatever's in the room, limiting to how an academic can present information."*

From the academics' point of view, the majority (almost nine in ten) experience delays with online/hybrid teaching, whether waiting to connect to online learning platforms, for students to connect, for applications to load, or because of network outages. Delays are most frequently experienced with waiting for students to connect (30%), followed by waiting for applications to load (22%) and connecting to online learning platforms (17%). Only 9% experience frequent network outages, although this relatively small percentage is still likely to be causing stressful situations, interfering with the ease and effectiveness of the learning environment. (See Figs 6-9).
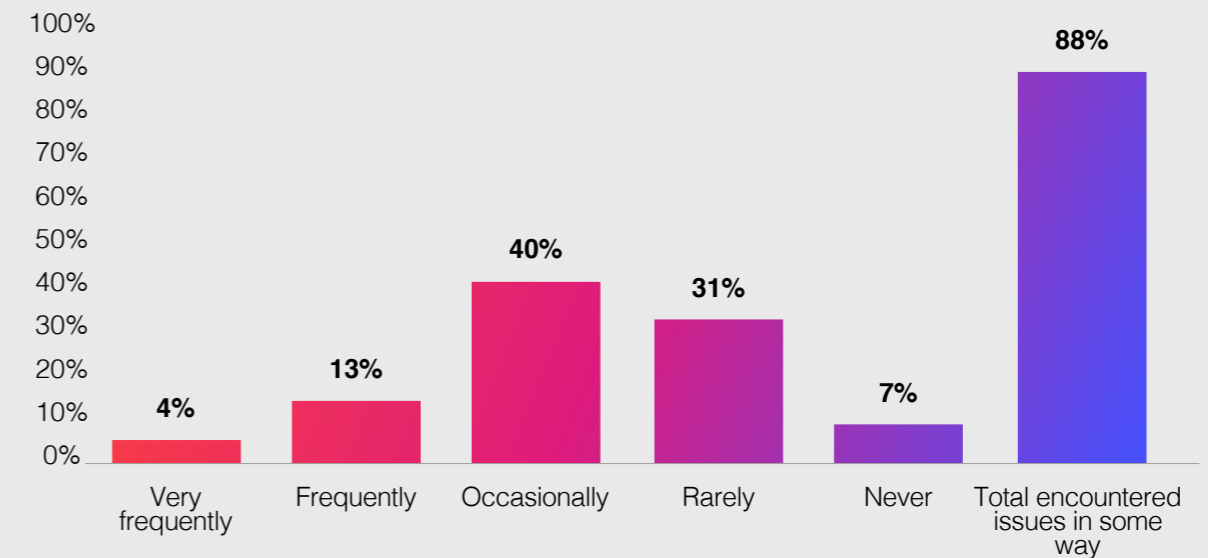
It is now about trying to "work seamlessly with students and staff so it does become an opportunity for academics to deliver in different ways instead of technology limiting whatever's in the room, limiting to how an academic can present information."

Delays In Connecting to Online Learning Platforms

Figure 6

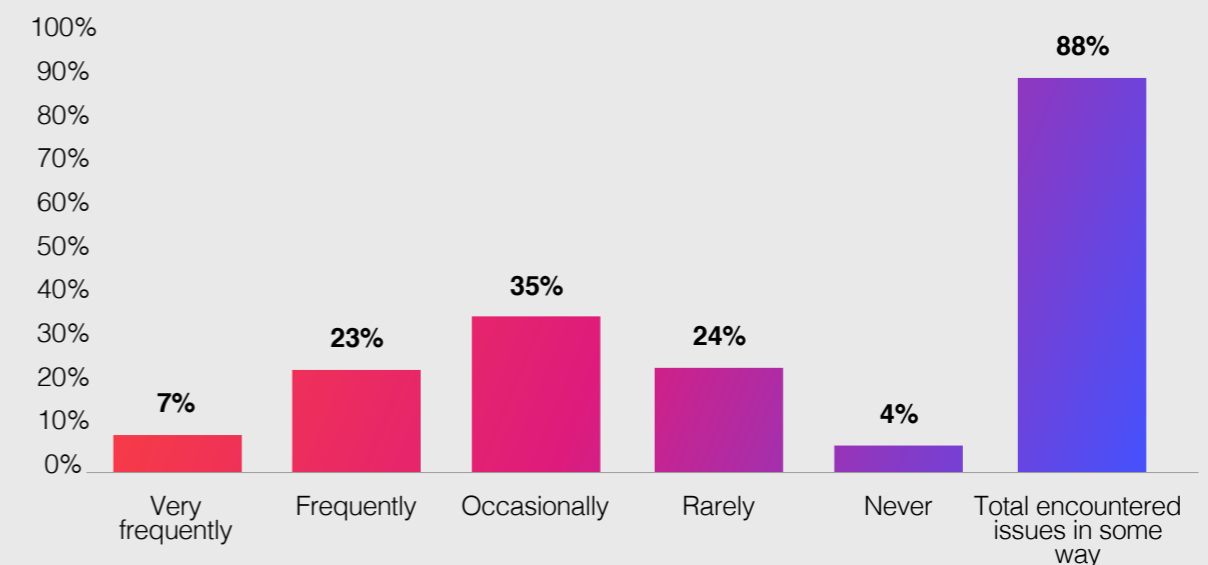| Category	Value
Very frequently	4%
Frequently	13%
Occasionally	40%
Rarely	31%
Never	7%
Total encountered issues in some way	88%

Question: Thinking about your experiences of teaching particularly any online/hybrid teaching how frequently do you encounter the following types of issues. Base: 336

Delays in Waiting for Students to Connect to Online Learning Platforms

Figure 7

| Category	Value
Very frequently	7%
Frequently	23%
Occasionally	35%
Rarely	24%
Never	4%
Total encountered issues in some way	88%

Question: Thinking about your experiences of teaching particularly any online/hybrid teaching how frequently do you encounter the following types of issues. Base: 336

Figure 8

Delays Waiting For Applications to Load
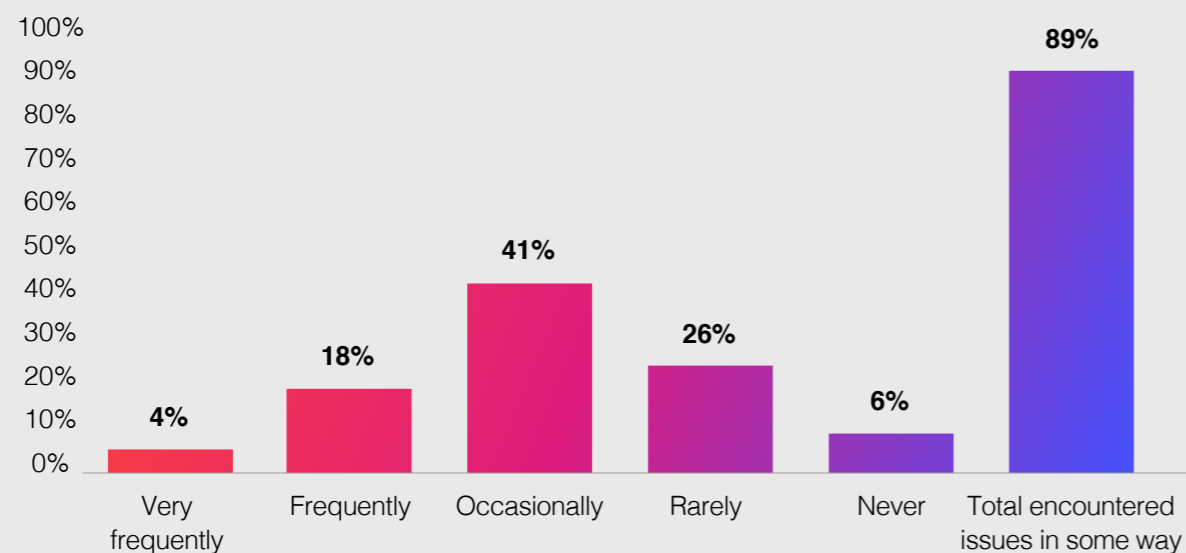
Question: Thinking about your experiences of teaching particularly any online/hybrid teaching how frequently do you encounter the following types of issues. Base: 336

Figure 9

Temporary Network Outages
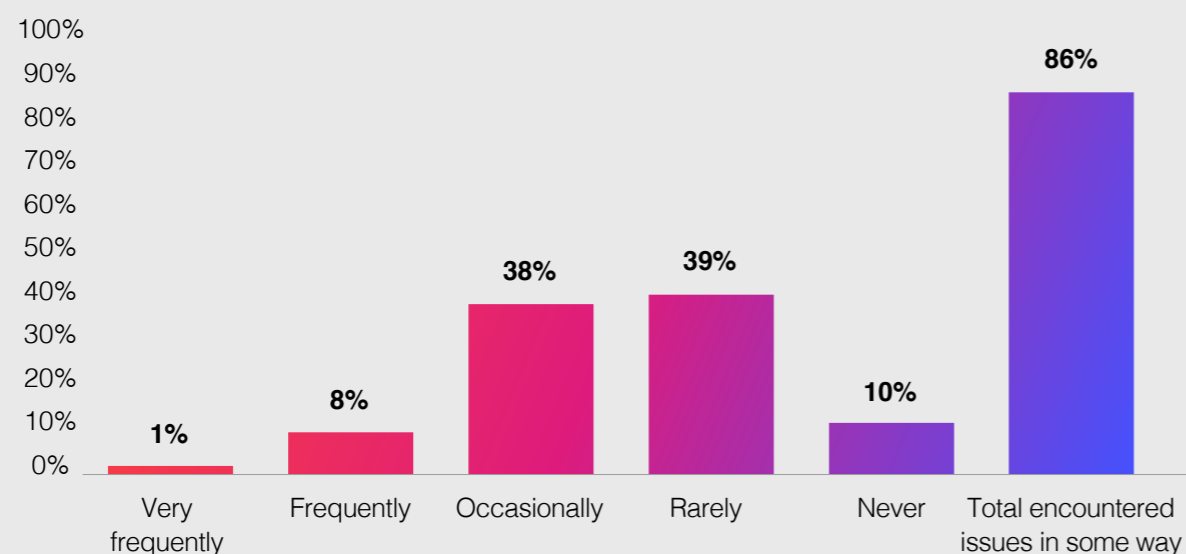
Question: Thinking about your experiences of teaching particularly any online/hybrid teaching how frequently do you encounter the following types of issues. Base: 336

We also asked the academics the extent to which a range of other issues had impacted delivery of online/hybrid teaching and found that almost a quarter said lack of IT support staff, and not having up to date hardware, had impacted (to a very large or large extent). Almost one in five said that students struggling with digital poverty, or digital literacy, had affected delivery of online/hybrid teaching. By a small margin, the struggle with digital literacy was the largest problem, in terms of the percentage impacted in some way, a clear call for additional support. 18% of the sample thought that not having up to date software had also been an issue to a large/very large extent. (See Fig 10).

Almost one in five said that students struggling with **digital poverty, or digital literacy, had affected delivery of online/hybrid teaching**

Figure 10

Extent of Technology Related Issues Impacting the Delivery of Teaching Particularly Online/Hybrid Teaching

	To a very large extent	To a large extent	To some extent	To little extent	Total impacted in some way
Students struggling with digital poverty	6%	13%	32%	21%	73%
Not having up to date software	5%	13%	29%	21%	69%
Not having up to date hardware	7%	15%	27%	26%	75%
Lack of IT support staff	9%	15%	24%	25%	74%
Students struggling with IT / digital literacy	6%	13%	30%	28%	77%

Question: To what extent have any of the following technology related issues impacted your delivery of teaching particularly online/hybrid teaching. Base: 336

THE FUTURE

The future for digital estates beyond the five- or seven-year span of current strategies is essentially perceived to be further development of the same tactics, such as enabling regular refresh of devices, consolidating platforms, apps and tools, upgrading software, and keeping on top of cybersecurity. At a higher level, there is a vision of digital inclusivity, meeting the expectations of the (many different) user bases in a university, *"continually moving to the Amazon/mobile phone experience….No one wants to do a training course"* and being more agile than has been possible before:

"

A part of being agile is that you don't always get things right all the time. You need to try something and if it doesn't work, look at it again. This becomes more of an exciting environment to work in. Automation if done well can really help."

*Chief Technology Officer,
post-1992 university*

The barriers to achieving this are the same day-to-day challenges, such as financial constraints (including the effects of the freeze on university fees since 2017, and high inflation rates), and the vastness and complexity of universities which can mean different parts of the university pulling in different directions, making assessment of IT priorities more complex. In addition, *"there is a revolving door of people at the top in IT in HE. But you need stability to drive changes through. Salaries in HE are not great, other people in IT are attracted by large salaries."*

Back to day-to-day concerns, we asked academics to what extent they agreed that they get sufficient support to effectively utilise technologies when delivering online – and almost one third disagreed. Disagreement that students have received sufficient support to effectively utilise technologies for online learning is slightly lower, but still almost a quarter of our academic respondents disagreed:

This is a clear call for support for online/hybrid learning, alongside the more transformative developments that CIOs are wanting to make in the future.

I Have Received Sufficient Support to Effectively Utilise Technologies When Delivering Online
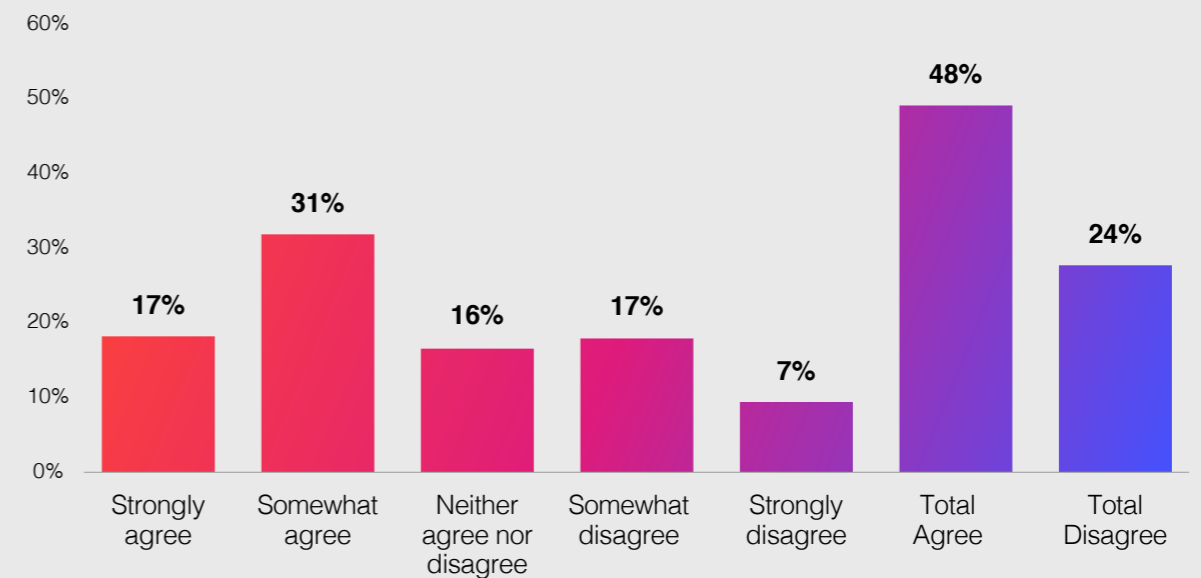
Figure 11
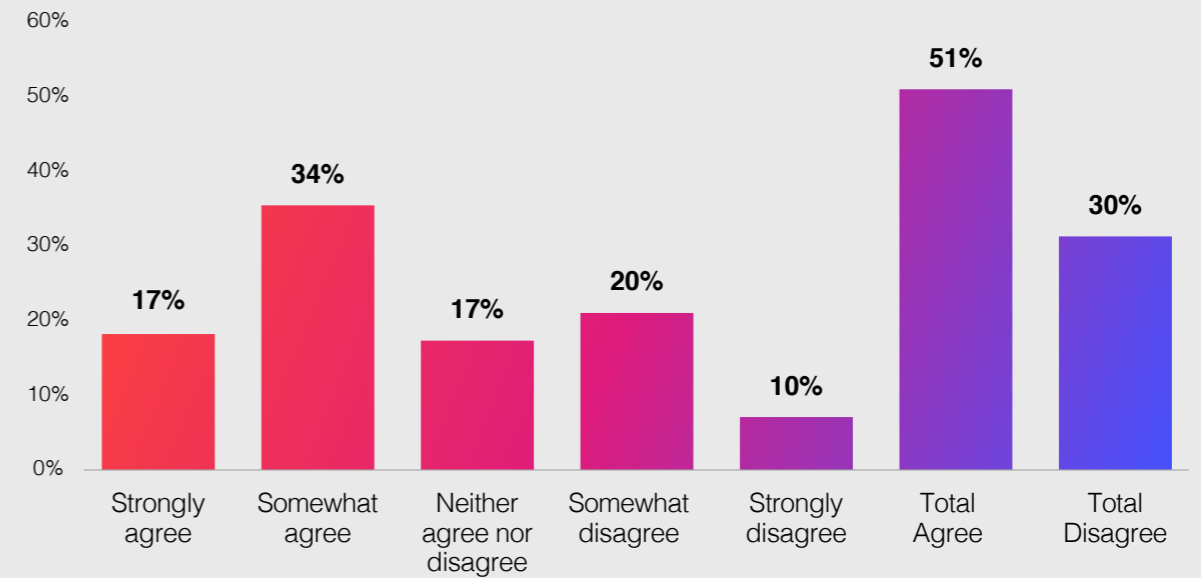
Question: To what extent do you agree or disagree with the following statements (I have received sufficient support to effectively utilise technologies when delivering online): Base: 336

Students at My Institution Have Received Sufficient Support to Effectively Utilise Technologies For Online

Figure 12

Question: To what extent do you agree or disagree with the following statements (Students at my institution have received sufficient support to effectively utilise technologies for online): Base: 336

CONCLUSION

This research has we hope shown clearly the challenges facing UK universities' digital estates. Chief Information Officers, as leaders of those estates, are facing an array of problems, from people to processes and governance, and (of course) technology.

The people challenges, with both staff and students, can be anything from poor understanding of cybersecurity imperatives, to digital illiteracy and digital poverty. Processes and governance can inhibit progress because of budget constraints, red tape, contradictory institutional priorities, and 'power dynamics'. Finally, the technology itself is a huge challenge, particularly around the opportunity cost of technical debt within digital estates, which is not only financial but can also hamper productivity, innovation, and the learning experience. There is also the conundrum of balancing cybersecurity with easy access, and providing both staff and students with the devices, systems, and support they need.

Recent developments in AI add further complexity, constituting perceived threat to some, and opportunity to others. Understanding more about these threats and opportunities is a clear imperative for CIOs.

In summary, the digital estate landscape looks increasingly difficult to traverse successfully. However, the CIOs we spoke to saw clearly what they were aiming for: business transformation. This business transformation will see CIOs as trusted business partners within their institutions, making life easier and better for staff and students alike, integrating systems and providing business information to enable evidence-based decisions.

Equally importantly, day-to-day support for IT users, training, and provision of appropriate hardware, whether for staff or students, must not be left behind. Keeping in touch with those day to day requirements on the ground, as well as the overall strategy, is as important for a successful digital estate as the strategic vision.

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