Strengthening EdTech in Higher Education: Policy Recommendations and Principles 1.0

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This document is an outcome of the ESRC-funded research project 'Universities and Unicorns: building digital assets in the higher education industry'.

It is the first version of policy recommendations and principles, so we call it 1.0. It is based on our preliminary findings from the project.

As the research team continues to analyse data from the project and work on the digitalisation of higher education, we plan to update the recommendations in future. We also call on the higher education and Edtech communities to engage with our recommendations and principles, propose updates, and comment on this document.

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Contents

1 Summary of the proposal

British universities now depend on digital technologies. Educational technology (Edtech) brings new opportunities to personalise student experience and pursue institutional efficiencies. These technologies support complex data operations, using machine learning and artificial intelligence, which depend on digital user data. Therefore, it matters who collects, controls, processes, and innovates with user data in higher education; and with what aims and principles.

Since data-driven technology will have increasingly consequential effects on students' learning paths and academics' careers, they should be included in decision-making on Edtech and underpinning data processes.

Higher education stakeholders, Edtech companies, investors in Edtech companies, and policymakers need to work together to achieve a system in which Edtech and user data are governed to support individual rights, institutional progress, and fair market competition and innovation.

This document introduces proposals that are intended to stimulate discussion among UK higher education stakeholders and motivate collective action.

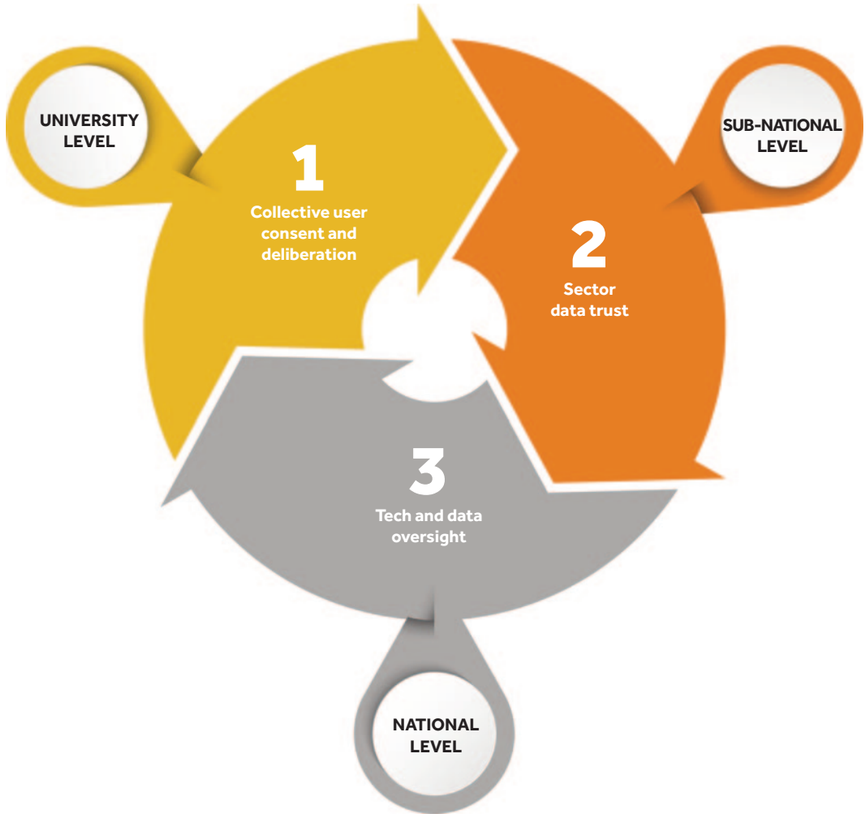


Figure 1. Three dimensions of technology and data governance in higher education

Our proposals are organised into three dimensions:

1 Student and staff agency and autonomy in engaging with digital technologies in their studies and work. These recommendations would require university implementation.

2 User data governance that supports data processing and responsible innovation while controlling for risks. These recommendations would require sub-national-level implementation (England, Northern Ireland, Scotland, Wales).

3 Monitoring the impact of various Edtech products and services and data operations that these products and services conduct. These recommendations would require national implementation.

We invite stakeholders to discuss our recommendations.
We welcome feedback as we continue with our research.

2 Introduction

British universities use various digital technologies to run their operations, including teaching and learning, research, and enterprise management. The recent expansion of Edtech, including a vibrant start-up sector, has brought new expectations of how technologies and digital data operations could support higher education. The key aims of the Edtech sector include the personalisation of learning and student experience, and increased institutional efficiency. These aims are expected to be delivered by data-driven technologies, such as machine learning and artificial intelligence, and to produce various outputs, such as predictive analytics. Edtech is already impacting how students learn, how staff work, and how we think about the aims and value of higher education. With the increasing capacity of data processing and expansion of data-driven Edtech, the impact is predicted to become even more substantial. Therefore, it is crucial how Edtech develops, what kind of products will be introduced into the sector and with what effects, and how students and staff can influence the direction of technological development.

However, universities and their students and staff face several challenges and risks. These include the ability to make decisions about which digital technologies are used for their studies and work, which user and personal data is collected when they use these technologies, how data are processed and for what purposes, how data are acted upon, and how the impact of Edtech is monitored and evaluated.

Edtech companies face challenges as well. While digital innovation is desired by policy and higher education stakeholders, the potential for competing with established companies is limited. Realising innovation potential is difficult due to the challenges of scaling services and the winner-takes-all strategies of established companies. The resources available to support Edtech in the sector are limited.

It is essential that we find ways to guide the path of Edtech development. Most importantly, we must develop approaches that enable transparent, democratic, and fair user data governance.

These initial recommendations and principles are based on our interim findings from interviews with university staff, Edtech companies' employees, and investors in edtech; focus groups with universities; public consultation; document analysis; literature analysis; and quantitative database analysis. Fifty participants contributed to our interviews, focus groups and public consultation, and 2,500 documents related to universities as they digitalise, Edtech companies, and investors in Edtech were analysed. Moreover, our quantitative analysis included 2,000 Edtech companies, 1,200 investors in Edtech, and 2,000 Edtech investment deals.

Education technology (Edtech) is incredibly diverse and complex, but these proposals only address Edtech and other digital technology in higher education. We focus only on products and services catering to universities and supporting university students, staff, and management, excluding those targeting individuals directly or those focusing on enterprise learning. Nevertheless, our suggestions may apply to other Edtech industry segments; or even other social and economic sectors more generally, as they get increasingly digitalised and datafied. Furthermore, this document intends to motivate discussions in the UK, but the suggestions may also apply to higher education sectors in other countries.

The proposals in this document outline a set of possible directions to motivate stakeholder discussion about key issues. The recommendations:

- Relate to both digital technology and data operations. It is not only about how user data are processed and acted upon, but also about which technology is used in the sector and how.
- Support innovation and fair competition. By setting the rules of user data governance, conditions would also be set for societally beneficial data processing, innovation, and monetisation.
- Safeguard against potential harm and protects users, and opportunities for independent structures to work in the users' interests.

These policy recommendations focus on long-term strategic changes and build on existing policy frameworks and recommendations[1]. Moreover, we recognise and encourage principles that are already broadly accepted, including:

- Interoperability
- Avoidance of technological, economic, and legal lock-ins
- Avoidance of monopoly tendencies
- Open standards and open source
- Care for the environmental impact of technology

This document first outlines our proposals for discussion. It then suggests how these could be implemented by higher education stakeholders. The appendix provides a brief overview of the context based on our preliminary research findings and describes the process of preparing this proposal.

1 Some of these are: Framework for digital transformation in higher education by JISC and other JISC's work on Edtech; Trust Framework for EdTech in Public Education by Project team based in the Netherlands; European Edtech alliance and its publications, such as Foundations for public-private partnerships; Data trust initiative

3 Proposals for Discussion

These proposals for discussion are organised into three dimensions at different levels. Together, they represent a holistic and cross-cutting intervention in technology and data governance to support individual rights, institutional progress, and fair market competition and innovation.

Figure 2. Three dimensions of technology and data governance in higher education

3.1 Improving User Consent and Deliberation Processes

The first dimension relates to student and staff agency and autonomy in engaging with digital technologies in their studies and work. It is proposed for university-level implementation.

3.1.1 Current State

Universities use technology for running and improving their operations. Increasingly, they also process, analyse, and use student and staff user data collected from various digital platforms, and are able to connect these data to student records. Universities analyse and use data with the students' and staff's best interests in mind. However, as more and more student and staff activities become mediated by digital technologies, so does the amount and granularity of user data generated by these technologies.

While universities have legal obligations in place to safeguard personal data, students and staff do not seem to be meaningfully included in their university technology policy and practices more broadly:

- Students and staff do not discuss and choose which technology they can use for their studies and work. Decisions are largely made for them.
- Students and staff do not know which data are collected from them when they engage with various digital platforms, how data are processed and by whom, which digital products are developed based on their data, and most importantly, how their data are used to impact their studies and work.
- There is an increased risk of surveillance as technology enables various data insights. User data might be used for important decisions on student study paths or staff work trajectories and labour conditions. These decisions might happen without including students and staff in decision-making, or without them knowing their data are being used.
- Current data protection legislation focuses on individual personal data instead of collective deliberation on how aggregated user data are processed, why, and with what impact.
- Institutional privacy and data policies are in place, but students and staff do not meaningfully engage with them. These policies are most likely not widely read and reflected.

3.1.2 Proposal for Consideration

As public institutions with a core mission to advance knowledge and an expectation to support social justice and democracy, universities should be leading organisations in setting new models of technology and data use and governance. Good practices that they develop could have spill-over effects on other sectors. There are three key recommendations for action at the university level:

Introduce selective consent

Introduce collective consent

Introduce/enforce digital strategy committees to enhance transparency

Selective consent addresses issues that arise when users (students and staff) are required to agree to i. institutional data and privacy policies and ii. terms and conditions of digital platforms they use for study and work without any choice. In these situations, students and staff must agree with unilaterally determined terms and conditions to access the technology required for their studies and work. However, as the sector becomes increasingly digitalised and datafied, it is essential to empower users to make informed decisions regarding these agreements.

Selective consent enables individuals to have greater control over their personal data and privacy when using a digital product or service, ensuring that they can make informed decisions about specific terms and conditions. This approach promotes transparency, autonomy, and respects users' rights to choose, fostering a more user-centric approach to data usage in the digital landscape.

Selective consent could be fostered by separating a digital service from analytics. For example, individuals could use the service only (e.g. accessing and reading e-books) without the platform collecting and saving user data (e.g. data relating to their reading patterns). Individuals could selectively agree that their

user data be collected and processed separately for each purpose, such as personalising the service, supporting institutional efficiency, research purposes, etc. This could work in a similar way as consent requested for web cookies.

Collective user consent addresses current practices that focus solely on individual consent, which are inadequate in addressing the complex nature of data processing. Many data processing operations are inherently relational and involve continuous comparisons and grouping of individuals in search of trends. These trends are then used for purposes such as personalisation of learning and predictive analytics[2].

Implementing models of collective consent would recognise the interconnectedness and interdependencies within data processes. Collective consent emphasises the importance of considering the impact on groups and communities, as well as individuals, and ensuring that decisions about data usage are made collectively, taking into account the potential risks and benefits that extend beyond individual users. This approach fosters a more inclusive and socially responsible framework for data governance, promoting a holistic understanding of the collective implications of data processing[3].

Digital technologies used by students and staff could be seen to operate at three levels. First is the 'primary' service, such as reading an e-book, using a virtual learning environment, or attending a lecture via an online meeting platform. The second level is using the primary service with an analytics function, e.g., getting statistical feedback on behaviour while using the service, such as an overview of time spent reading, writing, or answering emails. Both of these levels work between the user and the platform without other users' data. The third level is using the primary service with analytics at the aggregate level of multiple users, such as an individual getting an overview of time spent reading in comparison to their peers, or a university getting an overview of group trends, potential inferences and predictions. Selective user consent would be required for the first two levels, while collective consent would be required for the third level [4].

Universities could also establish or enhance ***digital strategy committees*** consisting of staff and students, who could work together to decide which technology is used at their institution, for what purposes, and with what impacts. The committee could also discuss user data collection, processing, operations, and overall effects at their institution. This approach would benefit from cooperation with sector data trusts (second dimension) and the establishment of an Edtech oversight body (third dimension).

Most importantly, such committees could coordinate the process of informing students and staff at their institution about technology and data practices and coordinate collective consent processes. While some universities might already have committees in which student and staff representatives oversee digital technologies and strategy, broader transparency and understanding among the population of staff and students is lacking. The intention of this proposal is for universities to consider how they can more meaningfully inform their constituents on technology and data practices more broadly, and involve them in decision-making.

3.2 Establishing a HE Sector Data Trust

The second dimension relates to a model for user data governance that supports data processing and responsible innovation while managing risks in the UK higher education sector.

3.2.1 Current State

Universities generally manage their own data lakes (i.e. a repository for storing, securing and processing large amounts of data) and processes for analysing user data to generate valuable insights that support the student experience, personalise learning, and enhance institutional efficiency. While data analytics of this kind are still developing, universities plan to expand these processes further. However, as users and data producers, students and staff do not

2 Predictive analytics uses statistical methods to compute the likelihood of future trends, actions, outcomes, etc., based on past data.
3 For relational data governance, see Viljoen, 2020.
4 For more information on inferences and institutional responsibility, see Wachter and Mittelstadt, 2018.

participate in decisions about which data are collected from them, how they are processed, how they are visualised, and how they are acted upon.

Moreover, as universities use more and more third-party digital products and services, user data flows between the university's digital ecosystem and various proprietary platforms. Technology providers in higher education are diverse and range from Big Tech companies to small Edtech start-ups, and these companies offer a diverse range of of services. Emerging research shows that user data from education settings are not only processed by a number of technology companies, but these companies sometimes process data in unknown ways. There are cases of Edtech companies that enclose and control user-produced data and content entirely (our participants gave examples of academic integrity platforms). Controlling user data can hinder innovation and produce unwanted effects. In other words, user data can be used poorly without users' knowledge.

Current data protection regulation focuses on individual consent and privacy, which is very important. However, existing regulation does not do enough for data-based products that process data relationally and have a collective impact (e.g. through inferential computation). Therefore, it is not a question of whether personal data are collected and processed legally, such as under legitimate interest, but whether data are processed for the benefit of users. This suggests a need to move towards stronger collective consideration of the impact of technology and data processes. People who produce user data and who are impacted by its analyses and effects have a right to be protected beyond privacy concerns.

3.2.2 Proposal for Consideration

The higher education sector would benefit from user data being governed in a safe manner that allows innovation and supports competition, while at the same time guarding against harm by protecting users. Our key recommendation for action, at the sub-national level (England, Northern Ireland, Scotland, Wales), with the potential to extend to the national level, is to:

Establish a higher education sector data trust

A "data trust provides independent, fiduciary stewardship of data" (Open data institute). It is a legal structure that enables the separation of control over data from the provision of data-driven services, as well as independent governance and control of data, and protection of individual data rights (Taylor, 2022).

The structure of data trusts can vary in their purpose and organisation. In the higher education sector, a data trust could be framed as a legal structure operated by an independent trustee body that collects and governs user data for universities across the sector. The trust could support fair competition and stimulate innovation by establishing rules for which data are collected, the purposes of data access, use and processing, levels of protection and security, and potential compensation. Stakeholders could discuss whether all user data would be required to be sent to the trust, including data collected by proprietary technologies and Edtech platforms. Data trusts could also run consultations with users to keep them informed about technology development and align its rules with their expectations. This would enable data producers (i.e. university technology users) to be informed of processes related to their data, and to have agency when making choices about data collection.

Setting up such a system is challenging, uncertain, and requires time and continuous stakeholder coordination. This kind of solution is new in any sector, so stakeholders have to be ready to learn and adjust as they develop the system and, most importantly, keep coordinating among themselves (Taylor, 2022).

We suggest learning from and building on emerging work, such as the Data trust initiative and Open data institute. The digital futures commission's work at lower levels of education would also be helpful to consider.

There are multiple ways in which the overall objectives for the establishment of a data trust could be achieved. Stakeholder coordination towards establishing a data trust could be a staged process. For example, the first stage could be for the sector to establish a forum that brings key actors together for a more coordinated discussion on the issues raised in this report and other issues deriving from their experience. Such a forum could provide advice on dealing with collective problems and stimulating innovation. This process would not require the establishment of a new organisation in its own right and with defined powers. Rather, it could be a precursor to establishing a data trust as a new body if that is deemed desirable and needed by the sector.

3.3 Technology Monitoring and Evaluation

The third dimension relates to monitoring the impact of various Edtech products and services and the data operations that these products and services enable. It also includes monitoring the impact of new technologies, including artificial intelligence (AI) models that undperpin many new technologies.

3.3.1 Current State

Universities are responsible for the digital products and services they procure, and for personal user data they collect from students and staff. There is no consistent evaluation or regulation of digital services and products. Universities have to monitor the impact of digital products and services themselves. This is difficult, if not impossible, because of the complexity of university digital ecosystems and the resources required to undertake such monitoring. As Edtech companies roll out their products and services, they could be expected to provide greater evidence that these products and services deliver as promised.

Monitoring and evaluation become even more complex as new AI-based technologies and other data-rich operations enable products and services for which quality and impact can only be evaluated with specific knowledge and datasets. Moreover, the impact of these technologies can only be comprehensively evaluated post-festum.

A key value proposition for the Edtech sector is the personalisation of learning and student experience. However, this value is currently pursued according to a 'like-like' logic: "if you like X, the system recommends something similar (XX), and then again something similar (XXX), so that you gradually get something that is more precisely relevant to the initial interest category" (Kucirkova, 2022). But as Kucirkova explains, this design approach works against educational principles and hinders creation of new ideas and the expansion of perspectives.

Another key value proposition of the Edtech sector in higher education is delivering efficiencies. But insights from our research show that the digital transformation of universities (i.e. introducing technology and data operations to support a wider set of university activities) requires more work and demands more human, financial, and technological resources. Thus, pursuing the value of efficiency may be counter-productive.

3.3.2 Proposal for Consideration

Currently, new technologies developed for and used in higher education are not consistently evaluated and monitored. Responsible oversight of technology and data practices is vital to support their beneficial impact and trust in the sector. Our key recommendation for action at the national level is to:

Introduce a credible body to monitor and evaluate Edtech services and products.

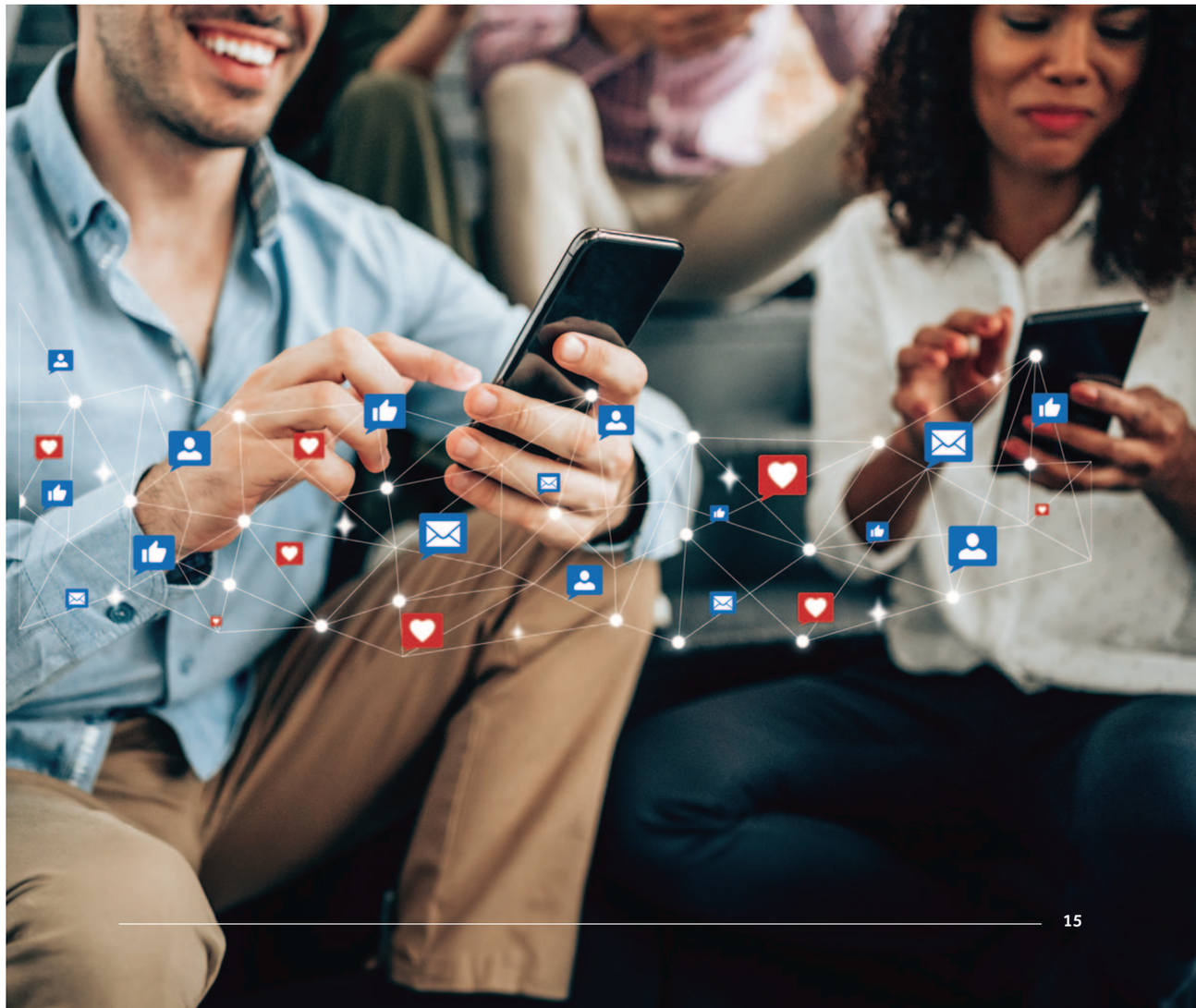
New digital platforms and learning technologies are being developed every day, and the promises made about the benefits of these technologies often outpace the generation of evidence to support these claims. Edtech companies are well-placed to innovate and bring new technologies to market, but need to take greater responsibility for demonstrating the efficacy of their products and services. This work can be undertaken in partnership with university researchers with the research expertise to evaluate these technologies' educational impact and benefit.

As consumers, we often look for assurance that the products and services we purchase are fit for purpose. This can be difficult for universities

purchasing new digital technologies because there is no consistent approach to monitoring or accrediting these products and services concerning their educational benefit and safety for users. Procuring digital technologies can be costly and risky.

Developing an independent evaluation and/or accreditation process would establish clear expectations for all stakeholders and would require cross-sector collaboration. An independent, trusted body could be established and tasked with Edtech monitoring, evaluation and accreditation. There are various options, such as associating this body with: an existing sector-level organisation with a clear stakeholder-supported mandate; new data trusts as mentioned above; and/or existing research institutes at universities that are already undertaking research on Edtech, or a network of such universities. Key sector organisations (e.g. Jisc) are already working with EdTech providers and universities to build a framework for expectations for education technology and managing user data. Initiatives like this could be enhanced and built upon.

A monitoring and evaluation body could provide benefit by accrediting individual products and services. Moreover, it could monitor the overall impact of digital technologies on higher education operations; the impact of specific technologies such as generative AI; and organise stakeholder public consultation feeding into this evaluation and accreditation.



4 Recommendations and Principles for Stakeholders

4.1 Government Policymakers and Sector Organisations

Government policymakers can support the proposals above by encouraging and resourcing collaboration between higher education stakeholders, including universities, students, staff, and the Edtech industry.

In particular, policymakers can support initiatives that:

- help with the establishment of higher sector data trusts by supporting any required legislative or regulatory changes and contributing funding;
- help with identifying or establishing a trusted monitoring and evaluation body by contributing funding; and
- encouraging and participating in stakeholder discussion.

4.2 Universities

Universities can support the proposals above by taking action within their institutions, collaborating and coordinating with other universities in the sector, and leading specific processes and actions.

In particular, universities can:

- establish/strengthen digital strategy committees at their institutions to ensure transparency of technology operations and user data processes;
- launch and lead the sector discussion;
- help to establish a HE sector data trust;
- cooperate in setting up an Edtech monitoring and evaluation body; and
- support the development of procurement processes that fast-track accredited digital products and services.

4.3 Edtech companies

Technology companies operating in the higher education sector can contribute to the proposals above by supporting higher education stakeholders' technology needs, cooperating with other stakeholders, and resourcing new initiatives.

Companies should listen to concerns about their products, services, and data practices, including critical voices. These concerns are mostly expressed in good faith and can contribute to improving products, services, and practices. Actively listening to these concerns can further establish the trust required to strengthen the Edtech industry in an ethical and sustainable way. Companies could also consider co-designing their products and services with higher education experts and stakeholders.

In particular, technology and Edtech companies can:

- support the establishment of sector data trusts and a monitoring and evaluation body;
- support client universities to introduce collective and selective user consent; and
- understand the concerns and support the educational objectives of higher education institutions and the sector.

4.4 Investors in Edtech

Investors in Edtech can support the proposals above by responding to higher education stakeholders' needs, cooperating with the higher education stakeholders and researchers, and resourcing new initiatives.

In particular, investors can:

- support the establishment of HE sector data trusts and a monitoring and evaluation body;
- work with and for higher education by inviting higher education stakeholders to contribute to their investment decision-making. For example, investors could invite stakeholders to participate in developing and evaluating/updating their valuation methodology;
- look beyond financial returns on investment towards broader social returns. New social impact methodologies would be beneficial if they involved higher education researchers and stakeholders in shaping these frameworks; and
- make their investment evaluation frameworks compatible with the guidance provided by new monitoring and evaluation bodies.

5 Conclusion

The proposals, principles and recommendations outlined in this document are intended to be discussed and pursued over a medium- to long-term timeframe. Enacting many of these proposals will require consultation and sustained political and financial support. These proposals are undoubtedly ambitious and new models of data governance must be developed with limited examples to follow.

Existing awareness of the issues raised here is low among many in the sector, and the nature of the challenges must be clearly established before proposals to address them can be collectively pursued. Significant collaboration amongst all stakeholders (students, staff, universities, sector organisations, Edtech companies, policymakers) will be needed, and as well as the trust and buy-in of higher education and Edtech. However, the proposals above point to important opportunities for democratic debate about the types of digital innovation that we want to encourage as a society and would represent a significant next stage in addressing the challenges raised by digital technologies in higher education by moving beyond a narrow yet highly important focus on data privacy issues.

Economic and Social Research Council

The support of the Economic and Social Research Council (UK) is gratefully acknowledged [ES/T016299/1].

6 Appendix: Context and Project

6.1 About the Project and This Document

This document is based on the ESRC-funded research project 'Universities and Unicorns: building digital assets in the higher education industry'. The project introduced new ways to think about and examine the higher education sector as it is digitalising, i.e. using digital technology to operate. The project investigated new forms of value creation and suggested that value in the sector increasingly lies in creating digital assets. Further, the project examined whether and how universities, companies, and investors shift from forms of entrepreneurship to forms of rentiership. This has important consequences. Assetisation and rentiership imply a change from creating value via market exchange to capturing value via the ownership and control of assets, such as personal data.

An international and interdisciplinary research team, supported by the Academic Advisory Board and the Stakeholder Forum, investigated the digitalisation dynamic in the UK higher education sector, including the Edtech industry and its actors. While the research focused on the UK, its implications are also relevant for other countries, not least because all actors in our research work globally.

The project formally concluded in June 2023, and these proposals, principles and recommendations are one of the project's outputs. We are appreciative of the ESRC support of our research, which allowed us to collect valuable data and advance our empirical and theoretical knowledge. Our next step is to analyse our collected data and produce more project outputs. Furthermore, we will continue researching the expansion of the digital economy more broadly and how it relates to higher education.

This is the first version of the recommendations. As the research team continues to work on the digitalisation of higher education and our societies more broadly, we plan to update the recommendations. Equally, we call on the higher education and Edtech community to engage with our recommendations and propose responses and updates to the ideas shared in this document.

6.2 Methodology and Process for Creating the Recommendations

This document is based on our preliminary findings and interim data analysis. Our data corpus consists of quantitative analysis of Edtech trends, interviews, focus groups, public consultation, document analysis, and literature review:

- Between March and November 2021, we conducted a quantitative analysis of 2,012 Edtech companies that we identified as active in higher education globally, 1,120 investors that we identified as investing in Edtech at the higher education level, and 1,962 investment deals. Using data that we downloaded from Crunchbase, we undertook a descriptive statistical analysis to examine the emerging trends relating to these three components of the edtech industry in HE.
- Between November 2021 and May 2022, we interviewed 23 professionals working in 16 Edtech companies with operations in the UK and beyond. The interviews focused on business models and strategies, data practices, digital ecosystems, and digital assets. We interviewed data and product managers, regional managers, as well as founders or CEOs of smaller Edtech companies. Furthermore, we collected and analysed 540 documents on these companies.

- Between March and August 2022, we analysed 28 investors in Edtech: we analysed 1,722 publicly available documents from 25 investors. We interviewed 8 investors from different countries, including the UK, USA, and European countries. We included a balance of Edtech-specific and generalist investors (generalist investors invest in various or all economic/social sectors, and education is only one of their investment interests). The interviews focused on investment decision-making, investment methodology, views on the state of higher education, Edtech and future trends, competition in Edtech, and desired future.
- Between July 2021 and July 2022, we interviewed 11 senior staff distributed across 4 universities (with more interviews not yet included in the corpus). We have interviewed senior university leaders, academic staff with responsibility for digital innovation in teaching and learning, IT managers, procurement staff and vendor managers. The interviews have focused on: changes to the HE sector driven by digitalisation; the development and implementation of digital strategy; relationships between universities and EdTech companies (including procurement and contracts); and a range of issues associated with the collection, management and use of digital data. In addition, we collected and analysed 236 documents from 8 universities.
- We conducted 6 focus groups with 21 people from 19 universities discussing the value of Edtech, the value of digital data, Edtech data operations, Edtech business models, Edtech relations with universities, innovation needs, challenges that need stakeholder discussion and digital disruption in higher education.
- 16 people participated in the public consultation about Edtech about drivers and principles of Edtech, how user data should be used and to whom it should be accessible, and about Edtech business models.
- We also reviewed documents and materials about 'Big tech' in higher education to map the strategy of technology giants and their roles in higher education digital infrastructure. All the documents were publicly available and included webpages, prospectuses, videos, news items, blogs, case studies, and similar (107 documents regarding Microsoft, 130 documents regarding Amazon Web Services, and 94 documents regarding Salesforce).

We prepared a draft of our recommendations and discussed it at our Academic Workshop in May 2023. The Workshop hosted 29 participants from four continents, nine countries and 19 universities, including world-renowned academics. It included interdisciplinary scholars from education studies, sociology, geography, science and technology studies, media studies, and organisational studies. The participants included members of the project's Academic Advisory Board[5]. We updated the document and prepared the second draft based on the discussions at the Workshop.

We sent the second draft to the project's Stakeholder Forum and collected feedback. The Stakeholder Forum includes key higher education stakeholders in the UK and three international members[6]. After receiving and considering their feedback, we updated and finalised this document.

By publishing this first version of the policy recommendations and principles, we aim to open the debate in the UK higher education and beyond about the sector's digitalisation. The recommendations in this document are tailored for higher education but might be relevant to other sectors.

6.3 EdTech in the UK: Context and brief summary of findings

6.3.1 About Higher Education and Technology

Our research shows universities are motivated and determined to digitalise their operations and make the best use of technology and the digital data they collect. While they are in very different positions regarding technological maturity, available resources, and strategy, they all have a digital ecosystem (sociotechnical set of technologies, applications, services, suppliers, users, etc.). All universities have already constructed their own data lakes, or are working towards creating them.

Based on our research, the key characteristics of UK universities' digital ecosystems are as follows:

- Historically, universities hosted their own servers and infrastructure on the premise. But institutional digital infrastructure is now increasingly shifting towards utilising cloud-based infrastructure provided by Big Tech companies. Microsoft, Salesforce, and Amazon Web Services are the most common ones reported to us. Our interviewees thought these companies offer robust platforms and services that universities can leverage for their operations, including integrating various systems and platforms, different processes across the institution, and analytics and AI.
- Many universities face challenges in dealing with outdated legacy enterprise software. These older systems lack interoperability, making it difficult for different software platforms to communicate and share information effectively. Each university must handle the integration of these systems individually, which can be a time-consuming and complex task. Additionally, there is limited competition in the higher education enterprise software sector, with only a few dominant companies controlling the market. For example, most universities use only two or three companies for timetabling, human resource management, customer relationship management, and other enterprise process needs. These conditions (outdated software with limited competition) make university digital enterprise ecosystems patchy. Still, these systems are core to the operations of every university, and it would be extremely costly and risky to replace them.
- Universities use established systems for Virtual Learning Environments (VLEs). The most prominent players in this field include Blackboard, Canvas, and Moodle. These platforms have traditionally focused on providing tools and functionalities for supporting traditional classrooms by allowing teachers and learners to upload and share digital content; or were used in online learning. However, these companies have been transforming into data and analytics companies. They are expanding their capabilities to collect and analyse user data, and provide intelligence from the vast amounts of data generated by universities and learners. Their business intelligence affects how universities think about analytics and what analytics can do for them.
- While these established systems continue to evolve, only a small portion of the institutional digital ecosystem is actively experimenting with new Edtech products that focus on a specific aspect or need within the educational landscape. As a result, universities are tasked with finding ways to integrate these diverse platforms while minimising risks. Furthermore, universities have limited funds to acquire new Edtech products or support innovation in this area.
- Some university representatives are keen to participate in specific Edtech companies' boards or buy shares in Edtech start-ups to learn more about Edtech innovation and/or influence its direction.

Our interviewees state that the most significant power and potential for digital transformation in higher education is "Big tech," with Microsoft being named as a prominent player. Despite not being traditionally viewed as "Edtech", Microsoft's underlying infrastructure, which includes AI and analytics features, is predicted to impact the sector significantly. Some of our participants, especially IT directors and professionals, were keen on the potential of Big Tech in higher education and saw this as potentially a positive development.

Established and legacy software companies that are adapting their operations towards analytics and data products need further research to analyse the impact of changes to the higher education sector as it digitalises. Edtech start-ups face challenges in competing and establishing their products at scale due to the prominence of established software companies, a lack of competition, and limited university resources.

5 We thank all members of the Academic Advisory Board for their support and contribution to our work and the project.
6 We thank all members of the Stakeholder Forum for their help and support throughout the project. We appreciate their feedback on this document and particularly thank Mr Christopher Hale for his detailed response.

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Our research suggests that the higher education sector is not likely to be the subject of digital disruption in the sense of a fundamental and sudden break from past practices. Instead, digitalisation evolves via incremental changes in various operations and functions. Digital products that seem most mundane and simple are said to be the most impactful in that they enable bigger changes in the sector. Examples include software for video calls (e.g. Zoom), as it enables online synchronous delivery of classes; recording lectures, as it allows students not to attend classes in person; online assignment submission, as it helps underprivileged students by not needing to travel to the university and print papers to submit assignments. Our participants did not identify specific Edtech products targeting one aspect of higher education practice as being transformative.

Finally, our research indicates that the biggest motivators for universities to introduce more data-rich operations and Edtech in their practices are: supporting the student experience, increasing institutional efficiency, and collecting evidence for the regulator and policymakers.

6.3.2 Tech Operations in Higher Education and Beyond

Ed Tech companies operate in the regulatory and normative environment of the digital economy. On the one hand, technology brings excitement and expectations of supporting or transforming teaching and learning, with some specific products entering a phase of tech hype. But on the other hand, there is a growing scepticism in education driven by concerns about dangers such as discrimination, surveillance, dehumanisation of learning and learning environments, and worsening academic labour conditions.

Some of the critical challenges for higher education that we identified in our research, and which are equally applicable beyond the higher education sector, include the following:

- Monopoly tendencies and consequent lock-in and interoperability challenges. Legacy enterprise (such as human resources, timetabling, customer relationship management) and established software (such as virtual learning environments, plagiarism detection software, online programme management platforms) companies in higher education are seen to operate as oligopolies by our participants, often disregarding interoperability needs of universities. Universities are locked-in to use particular products as it would be too costly to change. Prices for services increase. Start-up Edtech companies face significant challenges in offering their services to universities and scaling them due to competition with established companies, procurement processes, limited funds available at universities, and the risk aversiveness of universities.
- Access to and use of data. Legally, UK universities are data controllers for personal data collected from their students and staff. However, they can share data for processing with third parties in case of legitimate interest and if appropriate contracts are in place. At the same time, Edtech companies are interested in processing user data to offer analytics and data intelligence services in addition to their primary services. Two particular points are relevant in this situation. First, universities are interested in analysing and making their data valuable. However, making valuable use of digital user data seems to be in a very experimental stage, and we have not seen consistent and bigger-scale use of user data to support teaching and learning or management processes. Second, Edtech companies need access to data to analyse it and turn it into analytics in order to offer personalisation and efficiency insights. Based on our research, we are in a phase where this is being realised and negotiated between universities and companies.
- Individual agency in decision-making on which technology or its aspects to use. Students and staff do not seem to have much say in: which technology will be used for their studies or work, or for managing their university; which data will be collected, how it will be processed and for what purpose; what products will be developed with their data continuously into the future; and so on. There is an apparent lack of individual agency of students and staff over decisions on the technology used and the collected and processed data. There is also a lack of agency in participating in institutional (and national) policies on (Ed)tech and data operations.

- Lack of collective decision-making. Analytics and insights have collective impact because individuals are being compared to each other and put in groups in search of trends. However, existing protection is limited and individual. There is a mismatch in who decides on group impact.
- Lack of skill and/or resources in processing, understanding and acting on data at universities. Our interviewees stated there is limited processing and use of various digital data collected from staff and students when they use technology for study and work. Furthermore, our participants say that even if data are processed and used, there is often a lack of understanding of data outputs, insights that are produced, and/or capacity to act on these insights.
- Non-transparency of AI. As in other sectors, AI is expected to be increasingly used in higher education. Like elsewhere, there is a lack of transparency and accountability in how it operates. There is also a lack of research on the impact of AI in higher education, which is also due to its relative novelty.

6.3.3 Lack of resources to implement data-driven HE

Our participants reported on some university actors, particularly leadership, often having inflated views and beliefs on what new technology can bring and deliver at their institutions. They stated that there is a need for a deeper understanding of technology, data processes, and a realistic digital strategy. There is also a mismatch reported between the promises and discourses of many Edtech companies on the one hand, and what they are actually able to deliver on the other hand. Finally, they report on the fact that the abundance of staff and students data are not properly analysed and made valuable despite it being available. Instead, there are only experiments with analysing data and what can be learned from analysing them, which is done by existing staff in addition to everyday tasks. This is not a sustainable strategy.

Many processes at universities, such as learning, are complex, intangible, and relational. They cannot be broken down into tangible units that can be turned into digital objects for processing (e.g. learning per se cannot be captured as a digital object or a metric, but what we believe is related digital user behaviour can be captured, such as time spent accessing a digital book). However, it is often believed that data analytics represents the objective reality of intangible processes. Our participants talked about fears and risks that include misunderstanding particular data and outputs of data processing, such as various intelligence and visualisation. University leaders need to ensure that all constituents properly understand the data and data analytics they use and act on.

Another challenge is the threat of surveillance. It should not be automatically assumed that simply because a platform can collect user data, it should, or that engagement with or using platforms is automatically a measure of learning or work success.

Universities need more resources and staff to analyse and use data properly. This includes all aspects: technical (have proper IT and equipment), statistical (have enough expert staff to analyse data and prepare insights), pedagogical (to make sure that all data processing and insights support noble pedagogical purpose), collective and democratic (to make sure that university constituents decide together what kind of analytics operations and insights are wanted and needed), and leadership (to understand the possibilities and problems of using technology and data).

It is important to recognise that using Edtech and its data insights is also a workload issue. Introducing technology and disregarding the time it needs to be implemented, maintained, used, etc., can lead to increased frustration and decreased productivity. It can also hinder the successful integration of these tools and processes in university practices. University leaders should recognise that using Edtech and data analytics can bring more work. Training and support should also be provided for staff and students with enough time dedicated to this issue.

6.4 Future Outputs and Reports

Please follow our forthcoming project outputs, including reports, articles, and webinars, as we publish them on our project website and other outlets. We plan to update the proposals outlined here based on our future analysis and feedback we receive from stakeholders.

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