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Transforming the digital landscape of higher education in Latin America and the Caribbean

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Transforming the digital landscape of higher education in Latin America and the Caribbean

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Foreword

Writings and reports on educational transformation tend to be divided into two groups: those that bet on a messianic vision and those that bet on an exacerbated pessimism. The former tend to be grandiloquent, with language that veers between epic and poetic, and tend to leave the reader dumbfounded, but without a clear idea of how to move forward or what to start doing today. The latter, on the other hand, plunge the reader into a state of acceptance of the umpteenth inevitable misfortune that looms over our young generations. It is possible that these two approaches are, in a way, complementary and that the reading of texts or the viewing of talks alternating between the two is a way of promoting progress and reflection in a dialectical process.

In this report, we have opted for an approach to the transformation of higher education that attempts to describe and analyse trends of which we are just beginning to have some indications. This may run the risk of erring on the side of conservatism, or perhaps simply of incrementalism. But what is certain is that the end of the pandemic seems to have clearly demonstrated that, far from radical changes, higher education is much more inclined to continuity than to radical change, moderated as it is by its proverbial capacity to absorb threats and digest opportunities. Higher education changes, yes, but always preserving the continuity of those elements that the academic community itself considers essential and that continue to attract students, at least for the time being.

The UNESCO's International Institute for Higher Education in Latin America and the Caribbean (UNESCO IESALC) is actively supporting the efforts to establish the overall panorama of digital transformation in education in higher education, advocating for a rights-based approach to technology and connectivity research and capacity building projects, including this joint research to investigate digital transformation in higher education which was undertaken in collaboration with the UNESCO's International Centre for Higher Education Innovation (UNESCO ICHEI). Ultimately, the project aims to unlock the potential of digital transformation in LAC higher education, offering practical guidance and policy recommendations on how to implement these changes in ways that are equitable, sustainable, and valuable for the region.

An examination of the evolution of teaching strategies over the last two decades shows that the lecture has remained the most widely used method, increasingly supported by computer-based presentations. The latter have increased at twice the rate of strategies that could easily be linked to more interactive or learner-centred strategies, such as cooperative learning or student discussions. This evidence shows, for sure, that there is an undeniable impact of technology in higher education, but that the predominant uses tend to reinforce traditional strategies. The problem is not one of availability of resources or applications, but of lack of mechanisms and incentives for pedagogical redesign, some of which could be enhanced by intensive use of technology, to be considered a priority by teachers. It is more of a systemic problem than a technical one.

Research insistently reminds us that, since the early nineteenth century, educational innovations have been constant, almost overwhelming at times, but, despite this, formal higher education continues to

look alike all over the world because the underlying model is universal. Some analysts have gone so far as to claim that, despite everything, higher education has progressively changed in its internal structure, the configuration of procedures and the use of technology. However, it does not appear that the universal model of higher education has undergone a transformation. In a way, the paradox is that the more things have changed on the surface of higher education institutions, the stronger the classical universal model has become. Should we conclude, then, once again that in education *plus ça change, plus ça reste la même chose*? Perhaps, but the important thing is that higher education should not lose sight of the fact that one of its missions is to meet the needs of people who see in it a hope for personal and social development. Placing people at the centre of its educational mission is the best bet for transformation that it can make.

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Executive Summary

Higher education contexts in Latin America and Caribbean (LAC) have been witnessing an increasing utilization of technologies and digital data, resulting in new activities and alterations to existing functions. Nonetheless, the challenges in the region remain immense, including variable access to the internet, limited digital skills and training, lack of technology infrastructure, and limited resources. UNESCO has been working to establish the overall panorama of digital transformation in education, advocating for a rights-based approach to technology and connectivity. In higher education, digital transformation describes the process of strategically improvement and change by leveraging the potential of technological innovations in teaching and learning, student support, research, administration, and societal engagement.

This publication provides valuable insights into how digital transformation in higher education (DTHE) can be implemented in LAC and identifies ongoing challenges. It is based on a multilingual literature review and a multi-stakeholder consultation. The consultation engaged nine government officials and representatives of public and private national university associations and 1,420 students at 12 universities in Argentina, Brazil, Chile, and Venezuela.

Beyond affecting millions of students and educational staff, the **emerging legacy of the pandemic** is a profound reshaping of the digitalization agenda of higher education in LAC. It has significantly influenced the perceptions of higher education stakeholders on the integration of ICTs. While there has been a major drive to return to in-person activities in higher education, a significant number of students have continued studying in blended or hybrid modalities.

Government financing and initiatives for digital transformation have varied from country to country in the region, with pandemic-era investments ranging from US$1.5m to US$358m. The very different socio-economic and policy environments in the region have led to different modalities for funding DTHE as well as a range of new regulations covering digital diplomas, distance education, infrastructure for hybrid education as well as broader digital transformation projects with a reach across different economic sectors.

At the level of universities and higher education institutions, **institutional innovations and adaptations** have also been very varied. Given that the 80% of HEIs in the region already had a platform for distance education before the pandemic, the majority were able to transition to online learning, but few focused on fundamental adaptation of in-person modes for an online environment. The use of artificial intelligence (AI) to support DTHE has not been very widespread.

DTHE projects can improve **administrative efficiency and technological interoperability**, decrease processing times, and reduce administrative operations costs. Some government initiatives are supporting coordination and transfer of information in public sector data, but students see the need to improve the educational and administrative platforms.

In relation to **digital skills and the student experience**, students reported small improvements to their digital literacy competences during the pandemic period, particularly in relation to information and data literacy. However, students are critical about lacking the skills needed for an increasingly digitalized world and want to see technology used for greater personalization and for expanded forms of study modality.

Forming a culture of DTHE requires **upskilling faculty and staff for digital transformation**. Reformulating approaches to teaching should include teaching methods, educational applications, assessment, and plagiarism. Despite the challenges, just over half of students reported that teaching at their university has been transformed for better since the start of the COVID-19 pandemic.

DTHE could support **more flexible and internationalized educational pathways** that recognize competences acquired outside traditional formats such as work experience, non-formal learning and microcredentials. Technology to support internationalization is expanding and can improve access, but only 14% of students took part in a virtual student mobility programme between 2020 and 2021.

Supporting the democratization of higher education through digital transformation relates to increasing access to higher education and expanding its reach to remote areas. The benefits of DTHE should be shared with local communities, preventing threats caused by the increasingly unequal use of ICT and supporting digital literacy.

In terms of **digital transformation and gender**, female students felt less well prepared for the transition to online learning and had more propensity to suspend their studies before and at the start of the pandemic. However, male students were more likely to stop studying in 2021 and 2022. The impact of intersecting students' characteristics such as those related to gender, location and disability remains under-examined.

Ultimately, the project aims to unlock the potential of digital transformation in LAC higher education. To that end, the report offers the following recommendations:

1. Plan for the longer term, building agility into processes.
2. Focus on quality in digital transformation, not only the use of technology.
3. Ensure HEIs can be responsive to digital change to support students and communities.
4. Promote more forms of hybrid teaching and learning.
5. Embed continuous professional development for faculty and staff on DTHE into all HEIs.
6. Create and maintain spaces for HEIs to collaborate and advance DTHE.
7. Harness DTHE to improve equity and uphold students' right to higher education.

1. Introduction

The digitalization of higher education has seen the increasing use of technologies, digital data, and their interconnections, resulting in new activities and changes to existing functions of higher education (Deloitte, 2020; OECD, 2020c, 2020b; UNESCO IESALC, 2020; Okoye et al., 2022). COVID-19 accelerated the adoption of technology into teaching and learning, but the wide application of technology in higher education started well before the pandemic. This transformation can be observed everywhere including across Latin America and the Caribbean (LAC), despite very wide-ranging socio-economic, political and technological contexts (OECD, 2020a; UNESCO IESALC, 2020).

Higher education institutions (HEIs) have been offering numerous programmes related to digital technologies, for example, with over 3,000 recorded in Brazil in 2018 (Katz, 2018), the same year that the country published a national strategic plan for digital transformation (Brasil, 2018). Nonetheless, the challenges in the region remain immense: variable access to the internet, limited digital skills and training, lack of technology infrastructure, and limited resources are among the key barriers to the digital transformation of higher education (Deloitte, 2020; OECD, 2021; Okoye et al., 2022). Furthermore, the rate of connectivity via internet and mobiles phones is very uneven in the region (UNESCO IESALC, 2020). Across sectors, LAC has lower rates of digital technology use and the price of it is higher than other countries (Lustosa Rosario et al., 2021b).

The connectivity level in LAC is lower compared to other countries with similar GDP (OECD, 2021): 32% or 78 of the 244 million people in LAC do not have access to the Internet, of whom 46 million live in rural areas (The Dialogue, 2022). This is reflected in the findings of a survey of 178 HEIs in nine countries, which found that the lack of infrastructure and internet connectivity are challenges for 30% of the HEIs not currently offering virtual provision (Herrero Tejada, 2022). Also, from a report of nine LAC countries, 40% of teachers reported that they do not have access to the Internet (Arias Ortiz et al., 2020a). Not only is digital equipment often developed in other continents, but the cost of licensing is a critical obstacle to access technology. For example, 70% of LAC professors consider that limited resources for digital licenses is a main factor that blocks technology adoption (Arias Ortiz et al., 2020a).

Even when digital technologies are being deployed, the availability of technological innovation (see table 1) does not automatically imply digital transformation in higher education (DTHE). Digital transformation is a deep and long process, which is the result of structural change that includes processes, and more importantly, people (Marquina et al., 2022; Silva, Lenon Pinheiro da & Fröhlich, Cátia, 2019).

In higher education, digital transformation describes the process of strategically improving and changing higher education by leveraging the potential of technological innovations in teaching and learning, student support, research, administration, and societal engagement. This process can take place using strategies, training, and changing the organizational culture (Pacheco et al., 2020). At its best, digital transformation ignites the evolution of human thinking, new ways of work, new customs and habits impacting the environment to promote new leadership with a vision of the future, teamwork and new skills based on technology (Barón Hernández & Caicedo Rojas, 2021; Castillo et al., 2021).

HEI leaders recognize digital transformation as a recent trend that encompasses people, culture and organizational change that expands beyond technical improvements and creates added value for internal and external stakeholders (Cerdá Suárez et al., 2021; Lustosa Rosario et al., 2021b; Rodrigues & Silva, 2019; Sigalés, 2021). It affects all functions of higher education: not only teaching and research, but administration, community engagement, governance, and infrastructure (Benavides et al., 2020). Students and teachers (professors) are seen as the main actors of digital transformation processes, which in turn helps to explain the emphasis on teaching and learning as components of DTHE (Benavides et al., 2020; UNESCO IESALC, 2020). The dimensions of DTHE for teaching and learning are set out in table 2.

To address the challenges and opportunities offered by this new higher education scenario, UNESCO has been working to establish the overall panorama of digital transformation in education, advocating for a rights-based approach to technology and connectivity. UNESCO International Institute for Higher Education in Latin America and the Caribbean (UNESCO IESALC) is actively supporting these efforts through research and capacity building projects, including this joint research to investigate DTHE which was undertaken in collaboration with the UNESCO's International Centre for Higher Education Innovation (UNESCO ICHEI).

Table 1: Impact of technological innovation

Wave (period of impact)	Technological innovation	Economic impact	Impact on teaching and learning in higher education	Impact on HEI management and culture
1 (1990 – 2010)	• Computing • Broadband • Mobile telecommunications	• Automate processes • Decentralize production chains	• Incorporation of training and technical software • Automatization of calculations	• Digitalization of institutional information • Automatization of administrative procedures
2 (2005 – now)	• Internet platforms • Cloud computing	• Reconfigure production processes • Optimize cost of access to materials, services, and goods • Increase reach and coverage of markets	• Online educational platforms • Synchronous online classes • Search mechanisms/ engines • Digital and hybrid education	• Branch campuses can be connected by technologies • Digitalization of central administrative processes • Integrated systems • Increase reach and coverage of higher education markets
3 (2020 – now)	• Internet of things • Robotics • Artificial intelligence, machine learning • Gamification • Blockchain • Low and no code technologies	• New business models • Virtualize stages of the value chain • Improve management and decision making	• Simulation/ Incorporation of virtual reality • Interoperability of information • Potential for mainstreaming of AI • Demand for flexible modes of delivery	• Partnership/ association formation • Internationalization • Engagement in digital transformation • Expansion of non-degree courses and flexible pathways

Adapted from Katz, 2018; Núñez Valdés et al., 2021; EDUCAUSE, 2023; columns on the impact on higher education created by UNESCO IESALC.

Table 2: Dimensions of the digital transformation of higher education for teaching and learning

Dimension	Rationale
1. Technological and telecommunications infrastructure	This is a primary condition: without sufficient and quality infrastructure, DTHE is impossible. Infrastructure includes equipment, networks and solid WiFi/internet access.
2. Institutional policies to promote digital transformation	DTHE is a series of complex processes that should be organized through institutional policies and/or strategies, led by supportive and engaged leaders, with the buy-in of the HEI community.
3. Change the dominant teaching model	Active learning (e.g. case studies, project based learning, product creation) as a pedagogical model can overcome limitations of traditional pedagogies (e.g. lectures, rote learning) and DTHE can be the opportunity to change the paradigm.
4. Reformulate the role of the teacher	The new teaching model requires new ways of teaching and new skills such as organizing digital teaching environments, designing different modalities of teaching (in-person, online, hybrid) and competence in selecting and applying digital teaching materials.
5. Develop new flexible and hybrid teaching models	Break the dependence of teaching organized around fixed times and spaces to offer greater flexibility to students and blend physical and virtual environments.
6. Offer and develop digital support services	Such services include a learning management system (LMS), platforms for offering courses, online repositories, editing suites, audiovisual production services, and online libraries. These services should be staffed by professionals with the expertise to support teachers and students.

Adapted from Area-Moreira, 2021 by UNESCO IESALC

This research took place during late 2022 and early 2023, at an inflection point of the COVID-19 pandemic. Beyond the immediate responses to the emergency situation and therefore with the ability to look back and reflect on the three peak pandemic years, this report provides valuable insights into how digital transformations can be implemented in the region and identify the challenges that must be overcome. Ultimately, the project aims to unlock the potential of digital transformation in LAC higher education. This report presents an up-to-date and detailed review of the impact of DTHE in LAC across all aspects of higher education and is organized in the following sections:

- The emerging legacy of the pandemic
- Government financing and initiatives for digital transformation
- Institutional innovations and adaptations
- Administrative efficiency and technological interoperability
- Digital skills and the student experience
- Upskilling faculty and staff for digital transformation
- Flexible and internationalized educational pathways
- Supporting the democratization of higher education
- Digital transformation and gender

The current situation in LAC is one of uneven technological development and varying efforts and resourcing for DTHE. As such, the report concludes with recommendations on how the region could engage more deeply in digital transformation, learning from the near-universal experiences of digitalization during the COVID-19 pandemic, accentuating the need for deeper structural changes while respecting the criticality of equity and inclusion.

2. Methodology

The research started with a literature review of publications from the past five years (2018 to 2022) located in the main English, Spanish and Portuguese language education research databases: ERIC (English), SciELO (Spanish), CAPES and BDTD (Portuguese) as well as Google Scholar. Relevant publications pertaining to Latin America and the Caribbean (LAC) were identified using search terms with variants of 'digital transformation' and 'higher education'[1]. The literature review also includes reports from major international and national organizations (e.g., UNESCO, IADB, World Bank, CEPAL, OECD).

Based on the findings of the literature review, a multi-stakeholder consultation was designed and conducted. Nine semi-structured online and in-person interviews with government officials and representatives of public and private national university associations were conducted in three selected countries: Argentina, Brazil, and Chile. The questions were primarily related to higher education stakeholders' perceptions about the digital transformations processes in their countries and higher education systems, including the main contributions of the organizations they represent.

The interviewees were selected to illustrate the perspectives of two influential higher education stakeholders: the government authority represents the policymaker' perspective, and the national university associations' representatives illustrate HEIs' viewpoints. This approach also allows a better understanding of the connection between institutional and public policy levels. Considering the operational differences between public and private HEIs, it was deemed relevant to interview representatives of both contexts. A list of interviewees can be found in Appendix I. Interviewees are quoted through individual codes that follow the format of country-level-initials.[2]

Additionally, an online survey was opened to upper year undergraduate students at 12 universities in Argentina, Brazil, Chile and Venezuela (3 universities per country): 1) a public university, 2) a private university; both multi-faculty in a large or major city and 3) a public university, multi-faculty in a small town or remote region to gain insights into students' experiences with digital technologies and DTHE. The survey focused on students' experiences at different stages during the pandemic to better understand the impact this period had on them and on digital transformation in their universities.

1 Keywords used: 'higher education' or university and 'digital transformation' or digitalization and 'Latin America' or 'Caribbean' or 'Central America; in Spanish: 'educación superior' or 'universidad' and 'transformación digital' or digitalización and 'América Latina' or 'Latinoamérica' or 'Caribe' or 'Centroamérica'; in Portuguese: 'ensino superior' ou universidade e 'transformação digital' ou digitalização e 'América Latina' ou 'Caribe' ou 'América Central.'

2 For example, 'AR-Gov-OA' means Argentina-Government representative-Oscar Alpa. The codes are also listed in Appendix I.

Overall, 1,420 valid responses were received in the survey and a breakdown of the number of responses by university can be found in Appendix II. The results from the student survey are in Appendix III. The student survey was designed to ensure anonymity. Selected quotes have been used to support the findings and are tagged in the text by their age group, gender identity, whether they identify with any equity deserving groups (EDG)[3] (if applicable), subject of study, country.

3. The emerging legacy of the pandemic

The **impact of the pandemic on DTHE cannot be understated**: it has altered the digitization agenda of higher education in Latin America (Herrero Tejada, 2022; Useche et al., 2022). In LAC, the COVID-19 pandemic has affected more than 26 million students and 1.4 million professors (Arias Ortiz et al., 2020a) who had to transfer from face-to-face classes to online mode (UNESCO IESALC 2020, 2022b). However, it is important to differentiate between the emergency remote teaching that was organized as an immediate response and deeper disruptions to pedagogy that would be the result of true digital transformation (Area-Moreira, 2021). As noted in the Introduction, simply because technologies exist does not mean that the underlying structural change necessary for transformation is taking place.

The pandemic has had a significant impact on higher education stakeholders' perceptions about the incorporation of Information and Communication Technologies (ICT) into higher education. According to one respondent, 'I think that pandemic, if it had anything good, helped us all to lose fear (…) to understand it as a very normal, very natural' (CH-Pub-NP). While there were strong hesitations about digital transformation processes before the pandemic (UNESCO IESALC, 2020), due to the emergency period, higher education stakeholders became **more open to the benefits of DTHE** initiatives. As one interviewee noted, 'when we started in 2020, we asked the teachers to raise their hands if they wanted to innovate and we found that only 10% agreed (...) today we have 45% of the teaching staff who not only wanted to but are being trained and certified by us' (AR-Pri-RDV).

Beyond investments in the structure to transmit educational content, some initiatives from both policymakers and HEIs aimed to **improve access for students in socioeconomic vulnerability**. At the Federal University of Rio de Janeiro (UFRJ-Brazil), for example, 'besides the 4000 SIM cards with internet mobile access, [the university] also distributed equipment like tablets and modems, so that students could continue their courses' (BR-Gov-DC). Concomitantly, to ensure the practical orientation of certain subjects, some departments sent kits to students' houses to enable their participation in practical experiments conducted synchronously with the professor in online courses (BR-Gov-DC). The concern for equitable access in a future that is more informed using technology in higher education was also noted by students.

> **'Among other issues, equipment availability should be taken into consideration since not everyone has access to these devices for teaching (online) must be looked with care and inclusion methods so that teaching is homogeneous and efficient.'**
>
> *25-34, Female, Receiving financial support, Engineering, Manufacturing and Construction, Brazil*

Students who participated in the survey provided feedback regarding their institution's **transition to online learning** because of the pandemic (figure 1). An important 10% of participants indicated that their university was not at all prepared for the transition to online learning, while 31% said that their university was somewhat prepared for the onset of the pandemic, and more than half noted that their university was quite well prepared or very well prepared. However, students identifying with equity deserving groups (EDG) were more likely to say that their university was not at all prepared or somewhat prepared. Among the students that identified themselves with 4 EDGs, 29% of stated that the university was not at all prepared for online teacher, 57% somewhat prepared.

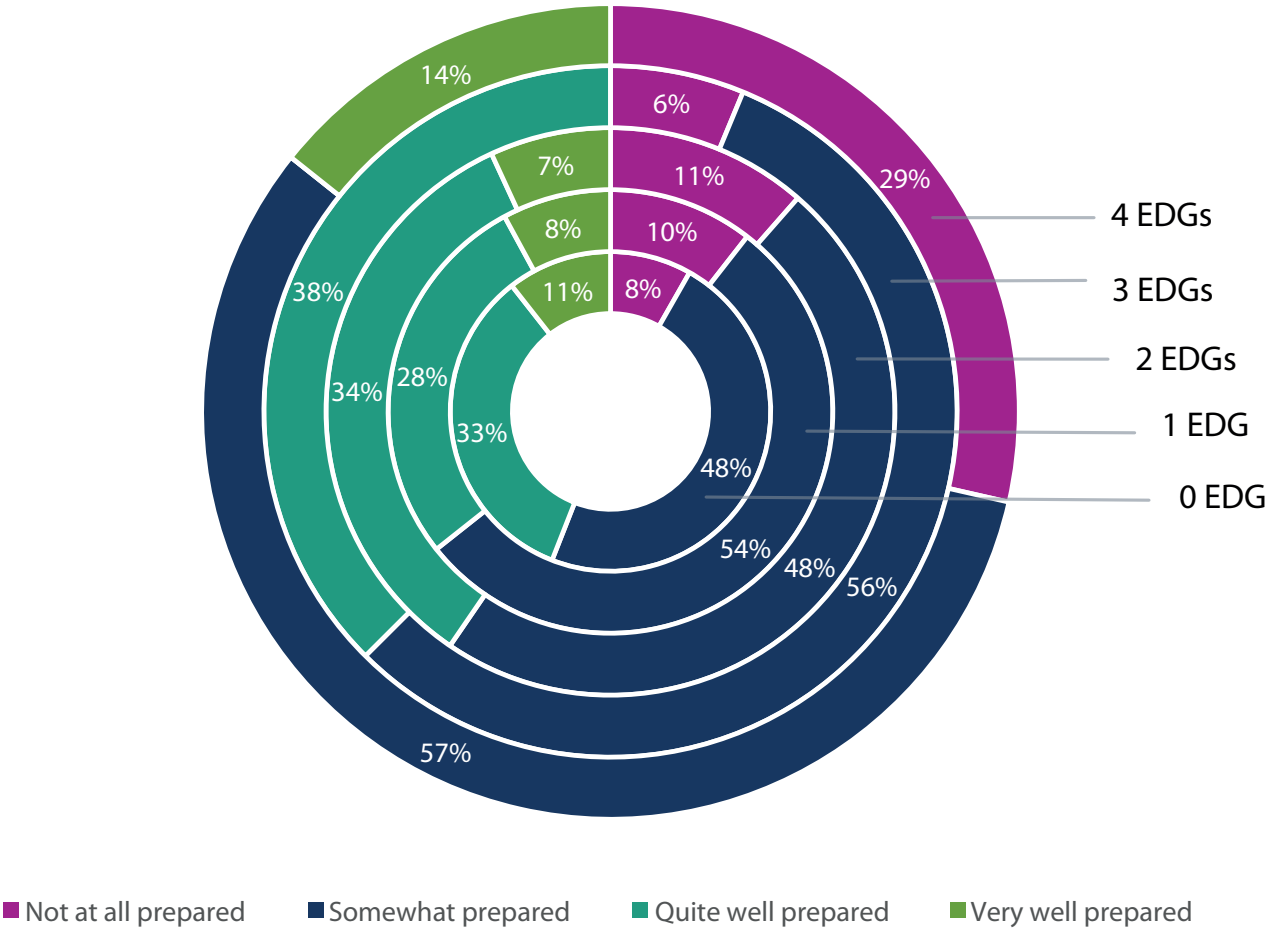
3 Equity deserving groups refers to group of people who have been disproportionally impacted by higher education policies and structures that discriminate against them in visible and less visible forms, with lasting consequences in their academic, personal, and professional lives. In this case: Indigenous or ethnic/linguistic minority, Racialized (people who have been negatively impacted by racism), LGBTQI+, Receiving financial support (e.g., scholarship, loan) based on financial need, Refugee or forcibly displaced person, Grew up in/Currently living in or commuting from a remote or rural location. See also (UNESCO IESALC, 2022a), https://unesdoc.unesco.org/ark:/48223/pf0000380988

A **culture of collaboration** was also incentivized by the emergency situation. Seminars, meetings, online discussions, and conferences between education stakeholders allowed them to reflect on good practices, share experiences and cooperate. This proved extremely important for efficiency and budgetary reasons. For example, in the words the Brazilian National Council for the Federal Network of Vocational, Scientific, and Technological Education's (CONIF) representative, 'a great positive point of our network is exactly being a network. Our institutions are not so isolated. This exchange between the 41 institutions helps us a lot to seek new paths and solutions to our challenges in a collegial way' (BR-Pub-FN).

As social restrictions started to be revoked, there was a **general effort in HEIs to resume face-to-face activities**. Undeniably, returning to the traditional workplace reduced the speed at which the digital transformation processes was been conducted, even if advice provided early in the pandemic called for a rethinking and redesigning of teaching and learning processes (UNESCO IESALC, 2020). Some of the eagerness to learn and incorporate ICT into the educational journey was substituted for the willingness to reactivate social interaction: 'I get the feeling that some institutions are back in 2019. Same models, the same attitudes. The pandemic brought a sense of emergency, of change but the processes returned to what they were before' (BR-Pri-FR).

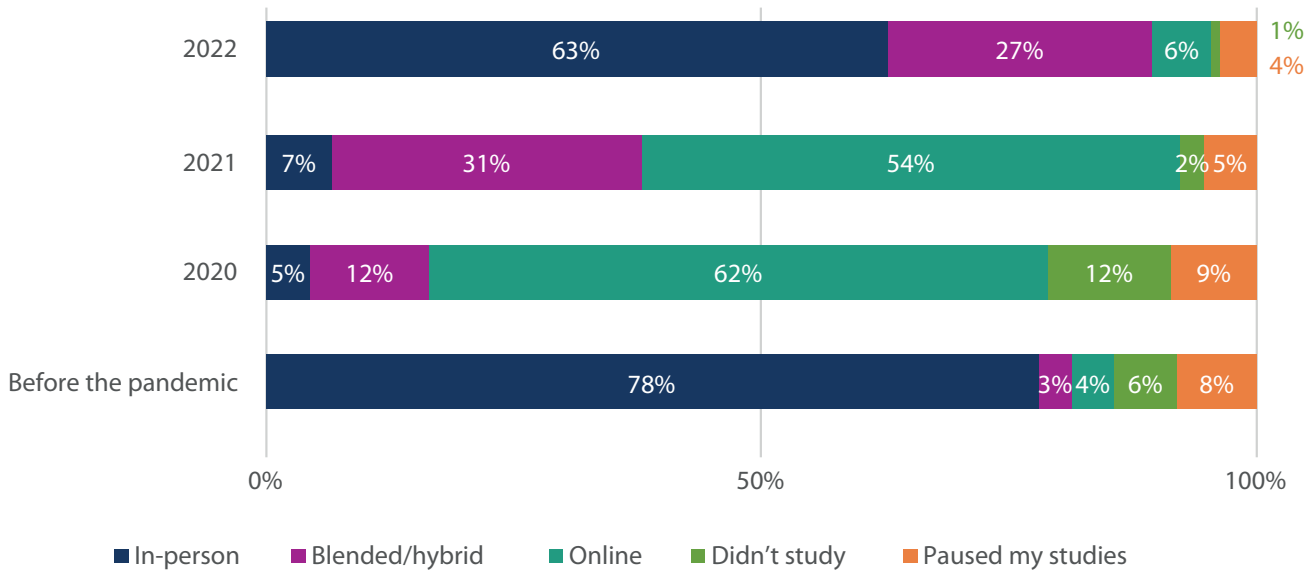
Although most students having returned to in-person education, which was also the main modality before the pandemic, a significant number **have continued studying in blended or hybrid modalities**, with fully online learning also remaining higher than in 2019 (figure 2). This net increase in blended and online modalities contrasts with and puts into question the regression in pro-digitalization attitudes observed in some HEIs.

Figure 1: How well prepared do you think your university was for online teaching based on affiliation to equity deserving group (EDG)



Source: UNESCO IESALC Digital transformation student survey (2023)

Figure 2: What has been your main mode of study over the past three years?



Source: UNESCO IESALC Digital transformation student survey (2023)

4. Government financing and initiatives for digital transformation

Although many governments changed their higher education policies during the pandemic, there is still a need for governments to develop and adopting public policy to **formalize their commitment to digital transformation** (Cerdá Suárez et al., 2021). By 2021, 27 countries in LAC were at different stages in their overall digital transformation policies: some are being implemented (16 countries), while the rest need to be updated (11 countries)[4] (CEPAL, 2021). Those agendas are mostly linked with economic aspects rather than the education sector, so there is space for improvement and further calibration to better encompass the specificities of the higher education sector. Some improvements in digital transformation have been made by governments and by HEIs in addition to those initiatives directly in response to the pandemic.

Policy level changes have varied from country to country in LAC depending on the level of readiness and national capacity to invest in the digital transformation of higher education systems. If some countries demonstrate practical applications of their policies by investing funds and developing concrete mechanisms leading towards more digital transformations, other countries recognize that they are still in the early stages of their journey to DTHE (e.g., Ministry of Education and Youth, Jamaica, 2022). Other countries are already piloting advanced technologies such as the use of blockchain for producing academic credentials in Colombia (Ministry of Education, Colombia, 2022).

It is important to note that the countries in LAC have **different approaches to regulating higher education**. This characteristic directly impacts how public policies can influence digital transformation processes in HEIs. While in Brazil, policy makers can legislate in areas that directly impact universities' workflow, the Argentinean law on higher education 'privileges university autonomy over state intervention and justifies state intervention only in situations where there is a direct risk to the public interest' (AR-Pri-RDV). Chile has taken a market-driven approach that encourages competition: 'We have a fairly strong system of development competitions. The state invests a lot in development projects that the institutions compete for' (AR-Pri-CNA).

4 Implemented: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Guatemala, Jamaica, San Vicente and the Grenadines, Panama, Paraguay, Peru, Dominican Republic, Trinidad and Tobago and Uruguay. To be updated in: Barbados, Ecuador, El Salvador, Granada, Haiti, Honduras, Mexico, Nicaragua, Santa Lucia and Saint Kitts and Nevis.

Table 3: Examples of LAC government investment in DTHE during the COVID-19 pandemic

Country[5]	Actions	Period	Budget (USD[6])	Source
Argentina	Virtualization Plan for Higher Education. Investment in hybrid classrooms, connectivity, technological tools for inclusion (in 2020: focused on 62 public universities and from 2021 to 2023 at least 59 universities)	2020-2023	$2.5m (estimated annual per capita expenditure of $0.22/student)	Ministry of Education (Government of Argentina, 2022)
Bolivia	Infrastructure and equipment for 300 students from rural places in the Universidad Autónoma del Beni 'José Ballivian'	2022	$1.5m	(Ministry of Education, Bolivia, 2022)
Brazil	Ministry of Education expanded capacity of web conferences for universities and federal institutes from 1,700 simultaneous accesses to 10,000	2020	Not specified	(Argüelles-Cruz et al., 2021)
Chile	Infrastructure and equipment including hybrid classrooms and use of platforms for all (119) HEIs	2021	Not specified	(Higher Education Information Service, 2022)
Peru	Strengthening of public universities: more places offered (5,279 new places for students), incentives and promotion of research (1,626 professors benefited), and free access (special scholarships, connectivity centres in 9 universities). Strengthening of other public educational institutions with Virtual Learning Environment (EVA) in 104 institutions, educational platform in 319 technological institutes for distance education and Virtual Library, Internet connectivity kits in 68 technological institutes. Scholarships and educational credits for 64,000 students.	2022	$358m (estimated annual per capita expenditure of $188.33/student)	Ministry of Education, Peru (Cadillo León, 2022)

Furthermore, some policy changes relating to digital transformation are **not specific to higher education** but have impacts on this field. In Ecuador, for example, the government introduced regulatory changes in 2021 by investing almost 50% of corporate taxes to promote connectivity in rural areas to reduce the digital divide (Government of Ecuador, 2021). The reduction of taxes on the import of technological equipment, the removal of taxes for connections (between places, organizations, buildings inside an HEI etc), and social tariffs for the certification of digital competencies have been mentioned as some of the regulatory tools implemented in Ecuador that could help to engage business in DTHE. These changes may incentivise HEIs to develop partnerships with the private sector, increase digital connectivity – especially in rural areas – or act directly and acquire technological equipment at lower cost (The Dialogue, 2022).

Digital transformation is **being financed by a range of sources**: not only national and local governments but international financial organisations and private companies. The diversified investments allow HEIs to implement different sections of their digital transformation strategic plans. As stated by a representative of a public HEI association, '[in Chile], we work, at least the state universities, with funds from the World Bank, for example. We have projects every year for strengthening our public education and, of course, they can perfectly be aligned with digital transformation' (CH-Pub-NP). The *Nueva Patagonia* initiative in Chile aims to digitally connect isolated areas in the Patagonia region of the country and has counted on funds from diverse ministries, including Education, Health, and Energy. In Brazil, the nationwide plan of connecting every educational institution has been developed by a partnership between the Ministry of Education and the Ministry of Science and Technology.

Governments in the region invested funds to provide support during the pandemic; selected initiatives are summarized in Table 3.

Beyond developing, conducting and financing projects of digital transformation that directly affect HEIs, **by the end of 2021, 17 out of 22 countries in LAC had**

5 No information was available for other countries in the region.

6 Exchange rate checked on December 5, 2022. Amounts rounded.

adopted new protocols allowing the adaptation of face-to-face classes to hybrid mode (UNESCO IESALC, 2021). This was a rapid increase from just five months previously when only 50% of those countries had established protocols related to digital learning (UNESCO IESALC, 2021). Despite innovative efforts to regulate in a future-focused direction, interviewees in this research project noted a marked absence of policies that go beyond the limits of government mandates. According to respondents, their countries are currently lacking state policies to strategically build the most efficient projects of digital transformation.

Policymakers have also been **operating at a regulatory level** to incentivise digital transformation projects. In Brazil, for example, the development of the digital diploma and the platform for title recognition (which incorporates mechanisms to verify, recognise and validate certificates) aims to set the ground for the expansion of distance education and, at the same time, ensure the quality of the offered educational pathways (BR-Gov-DC). In Ecuador, a policy change adopted in September 2022 expanded the modality of teaching and the use of technology for all HEIs. Now, the minimum 16 contact hours with professors are recognized regardless of the modality of classes, where only face-to-face classes used to be recognized before. New modalities have been added besides the traditional in-person teaching[7]. Universities also have to guarantee students open access to virtual libraries and digital repository as part of their student support (Higher Education Council, 2022).

To ensure different learning possibilities for students, the Argentinean government has been making efforts to provide adequate **infrastructure for hybrid classrooms** in higher education systems (AR-Gov-OA). Additionally, the Argentinean digitalization agenda embraces infrastructure, student equipment, software acquisition, and the digitalization of learning content and teaching materials. As stated by an interviewee, it goes one step further, as 'this virtualisation plan also addresses institutional capacities for hybrid training. The virtualisation plan ensures the funding, and each institution employs them according to their own institutional policy' (AR-Pub-CG).

Also in Argentina, new regulations for **distance education** have been proposed. As an interviewee noted, 'the resolution that focuses on the regulation of distance education seeks to integrate distance education with face-to-face education. This resolution is proposing a flexibility that blurs the boundaries between face-to-face and virtual education, between the synchronous and asynchronous world' (AR-Pri-RDV).

Raising awareness can also be a governmental initiative that promotes DTHE. For example, the Chilean National Senate and National Congress have for several years been promoting a project named 'Congreso Futuro', a scientifically oriented event that presents the world's most relevant trends, advancements, and updates in terms of digital transformations (AR-Pri-CNA). As in any innovation process, some issues can be raised as consequences of the implementation of new systems. Therefore, it is also necessary to be aware and prepared for eventual problems: 'we have to know how to deal with digital transactions, and with the problems they generate (…) our higher education will have to deal with this in order to not being 'running behind' to find solutions for problems that we could be better prepared to face' (BR-Pub-FN).

In 2021, the government of Peru implemented a platform to develop a **national survey focused on university students**, ENEESU. The ongoing survey conducted among students aimed to evaluate their adaptation to online learning during and after the pandemic, and their perception of the quality of virtual education. In addition, the survey aims to clarify the implementation of integrated systems of information and for university management to support universities in the implementation of new technological architecture (Ministry of Education, Peru, 2022). At the time of writing, the results had not been made public, but it will be an important resource for tracking DTHE in Peru in the future.

5. Institutional innovations and adaptations

The pandemic accelerated characteristics known as VUCA (volatility, uncertainty, complexity, and ambiguity) (Núñez Valdés et al., 2021), which in turn have **pressured HEIs to rethink their structures**. Digital transformation has become a way to implement new structures, make teaching and learning more flexible, and build trust

7 The new modalities of learning can be of five types (semi face-to-face – activities in direct interaction with the teacher and experimental practical-, online, distance, hybrid and dual -two learning environments: academic and work-). Of the five modalities of learning, the use of technologies is applicable specifically for online, distance and hybrid modes.

in hybrid and virtual modes of teaching and learning (Barón Hernández & Caicedo Rojas, 2021; Herrero Tejada, 2022; Silva, 2022). Illustrative examples include:

- At Universidade Estadual de Campinas (UNICAMP) in Brazil, the leadership allocated a greater share of the institutional budget[8] to **increase participation in online classes by providing access to the internet and loaning equipment to students** (Castillo et al., 2021). UNICAMP also received financial aid from the government to improve connectivity and deliver digital equipment (laptops and/or tablets) to their students (Arias Ortiz et al., 2021).
- In Argentina, in 2018, the Universidad Provincial del Sudoeste de la Provincia de Buenos Aires (UPSO) became the first public university to use **blockchain** to guarantee authenticity of diplomas for their continuing and regular education programs (Serna Gómez et al., 2021).
- The University of the Republic in Uruguay introduced a **virtual training environment** called EVA that has received government support to aid its promotion throughout the country (UNESO IESALC, 2020).
- In Mexico, the Tecnológico de Monterrey with the help of artificial intelligence (AI) designed a **virtual chat assistant** connected to the university´s information systems to improve the experience of their students by addressing questions during the enrolment process. The institution used to receive more than 14,000 enquires and needed a team of ten people to respond to them. With the chatbot, this process is now faster and interactive (Lustosa Rosario et al., 2021b).
- At the same university, known as a technological innovator, XAI (explainable AI[9]) has been used with a dataset of more than 120,000 students to **predict dropout** (Alvarado-Uribe et al., 2022), demonstrating the opportunity to deploy developments in technology such as AI to support student retention.

Across the region, however, the **use of AI to support the digital transformation process in higher education has not been very widespread**. In comparison with other regions, AI systems such as intelligent tutoring systems and adaptive learning systems that could improve students' active learning and critical reflection have not yet been deployed (Useche et al., 2022; UNESCO IESALC, 2023). Furthermore, the evidence base is still lacking: one systematic review identified only 31 studies published between 2016-21 that examined the application of AI technology in HEIs in the region (Salas-Pilco & Yang, 2022). Areas covered by research to date include student performance, student health and wellbeing, student development, teaching performance, assessment and evaluation, teacher-student communication, dropout and retention, university services, and university performance (Salas-Pilco & Yang, 2022).

Depending on their operational conditions, different HEIs included in this research project were **impacted by Covid-19-related challenges in diverse ways**. Universities with advanced digital transformation processes were able to quickly adapt to the social restriction period, especially when compared with institutions that hadn't started their digital transformation processes by the time of Covid's first wave. In Brazil, for example, while some universities successfully switched their operations to online in a few months, by June 2023, due to delays caused by the emergency period of the Covid pandemic situation, six universities still hadn't completed the 2022 academic year, which was expected to be finished by December (BR-Gov-DC).

Most universities in the region, however, only focused on sharing online classes but **not necessarily adapting in-person classes to new ways of learning** (online mode), suggesting a missed opportunity to use DTHE for the benefit of students (Barón Hernández & Caicedo Rojas, 2021; Valenzuela & Yáñez, 2022). There are multiple examples of individual initiatives in HEIs where, for example, in the case of a Brazilian mega-size public university, professors developed their own content and uploaded the videos to YouTube or the university portal. However, in the case of a different Brazilian large-size private university, it largely depended on professors' skills and whether they had support from the department unit. In contrast, in a Mexican mega-size public university, professors only used Moodle if they were requested to do so (Martínez-Pérez & Rodríguez-Abitia, 2021)[10].

8 The percentage/monetary change has not been published.

9 eXplainable Artificial Intelligence or XAI is a technique that adds explainability to artificial intelligence models, as a way to solve the complexity of machine learning models. Also, it improves the explainability of the inference process because could identify specific characteristics that influence a model (Lee, 2021).

10 Universities names were kept confidential.

It is also important to note that while the pandemic highlighted the importance of implementing digital tools (OECD, 2020c), innovation and cooperation, 80% of HEIs in Latin America and the Caribbean **already had a platform for distance education before the pandemic** (Cerdá Suárez et al., 2021). After COVID-19, that number increased by 8%, indicating an acceleration in technology changes from a relatively strong base (Castillo et al., 2021). In Chile, a government report found that of the 119 universities in the country, 70% use Moodle as their main learning management system (LMS), with 80% of HEIs using one unique system, and 20% relying on several LMS including those provided by Microsoft, Canvas, Blackboard and Google (Higher Education Information Service, 2022). Half of Chilean HEIs started to use Zoom as a tool for videoconferencing system; others in use in the country include Google Meets, Microsoft Teams, Blackboard and Bigbluebutton (Higher Education Information Service, 2022).

These examples show the complexity of DTHE and remind us that without structural change such as guidelines for assuring quality in teaching and learning with strengthening of capabilities, there is no transformation, only use of technology. Furthermore, in the research, respondents said that generally, there is **strength in numbers**. It is easier to reach funding opportunities when larger numbers of people or institutions are represented in the negotiation table. In the case of a higher education network in Brazil: 'we are 41 institutes and if each one of them went to ask the Ministry of Education for things in isolation, it would be very diluted, and we would lose strength. [Regarding] the question of internet access (…) we managed to structure this challenge and the Minister of Education managed to create an access solution for all our campuses' (BR-Pub-FN).

There also appears to be a tendency for strategic plans of digital transformation to incorporate the **simultaneous implementation of diverse initiatives through multiple financing opportunities**. For example, while IFSUL (Brazil) was using its own institutional resources to support economically vulnerable students with equipment acquisition, it was sponsored by the Ministry of Education to build multi-use labs and developed partnerships with private companies to offer ICT-oriented courses for their staff and students.

6. Administrative efficiency and technological interoperability

HEIs are currently at **different maturity levels when it comes to applying digital transformation** to teaching and learning, and this varies depending on the level of development of digital skills in their community (Martínez-Pérez & Rodríguez-Abitia, 2021). For administrators, managing processes such as admissions and registration in an online environment were challenges during the pandemic (Argüelles-Cruz et al., 2021). Institutions typically lack tools to measure those skills for students and faculty. Institutional plans to develop those abilities and skills appear to be absent. Private HEIs may be better prepared for DTHE owing to greater availability of equipment and infrastructure, as for example is the case in Colombia (Mejía Delgado & Mejía Delgado, 2021).

Varying institutional capacity also reflects in how digital transformation is being applied to enhance the **student experience**. A survey completed by 20 universities in the central American countries of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama showed that digital transformation is reflected in the preparation, development, and evaluation of the teaching processes, rather than in other aspects of academic experiences such as mobility of students and professors. Student support processes prone to digital transformations are finance and accounting (supporting students' loans, discounts, among others), library and bookstore services rather than marketing and student development and management services (Castillo et al., 2021).

Digital transformation projects can **increase efficiency, decrease processing times, and reduce administrative operations costs** in higher education contexts. In Argentina, respondents explained how entire administrative operations, including accounting, human resources, research, and student support, are being digitalized with investments of the national government. In Brazil, the Unified Public Administration System (SUAP), broadly implemented in the Federal Institutes of Science and Technology because of the pandemic, has drastically decreased the processing time of daily bureaucracy: 'In the SUAP case, we decreased by 99% the circulation of paper, we increased the efficiency of the response time of our processes. It was a great advance. We had been working on it, but the pandemic spurred us on' (BR-Pub-FN).

Furthermore, the incorporation of digital administrative systems **improved communication and increased the speed of management actions**, particularly when campuses located far apart from each other are under the same rectorate: 'when you have offices, for example, in Patagonia, 800 to 1000 km away, managed by the Rectorate, with a physical file it's impossible(...) It is precisely the electronic file that gives them the possibility to unify everything, to work together' (AR-Gov-OA). Initiatives to increase access to information and communication between higher education systems can also be favoured by successful execution of digital transformation procedures. At the governmental level, Argentina has been making efforts to promote the integrated university system by incorporating in a single platform all the administrative information of their HEIs.

As a part of a series of efforts to promote digitalisation and digital transformation in the administrative and academic realms of HEIs, the Chilean government has launched an initiative to promote **interoperability of public sector data**. It is expected that this project will improve management effectiveness not only in higher education but across the public sector (CH-Gov-VOC). In Argentina, after selecting the central administrative system for HEIs, the national government sponsored the development of courses to prepare HE staff to use the chosen management tool. The integrated administration centre was chosen at national level and the courses became available for employees of all HEIs (AR-Gov-OA).

Despite the initiatives reported in the interviews, students noted that there is still room for improvement in administrative efficiency and interoperability. When responding to the optional question about additional DT-oriented changes that they would like to see at their universities, students mentioned the **need to improve educational and administrative platforms**. Students said that modernising and integrating digital platforms would enhance the teaching and learning process. They also suggested to improve communication between management and students, to increase automation, and to pay more attention to data privacy. Survey participants believe that these measures would improve the understanding of their needs and make digital transformation process more inclusive and secure. In this direction, considering the security challenges, the approval of the Chilean data protection law can also be considered a milestone that backgrounded the nation wide process of digital transformation in higher education (CH-Pri-CNA).

> **'Greater integration between the administration, teachers, students in order to align which, how and when the resources will be 'used' during the remote learning period. Accessibility for teaching and learning processes needs to be a priority for public institutions, especially to promote really democratic and fair access for everyone.'**
>
> *25-34, female, LGBTQI+, Education, Brazil*

> **'Virtuality should not prevent closer and more coordinated communication.'**
>
> *45+, female, Journalism and Information, Argentina*

> **'I would like to see the administration being able to automate attendance effectively and I would like my personal and research data not to be under the control of big techs.'**
>
> *25-34, other, racialized, LGBTQI+, Mathematics and Statistics, Brazil.*

There are also challenges for teaching and learning in supporting DTHE through student support and IT teams, meaning that professors shifting from face-to-face classes to new modes such as hybrid (combining face-to-face and virtual) or online classes are **lacking relevant institutional support** (Castillo et al., 2021; Cerdá Suárez et al., 2021; Lustosa Rosario et al., 2021a). Despite the willingness of professors and students to improve teaching and learning, the lack of technological resources, budget and strategic planning in HEIs will continue to be important challenges (Arias Ortiz et al., 2020a; Lustosa Rosario et al., 2021b). Furthermore, instructors typically have little information about the diverse profile of their students to better address their learning needs and limitations when teaching online and in hybrid modes (Valladares Celis & Timmis, 2022).

7. Digital skills and the student experience

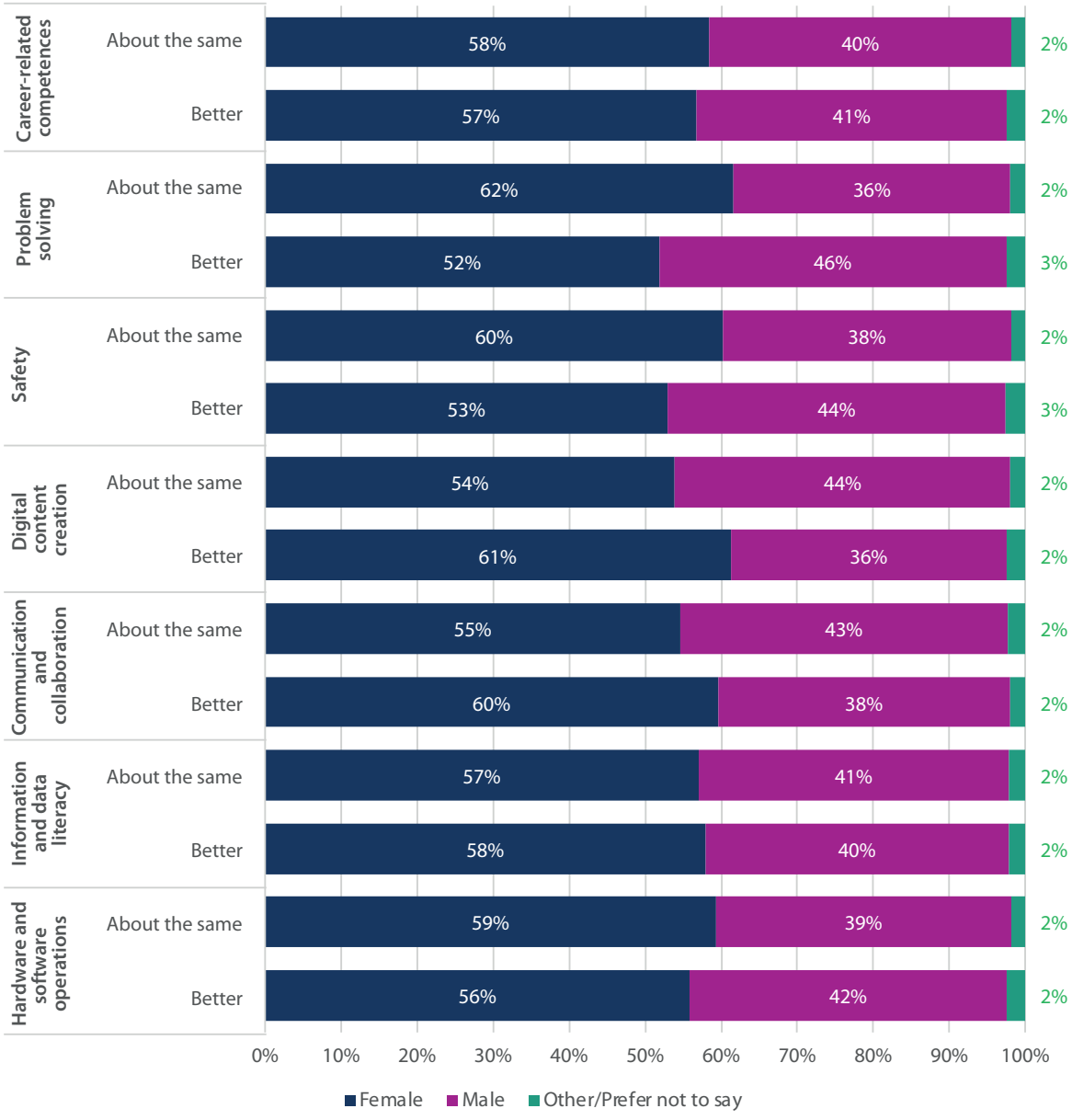
Encouraging the use of technology and ensuring students' familiarity with digital tools is not enough for digital transformation to happen nor to shift students' attitudes toward digital transformation initiatives. A study conducted with 491 participants at universities in Bogotá, Colombia found that **students' attitudes towards digital tools** were not directly connected to their expectations of using those or similar tools in the future (Mejía Delgado & Mejía Delgado, 2021). Rather, students' attitudes tend to positively change when they

recognized the contributions that certain tools can make and the advantages they can provide to teaching and learning processes.

To prepare students for a digitalized world, authorities have been discussing reforms of higher education that focus on the **competences that need to be developed by future professionals**. Governments have created strategic plans for modernizing higher education that include the promotion of digital transformation that not only aim to integrate ICT tools in higher education but also aim to increase the relevance of university studies for the job market and for the country's economic development. In Argentina, for example, the Secretariat of University Policies and the Council of Rectors agreed on seven items to guide the update of HEI policies, regulations, and operational methods. These are student-centred: 'We try to decentralize the offer, traditionally centred on professors' capacities, and reorient it towards the needs of the students, which are ultimately the needs of society' (AR-Pub-CG).

Students of all genders noted that their **digital literacy competences have somewhat improved** during their studies and therefore during the pandemic period (figure 3). Among the digital literacy competences defined by UNESCO, information and data literacy was the competence that was most improved, whereas problem solving and safety are the two competences where the least improvement was noted.

Figure 3: During your university studies, how would you assess changes to your digital literacy competences?



Source: UNESCO IESALC Digital transformation student survey (2023)

The **three main digital skills** demanded in the private sector are the ability to develop agile methodologies, create digital content, and the ability to analyse large volumes of information (Marquina et al., 2022). Considering that these skills can be taught as part of university degrees (Barón Hernández & Caicedo Rojas, 2021; Castillo et al., 2021; Sigalés, 2021), the aforementioned demands can also be interpreted as opportunities for HEIs.

However, students are critical about **lacking the skills needed** for an increasingly digitalized world. Students want to see technology used for greater personalization both of teaching and learning but also study modality.

> **'I would like to see better application of technology in my course. Also, allowing semi presential [education] would help optimise study/travel time.'**
>
> *25-34, male, Business, Administration and Law, Argentina*

> **'I would like the possibility for the student to choose the teaching modality that best suits their reality. [This would] democratize access to higher education, especially to students who work and study and sometimes cannot attend classroom classes.'**
>
> *25-34, male, Engineering, Manufacturing and Construction, Brazil*

In addition, another challenge identified by students relates to the importance of the skills acquired being aligned with the skills demanded by the labour market.

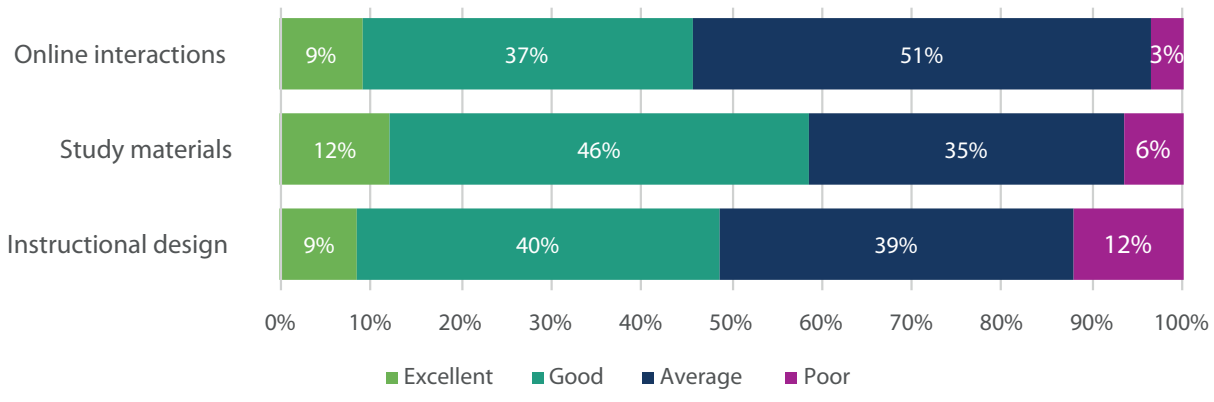
> **'[I would like to see a greater] availability of technologies which will be used in professional life after graduation, practical use of technologies!'**
>
> *25-34, female, Business, Administration and Law, Brazil*

When students in this research project were asked about the **quality of online interactions, study materials, and instructional design**, more than half affirmed that their study materials were good or excellent but online interaction and instructional design require more effort to improve the learning experience (figure 4). There was some polarization of the student experience given the range of survey responses.

Analysing the responses by gender, male and female students were very closely aligned in their views. However, **students identifying with other genders had a much more negative experience**, rating as average/poor as follows: 76% in instructional design (compared to 50% of females/52% of males), 53% for study materials (41% for females/42% for males) and 70% for quality of online interactions (54% for females and males). While only a very small percentage of the overall respondent base identified with other genders (1%), the right to higher education means that all students should be able to enjoy a similar quality of experience, regardless of their gender or other factors.

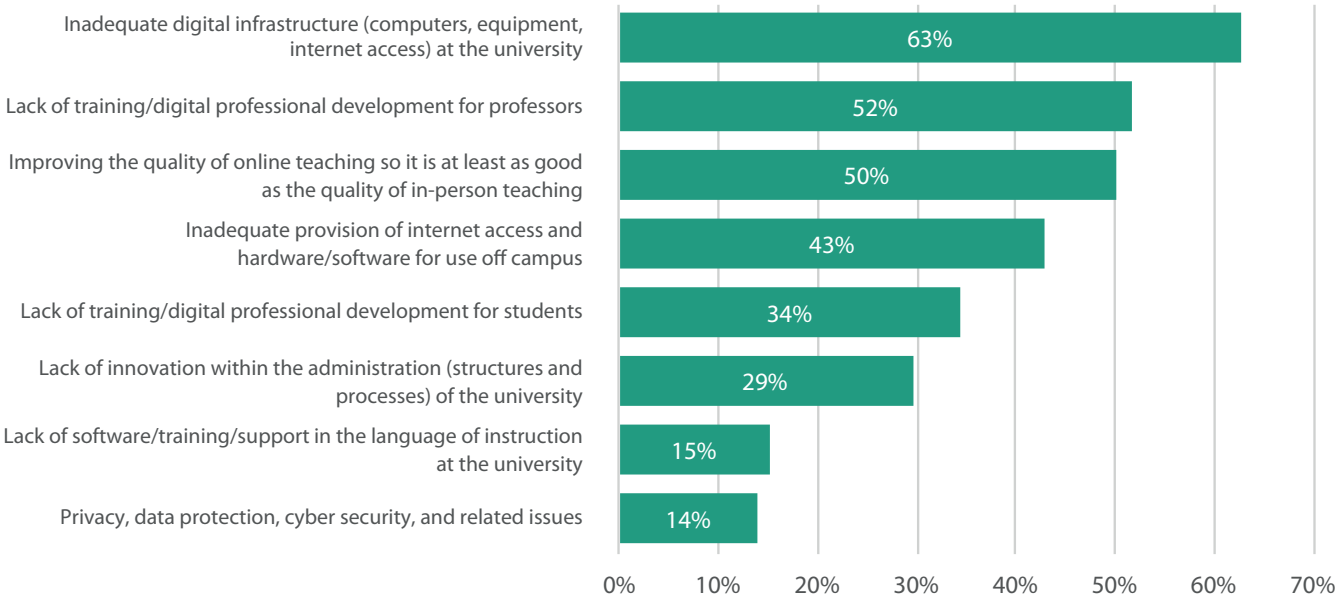
For students, **infrastructure is one of the main challenges** to DTHE that they see at their university (figure 5). The need for more and better technological resources applied to teaching and learning include up-to-date equipment (tablets, computers, 3D printers,

Figure 4: During 2020 and 2021, how would you assess the quality of online interactions, study materials and instructional design?



Source: UNESCO IESALC Digital transformation student survey (2023)

Figure 5: What do you think are the three main challenges for further digitalisation at your university?



UNESCO IESALC Digital transformation student survey (2023). N=970.

laboratories for teacher and students). Students highlighted that existing equipment, although functional, is obsolete. In addition, they also called for access to digital libraries, which allow access to recent books to improve their research.

A topic to be further explored in the LAC context is the **effects on the mental health** of the higher education community during digital transformation, if emotional, mental or psychological costs are involved, and the effect of digital transformation on people with disabilities who integrate institutional ecosystems (Castillo et al., 2021; Valladares Celis & Timmis, 2022). This will be important to learn because there is only evidence of the consequences for children and teenagers in schools (OECD, 2021).

8. Upskilling faculty and staff for digital transformation

A study with 172 professors and students at the Technical University of Babahayo in Ecuador found **strong links between digital transformation strategies and teaching and learning processes**, which in turn relate to teaching performance (Aracely et al., 2021). Research with 1,576 participants from nine countries in the region (Argentina, Chile, Brazil, Mexico, Peru, Costa Rica, Ecuador, and Uruguay) found a significant gap in attaining DTHE that relates to (the lack of) digital competences and knowledge (Okoye et al., 2022). To address the gap between the importance of teachers to DTHE and the current situation, a very common recommendation in the literature is to undertake a good diagnosis of digital skills (not only with professors but also among students and staff) to develop tailored training and achieve digital transformation in HEIs (Arias Ortiz et al., 2020a; Barón Hernández & Caicedo Rojas, 2021; Cerdá Suárez et al., 2021; Herrero Tejada, 2022; OECD, 2021).

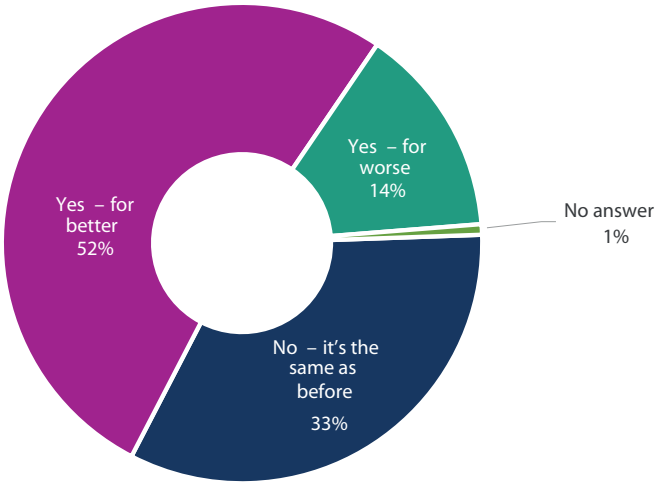
Respondents in this research project acknowledge that forming a culture of digital transformation requires a **shift in approach from faculty members**. It 'generates a possibility of permanent contact with the students. It means more work, but the teachers consider it is an initial effort that generates better conditions for the training process' (AR-Pub-CG). All higher education stakeholders need to promote cultural changes, not only so that new processes become embedded, and staff are supported to successfully carry out their projects, but as **a way of staying relevant** in today's world (UNESCO IESALC, 2022b). As one respondent put it starkly, 'if you do not carry out a digital transformation process, young people will not go to this institution. Then the diploma can lose its value, it is a loss of value of higher education' (BR-Pri-FR).

However, while digital platforms were introduced *en masse* during the pandemic, a survey of 800 professors in Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, and Uruguay found that 75% **did not feel**

prepared to use new digital technologies in their classes, with the lack of digital training being the main challenge identified (Arias Ortiz et al., 2020a). Other challenges identified by faculty include weak internet access and the necessity of more funding (Arias Ortiz et al., 2020a). HEIs that did not have virtual provision before the pandemic recorded that lack of digital competences of teaching staff was the biggest barrier to offering programmes at a distance (Herrero Tejada, 2022). During the pandemic, instructors in Argentina and Chile reported increased workloads which can be partly attributed to having to use digital tools, many doing so for the first time (UNESCO IESALC, 2022b).

The adaptation of higher education to the digital society also **incorporates reformulating teaching approaches**. The most frequently mentioned topics in the interviews are those that are well known in the literature, relating to teaching methods, educational applications, assessment, and plagiarism. Despite the challenges, just over half of students reported that teaching at their university has been transformed for better since the start of the COVID-19 pandemic, and only 14% said it has got worse (figure 6). Students identified the need to improve their digital skills and said that this gap extended to teachers as well.

Figure 6: Overall, do you feel that teaching at your university has been transformed since the start of the pandemic?



Source: UNESCO IESALC Digital transformation student survey (2023)

Some interview respondents reflected on approaches to disseminate knowledge based on mechanisms that better communicate with the target audiences. For example, one respondent mentioned the ability of science-oriented digital influencers to reach a greater number of people with academic-related topics, making it important to incorporate creative elements into teacher education to strengthen the relationship between university and society but also ensure better learning outcomes for students (BR-Gov-DC). Students also expressed the importance of having **better qualified teachers and staff**. When students refer to the quality of teaching, they refer to the need for more and better digital skills, but also, in a broad sense, they refer to the pedagogical part, which includes the support and supervising of students, regardless of the form of teaching (online or face-to-face).

> **'Offer training for students, especially indigenous and quilombola people who face great difficulties in terms of teachers' pressure. It is not enough to just give access to these people; you need to support them.'**
>
> *25-34, female, racialized, Health and Welfare, Brazil*

> **'I think that the use of ICTs would be interesting to diversify the methodologies of the classes without having a negative vision about the implementation of these, with this I refer to a change in the paradigm or thought that some managers, teachers, or students about the use of these tools within the classroom.'**
>
> *18-24, female, Education, Chile*

Upskilling for digital transformation also applies to staff in higher education. In Argentina, the national association of private universities (CRUP) implemented a 6-year-plan on digital literacy, innovation, and digital transformation for higher education staff. Among the teachers, for example, 45% finished their training and got certified by the first semester of 2023. Furthermore, digital competence development courses continue being offered to approximately 35% of the private institutions' professors (AR-Pri-RDV).

At the institutional level, **enhancing the knowledge and level of consciousness of rectors and deans** is particularly relevant for the engagement of higher education into digital transformation processes. In Brazil, for example, the rectors of 18 public and private universities were accepted into an international course offered by a privately run university network that focused on developing the knowledge, skills and attitudes that need to be acquired by senior administrators in order to conduct digital transformation

processes in their HEIs. Developing a strategic digital transformation plan for their universities was part of the exam to obtain the course certificate (BR-Pri-FR).

9. Flexible and internationalized educational pathways

Beyond the skills students seek to acquire in traditional degree programmes, interviewees also discussed ways that DTHE could support **more flexible educational pathways** that recognize competences acquired outside traditional formats. In Argentina, a seminar organized by the associations of public and private universities (GRUP and CIN) in 2022 noted that 'to articulate formal and non-formal education (…) it is necessary to be able to find ways of certifying those competences that come from work experience or from non-formal education, the university need ways to be able to certify it' (AR-Pri-RDV).

To support these flexible education pathways, the creation of **quality systems** that communicate with institutional quality frameworks is extremely important (AR-Pri-RDV). As stated by the Argentinean government representative, 'I would say that the big question of quality in this era will be how to balance homogeneity of quality criteria with a diversity of institutional projects, which are going to become increasingly diverse' (AR-Gov-OA). This connects to the need to enhance the general societal perception about the quality of online methods of teaching and learning. To achieve this aim, rigorous internal and external mechanisms of evaluation and quality assurance are needed. This was highlighted by a government respondent: 'I would say that our main issue is of cultural nature. Our main challenge is to get online education right so online education does not appear as a second-class education compared to face-to-face' (CH-Gov-VOC).

In connection, discussions about **microcredentials** were put forward alongside the **process of accreditation** of competences. Respondents expressed interest in creating 'intermediate' degrees, allowing curriculum flexibility, the use of a credit system, and possibilities for students to transfer between HEIs with automatic credit recognition (AR-Pub-CG). Besides speeding up the student's educational journey, HEIs would be able to be more focused in the series of skills that needs to be acquired by professionals.

Latin American higher education systems are also aiming to increase their international communication to **share and learn** from good digital transformation practices. In Argentina, for example, there has been a management-oriented digital transformation initiative with the French state quality agency. This mainly aims to meet European Union higher education quality standards to facilitate communication and collaboration with international institutions and to increase the impact of Argentinean HEI in academic and work-related contexts (AR-Pri-RDV). For students, international and regional links could be facilitated by technology and provide the opportunity to access international teachers as well as exchanges with HEIs outside their borders to improve the competences.

> **'[I would like to see more] Lectures, discussions and subjects related to academic education of online courses and international experience through virtual mobility.'**
>
> *18-24, female, Education, Brazil*

> **'[I would like to see more] Classes and lectures with teachers from other cultures, other countries!!'**
>
> *35-44, female, Education, Brazil*

> **'[I recommend to] create Latin American links.'**
>
> *25-34, male, Social Sciences, Journalism, and Information, Venezuela*

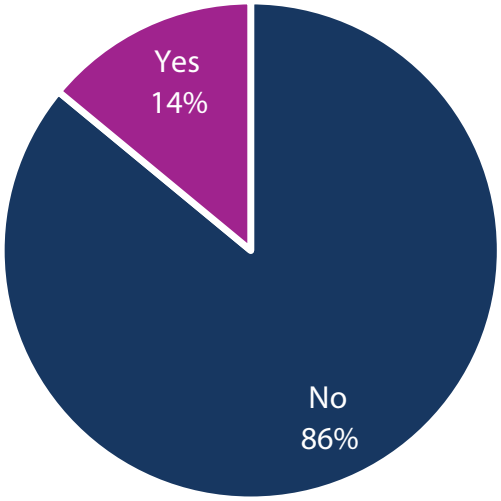
When analysing students' opinions about future challenges, hybrid education is pointed as the favourite study format and online learning is also highly demanded. The argument is founded on the flexibility that these learning layouts bring to teaching and learning processes, regardless of if this is done synchronously or asynchronously.

Academic mobility and other forms of internationalization are also areas with challenges related to DTHE (Marquina et al., 2022; UNESCO IESALC, 2022a). A significant number of LAC students lack digital skills, and access to connectivity, devices, and applications, which indicates that all learning experiences available through virtual student mobility (VSM)[11] remain challenging, particularly for disadvantaged students. The student survey also

11 Virtual student mobility (VSM) is a form of mobility that uses information and communication technologies to facilitate cross-border and/or inter-institutional academic, cultural and experiential exchanges and collaboration, which can be credit and non-credit based (UNESCO IESALC, 2022a)

shows that only 14% of students took part in a VSM programmes between 2020 and 2021 (figure 7) and, in this direction, more and better efforts are needed to promote VSM initiatives. It is important to stress that VSM initiatives need to consider the need to support disadvantaged students with ICT-oriented provisions, otherwise they may further widen inequalities in accessing exchanging opportunities, international experiences, and collaborative learning.

Figure 7: Did you participate in any virtual student mobility programmes during 2020 or 2021?



Source: UNESCO IESALC Digital transformation student survey (2023)

10. Supporting the democratization of higher education

Processes of digital transformation can contribute to the democratization of higher education. Beyond investments in the main national universities and campuses inside the biggest metropolitan areas, authorities have been making efforts to build enough infrastructure to support the implementation of **digital transformation projects in remote areas**. In Brazil, the Ministry of Education has been debating how digital transformation can expand access to higher education, especially outside of the major urban centres. As an interviewee stated, 'I believe that the challenge today is precisely the location of university campuses in these less developed regions (…) they should answer the questions of that region, according to the demands of the locality. I usually say that the 'modern university' needs to be territorialised' (BR-Gov-DC).

From the perspective of the students, democratizing higher education through digital transformation also relates to **increasing access to higher education**, considering connectivity, inclusivity, and the different barriers that may occur for students in precarious circumstances.

> **'Greater accessibility of digital technologies for students in vulnerability, making learning more democratic and egalitarian'**
>
> *18-24, female, Engineering, Manufacturing and Construction, Brazil*

> **'To offer better internet access so students won't need to go to libraries to have good internet access. By accessing it from their own laptop, the students will no longer overload computer labs, leaving access to these tools only for those who really need them, i.e., those who do not have computers/cell phones/tablets to study outside the university.'**
>
> *18-24, female, Commuting from a remote or rural location, Business, Administration and Law, Brazil*

Digital transformation process can **strengthen the connection and collaboration between HEIs and local communities**, increasing universities' social and economic impact. For instance, Chilean government authorities have been advocating for 'higher education [to be] transformed (…) into a space that promotes development' (CH-Gov-VOC). Similarly, in Brazil, there have been debates about the necessity for HEIs to support the development of research that can contribute to local economic development (BR-Gov-DC). In this direction, by allowing HEI expansion into previously unreached areas, digital transformation processes can incentivize the participation of universities in the development and integration of remote places.

HEIs themselves can contribute to digital transformation by supporting the development of **digital literacy in their communities**. As one respondent noted, 'it does not matter how much we want to revolutionise, have a lot of digital strategies, if the student who arrives does not have the skills because they did not acquire them during their school education. I think it is also important to link digital development in universities with what happens in universities' (CH-Pri- CNA). Outside the public policy realm, some national and international associations have been incentivising

digital transformation through **capacity building**. Brazilian associations of private HEIs have been trying to put digital transformation onto the agenda of HEIs: 'We are going to the Brazilian [state] capitals with thematic workshops about the theme of digital transformation as a way to raise awareness. For these workshops, we invite all institutions' (BR-Pri-FR).

In this regard, students also shared their ideas on how HEIs should be **enhancing their third mission (engagement, extension)**. Today, when most communication and knowledge is available online, students emphasise the need for internet connectivity on campus, at home, and also at the service of the community.

> **'[I wish] that universities were free spaces for digital updates not only for students but for the whole community.'**
>
> *45+, male, Education, Brazil*

On the other hand, this heterogenization of knowledge production can lead to misinformation if society is not properly prepared. According to interviewees, HEIs and research centres should participate not only into fighting the repercussions of the propagation of false information but also in **preventing threats caused by the increasingly unequal use of ICT** in different sectors of society. For example, one respondent said that Brazilian universities should stimulate the establishment of research groups focused on preparing for issues that arise from a broad employment of technologies in society (BR-Pub-FN). And in Chile, it was noted that 'what is at stake here is a greater step forward in the degrees of socialisation of the way in which knowledge is produced, created, and distributed and, therefore, the institution that aims to survive for a long time needs to incorporate this [function], just as it has incorporated other processes' (CH-Gov-VOC).

While the emphasis in the interviews was on teaching and learning and administrative processes, the impact of digital transformation on research was mentioned by six respondents. Data centres, online libraries, online forums, reference-manager software, academic searching engines, long-distance partnerships, research management tools and data analysis software not only **speed up knowledge creation processes** but also ensure the efficiency of applied investments, in turn supporting further democratization of higher education. This has been supported by policymakers, for example, in Brazil where the Ministry of Education has been continuously increasing the available cloud storage to allow HEIs to install their administrative systems online, enabling remote access to educational files (BR-Pub-FN).

By encouraging digital transformation in research contexts, it is possible to release researchers from conducting lower-level tasks (e.g., referencing) and give them the opportunity to spend more time on **meaningful research-related initiatives** (e.g., data analysis, critical thinking, writing). This was reinforced by an interviewee who said that 'thinking fundamentally about the application of algorithms to academia, we could simplify our lives with literature reviews (…) maybe in this way I can spend more time, for example, between my hypothesis and my pilot test' (CH-Gov-VOC). However, students expressed concern that these expectations of DTHE are not yet matched by reality in their universities.

> **'Internet access is still very restricted for the students of the institution. Computers are limited. Some courses do not have advanced technological tools to carry out adequate and quality scientific research.'**
>
> *35-44, male, Business, Administration and Law, Brazil*

Beyond the **increasing number of research initiatives and publications about the digital transformation**, respondents also explained strategies for the promotion of national and international scientific events such as seminars, congresses, workshops, debates, round tables, and conferences has been employed as mechanisms to nourish digital transformation into higher education contexts. The culture of researching, sharing, debating, and collaboratively reflecting on digital transformation is particularly important when the available budget is limited.

11. Digital transformation and gender

The literature review did not show differences by gender - including the LGBTQIA+ community - in the implementation of DTHE in LAC. However, research has shown that there is a **gendered digital divide in society at large**. For example, a study in Mexico's Maya speaking communities found differences in technology skills and use between women and men,

following trends that the researchers identified in other global studies (Domínguez Castillo et al., 2020). The benefits of digital transformation include the ability to recover space and continue working and studying from home with lower costs to commute due to new technologies and acceleration of digitalization (Beylis et al., 2020; OECD, 2021). Yet, it was not possible to identify additional quantitative indicators such as how many women or LGBTQIA+ people can access quality online learning, at what level of HE, and with which level of connectivity.

For the most part, the literature does not discuss in detail the **impact of intersecting students' characteristics** such as those related to gender, location, and disability. For example, only one study examined the intersection of gender and indigeneity and the impact of the digital divide, but in a broader societal context (Domínguez Castillo et al., 2020). However, some authors (e.g. Barón Hernández & Caicedo Rojas, 2021; Castillo et al., 2021; Núñez Valdés et al., 2021; Okoye et al., 2022) point out the influence of the location of HEIs (urban versus rural). The lack of consolidated digital infrastructure, limited and unstable connectivity on the speed of digital transformation, and the impact of socio-economic status of stakeholders may all act as potential hindrances.

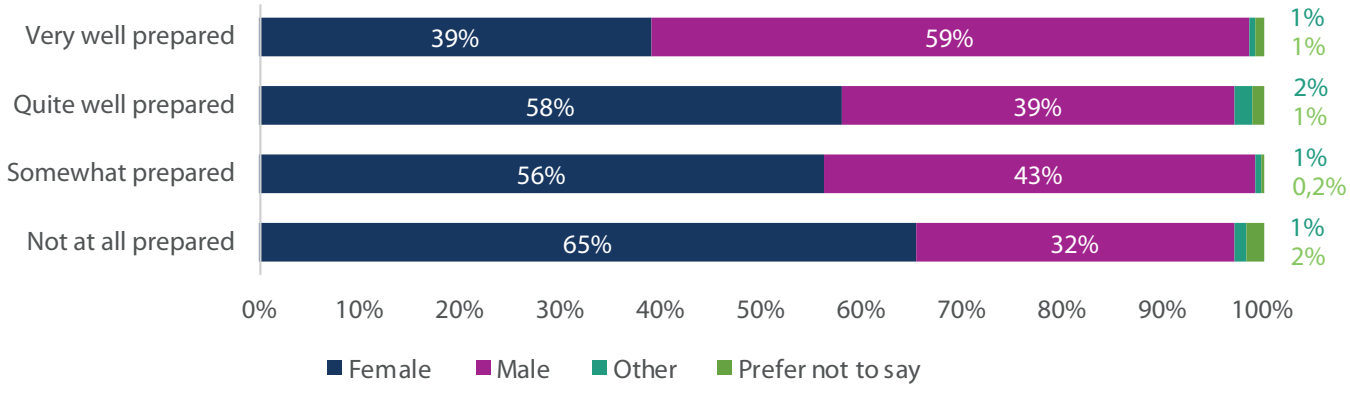
Based on the finding from the literature review that the intersection of digital transformation and gender was under-examined, this was raised as one of the topics in the interviews, and the student survey took gender and equity deserving groups (EDG) as two of the vectors of analysis. The interviews did bring up the issue of gender inequalities, but these were discussed in fairly general terms e.g., in relation to representation in STEM subjects.

Another gender dimension relates to **women's participation in generating digital transformation** e.g., by studying or researching technology. Although women's participation in science, technology, engineering and mathematics (STEM) subjects in HE has grown in the region by 22% from 2000 to 2018 (Lustosa Rosario et al., 2021b), their overall enrolment rate in STEM is still low: half that of men (Núñez Valdés et al., 2021). Interviewees tended to focus on efforts to improve female representation in general rather than in DTHE specifically. For example, In Argentina, gender parity on governing bodies and management teams of research institutes is mandated (AR-Pub-CG) and in Chile, the ongoing higher education modernization process includes an emancipation agenda that aims to address 'gender equality, interculturalism and inclusion in higher education in every sense. (…) Every area of academic work is crossed by the problem of gender; I would say that there is no corner of higher education where the problem of gender does not reach' (CH-Gov-VOC).

Although the leadership comments on digital transformation provide a macro perspective, the results of the student survey reveal some important findings for digital transformation from a gender perspective. For example, **female students felt less well prepared for the transition to online learning** at the onset of the pandemic than male students (figure 8).

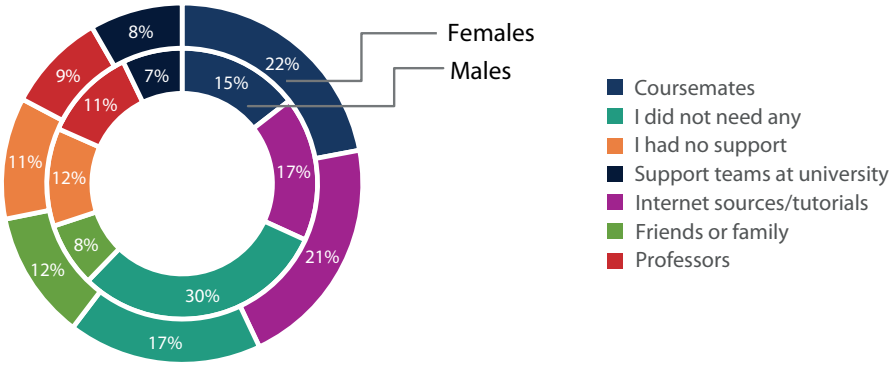
Similarly, 62% of female students turned to at least one source of technical support for the transition to

Figure 8: How well prepared did you feel for the transition to online learning that resulted from the onset of the pandemic?



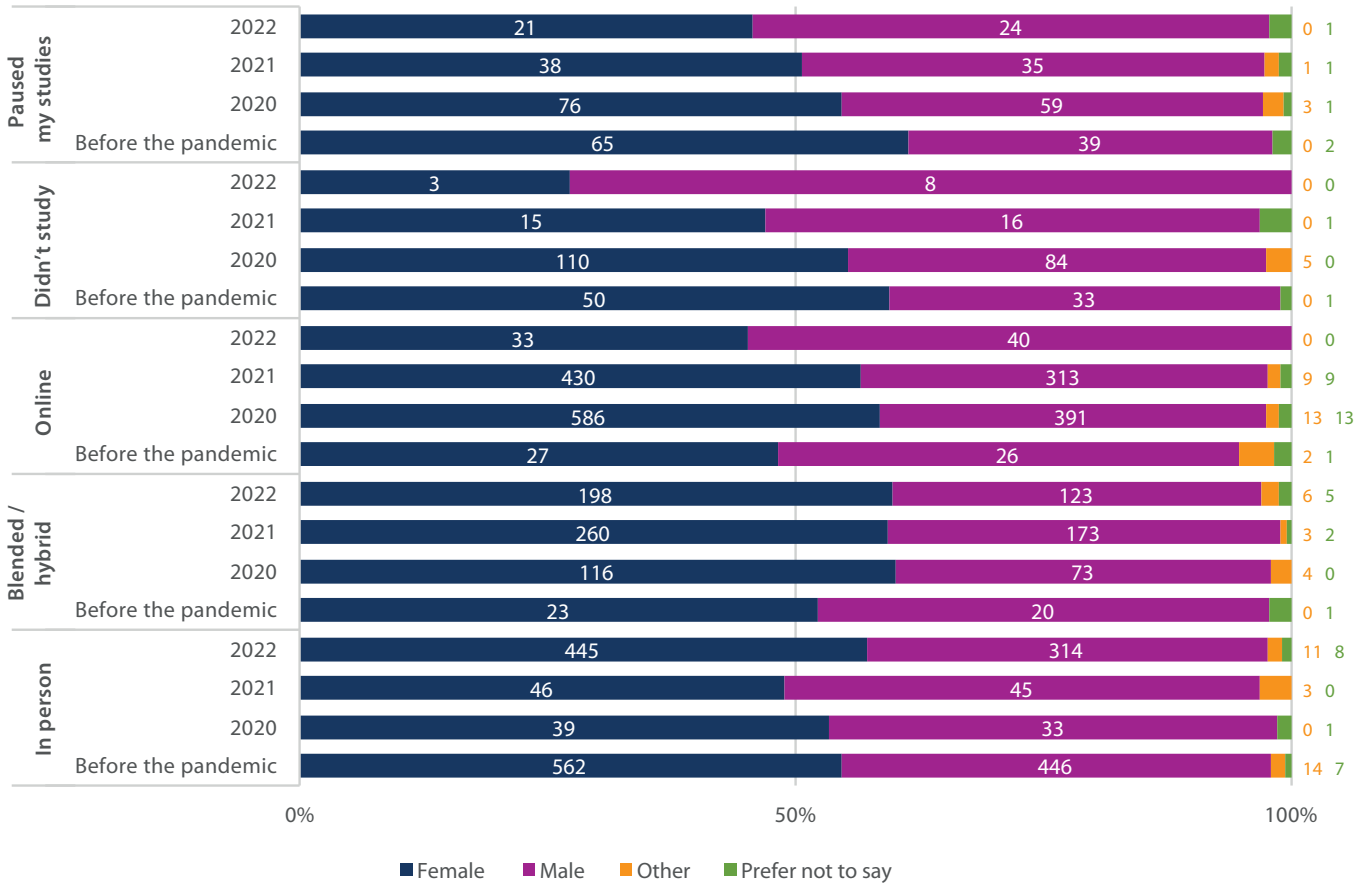
Source: UNESCO IESALC Digital transformation student survey (2023)

Figure 9: What was your main source of technical support for the transition to online learning?



Source: UNESCO IESALC Digital transformation student survey (2023)

Figure 10: What has been your main mode of study in recent years?



Source: UNESCO IESALC Digital transformation student survey (2023)

online learning, with 21% saying they did not need any support – for males, this figure was higher at 30% (figure 9). This could suggest that approaches to resolving problems or asking for technical support might differ according to gender.

In terms of their main mode of study, the survey also revealed that **female students had more propensity to pause (suspend) their studies before and at the start of the pandemic but that male students were more likely to stop studying in 2021 and 2022.** Based on the survey male students were slightly more likely to study online before the pandemic and in 2022 whereas female students show more propensity to study in-person or in hybrid or blended mode (figure 10). These varying patterns should be considered in future planning.

12. Conclusion and Recommendations

12.1 Summary of findings

While the pandemic served as a catalyst to significantly augment the use of technology in teaching and learning across LAC, it primarily led to more digitalization and not necessarily DTHE. The mere availability of technological innovation has not automatically led to DTHE, which encompasses profound cultural and structural changes, especially fostering an innovative mindset, a willingness to improve traditionally established procedures and the promotion of ethical collaboration and responsible dialogue.

It is also crucial to emphasize that significant disparities exist in the implementation of DTHE processes among the LAC nations. Substantial challenges persist in the region: unreliable internet access, limited digital skills, inadequate technology infrastructure, and constrained resources are among some of the main obstacles to DTHE. While some countries have already adjusted their higher education policies to support innovative processes and have demonstrated practical applications of their policies through investments and the development of concrete mechanisms that propel digital transformation, other countries have acknowledged that they are still in early stages of their journey towards DTHE.

The emerging legacy of the pandemic has seen increased interest in hybrid and virtual modes of education, supported in many LAC countries by new protocols and measures initially designed to facilitate the adaptation of face-to-face classes to hybrid and online modes. However, as social restrictions began to ease, there has been a general effort within HEIs to resume face-to-face activities and the return to traditional workplaces has slowed the pace at which digital transformation processes had been conducted.

Governments in the region are making investments in their digital infrastructure, although these are typically for other economic sectors. However, there has been a range of government financing for delivering educational content and some initiatives from both policymakers and institutions aim to increase access to higher education for students in socioeconomic vulnerability. During the emergency period, some HEIs were not only able to improve their institutional connectivity but also provide internet access through the distribution of SIM cards and the provision of electronic devices (laptops, tablets, etc.) to their students. However, HEIs are at different maturity levels when the development of digital transformation initiatives is considered.

It is also relevant to note that a significant number of LAC students still lack digital skills, access to connectivity, devices, and applications, even if their digital literacy competences improved during their university studies. Students from different HEIs affirmed that online interaction and instructional design require more effort to enhance the learning experience.

DTHE is a deep and long process, which is the result of structural change that includes processes, and more importantly, people. In this regard the successful adaptation of higher education institutions to the digital society necessitates reforms that encompass cultural and mindset shifts among all stakeholders, including students, professors, administrative staff, directors, and decision-makers. However, despite the willingness to enhance teaching and learning efficiency, the lack of budget and the limited technological resources remains a significant challenge for HEIs.

To support flexible educational pathways, the creation of quality systems that align with institutional quality frameworks is of paramount importance. In the region, discussions are underway to develop mechanisms in which DT initiatives can support the acknowledgement of competences acquired outside traditional formats. LAC higher education systems are also striving to enhance their international impact and there is plenty of scope to increase access to international learning experiences given that few students have participated in virtual student mobility programmes.

By expanding the reach of HEIs, digital transformation processes can contribute to the democratization of higher education. Even though LAC higher education systems consider various barriers that may affect students in precarious circumstances to develop projects related to connectivity and inclusivity, there is still a need to establish sufficient infrastructure to support the implementation of digital transformation projects in remote areas. Additionally, digital transformation initiatives can strengthen the connection between HEIs and local communities, amplifying the socio-economic impact of universities and enhancing the integration of rural areas. The promotion of local, national and international scientific events has been employed as mechanisms to

incentivize digital transformation into higher education contexts.

In order to prepare students for a digitized world, HE authorities in LAC have been discussing reforms in that focus on the competencies the future professionals need to develop. Governments have developed strategic plans to update higher education systems that encompasses the promotion of digital transformation. These plans aim not only to integrate ICT tools into higher education but also to enhance the relevance of university studies for the job market and the economic development of their countries.

However, merely encouraging the use of technology and ensuring students' familiarity with digital tools is insufficient for DTHE to occur. To promote social, political, and economic growth through higher education, collaborative efforts among stakeholders are imperative. It involves rethinking the mission of contemporary universities with the goal of making HEIs more connected, adaptable, and relevant to the current needs of globalized societies. To that end, the report concludes with a series of recommendations to support decision-makers to transform the digital landscape of higher education in LAC.

12.2 Recommendations

The recommendations in this section set out how higher education in LAC could engage more deeply in digital transformation, learning from the near-universal experiences of digitalization during the COVID-19 pandemic, accentuating the need for deeper structural changes while respecting the criticality of equity and inclusion. The recommendations for decision-makers recognize the very different socio-economic contexts in the region and the varying stages of adaptation or transformation to the digital era.

1. **Plan for the longer term, building agility into processes.** As DTHE is a process that is constantly developing, it should incorporate continuous and consistent dynamics that necessarily involve the establishment of short, medium- and long-term goals. Developing longer term state policies and strategic plans beyond current mandates is crucial to keep up with the constant changes required and will work in favour of students. Building agility into these processes can prevent and deal with issues caused by the incorporation of technology, particularly those related to the digital divide.

2. **Focus on quality in digital transformation, not only the use of technology.** The development of national guidelines and quality frameworks that simultaneously stimulate, guide, ensure autonomy, encourage innovative and creative initiatives, and assure quality higher education are pivotal to the development of locally oriented digital transformation strategic plans.

3. **Ensure HEIs can be responsive to digital change to support students and communities.** Considering the speed of digital changes in the modern society and the constant need to adjust the competences required for students to succeed in the job market, HEIs should have enough autonomy and agility to create, change, update and reformulate curricula and courses at a pace that can follow the technological innovations incorporated in the social, professional and academic world. For HEIs, this also offers important opportunities to focus on how DTHE can overcome challenges and meet the needs of the communities in which they operate.

4. **Promote more forms of hybrid teaching and learning.** COVID-19 accelerated processes of DTHE but once the state of emergency improved, the impetus for these initiatives decreased. However, rather than completely going back to traditionally established procedures, HEIs are promoting more hybrid forms of teaching and learning, which is also highly demanded by students. The demands of students around digital transformation lie in access, and the availability of adequate infrastructure to incorporate the skills and the knowledge that will make them contribute to a society that demands qualified global citizens. Continuing in this direction will support more flexible and student-centred education.

5. **Embed continuous professional development for faculty and staff on DTHE into all HEIs.** Promoting online teaching and learning is necessary but not enough to efficiently bring higher education systems to the current digitalized societies. Support and accompaniment from teachers are necessary regardless of the mode of study, especially for equity deserving groups, considering an intersectional perspective. To move forward in this direction, constant teacher training and staff upskilling need to be embedded in the culture of HEIs.

6. **Create and maintain spaces for HEIs to collaborate and advance DTHE.** DTHE incorporates deep cultural

changes, especially towards the development of an innovative mindset and the openness to change traditionally established procedures. While DTHE has been more commonplace in the private sector, communication, a culture of ethical collaboration and responsible dialogue should be promoted across the entire higher education system. This is in students' interests and could foster public-private partnerships that could ensure better conditions and crosscutting solutions to advance DTHE.

7. **Harness DTHE to improve equity and uphold students' right to higher education.** The lack of information on the impact of DTHE on gender equality and the needs of equity deserving groups affirms the need for more advocacy and data on the role that DTHE can play in improving equity. Further understanding students' preference for mode of study, investigating possible connections between mode of study and support provided in HE compared to rate of suspension or non-retention are valuable ways to see how DTHE could be harnessed to improve student success and enhance equity.

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Appendix I: Interview respondents

Interviews were undertaken with senior government officials responsible for higher education and leading representatives of national university associations in Argentina, Brazil, and Chile.

Participant	Country	Organization	Position	Code used in report
Oscar Alpa	Argentina	Ministry of Education	Secretary of University Policies	AR-Gov-OA
Rodolfo Néstor De Vincenzi	Argentina	Council of Rectors of Private Universities (CRUP) – National network	President	AR-Pri-RDV
Carlos Greco	Argentina	National Interuniversity Council (CIN)	President	AR-Pub-CG
Fábio Reis	Brazil	Union of the Entities that Maintain Higher Education Establishments in the State of São Paulo (SEMESP) – National network of private HEIs	Director of Academic Innovation and Cooperation Networks	BR-Pri-FR
Flávio Nunes	Brazil	National Council for the Federal Network of Vocational, Scientific, and Technological Education (CONIF)	Vice President of Parliamentary Relations	BR-Pub-FN
Denise Carvalho	Brazil	Ministry of Education	Secretary of Higher Education	BR-Gov-DC
Cristian Nazer Astorga	Chile	Corporation of Private Universities (CUP) – National network	President	CH-Pri-CNA
Natacha Pino	Chile	Association of Regional Universities (AUR) – National (inter-country regional) network	President	CH-Pub-NP
Víctor Orellana Calderón	Chile	Ministry of Education	Undersecretary of Higher Education	CH-Gov-VOC

Appendix II: Student survey responses

To make the survey available to students, contact was made with universities after the approval was approved by HEI's authorities. To invite students to participate in the survey, communication and responsible units shared the survey through different channels: social media, newsletters and radio programs.

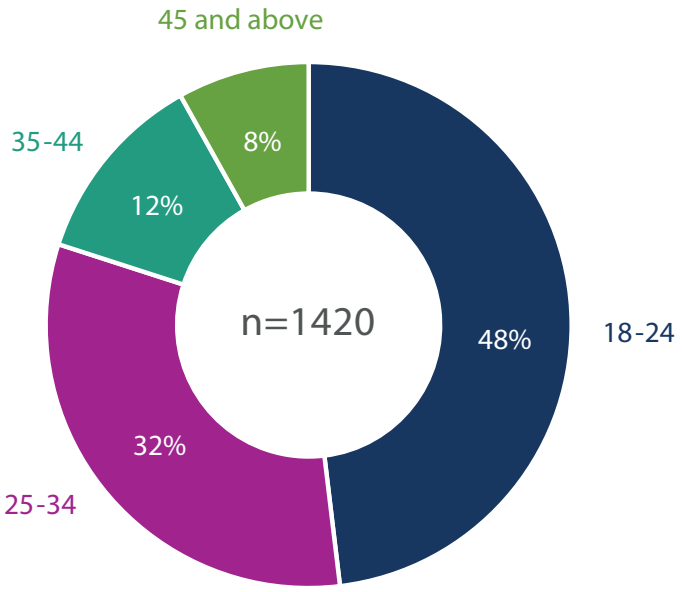
It was originally intended that the survey would be available for three weeks, allowing as many students as possible to reply. Since participation was low on some campuses, the survey was reopened for two weeks. Besides these efforts, participation continued to be very low in some HEIs.

Country	University	Location	Type	Number of responses	% of total responses	% of country responses
Argentina	Universidad Nacional de Tres de Febrero (UNTREF)	Buenos Aires	Public, main city	36	2,5%	19,6%
Argentina	Universidad Abierta Interamericana (UAI)	Buenos Aires	Private, main city	235	16,5%	
Argentina	Universidad Nacional del Litoral	Santa Fe	Public, region	7	0,5%	
Brazil	Universidade de São Paulo (USP)	São Paulo	Public, main city	106	7,5%	65,6%
Brazil	INSPER	São Paulo	Private, main city	23	1,6%	
Brazil	Universidade Federal do Pará (UFPA)	Belém + other campuses	Public, region	802	56,5%	
Chile	Universidad de Chile	Santiago	Public, main city	8	0,6%	11,3%
Chile	Universidad Católica Silva Henríquez	Santiago	Private, main city	142	10,0%	
Chile	Universidad de Tarapacá (UTA)	Tarapacá	Public, region	11	0,8%	
Venezuela	Universidad Central de Venezuela (UCV)	Caracas	Public, main city	0	0,0%	3,5%
Venezuela	Universidad Católica Andrés Bello (UCAB)	Caracas	Private, main city	6	0,4%	
Venezuela	Universidad de Carabobo	Valencia	Public, region	44	3,1%	
TOTAL				**1,420**	**100%**	**100%**

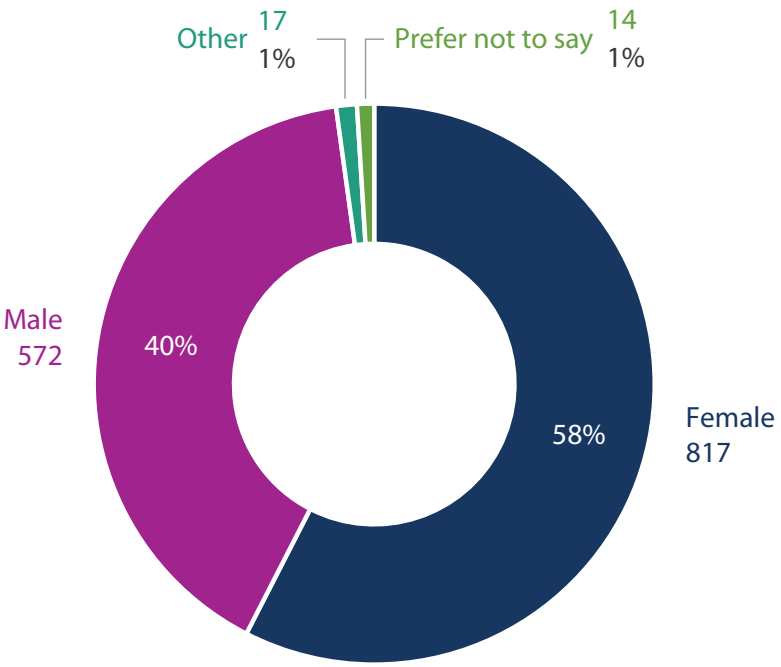
Appendix III: Full student survey results

This appendix includes the full results of the student survey. All questions were mandatory unless otherwise noted.

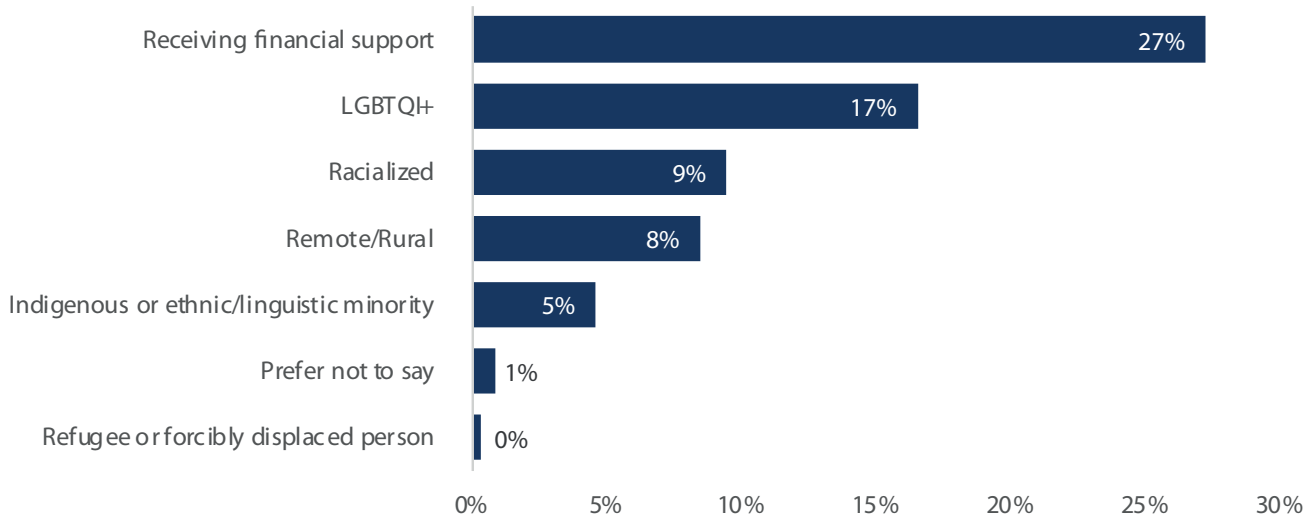
1. How old are you?



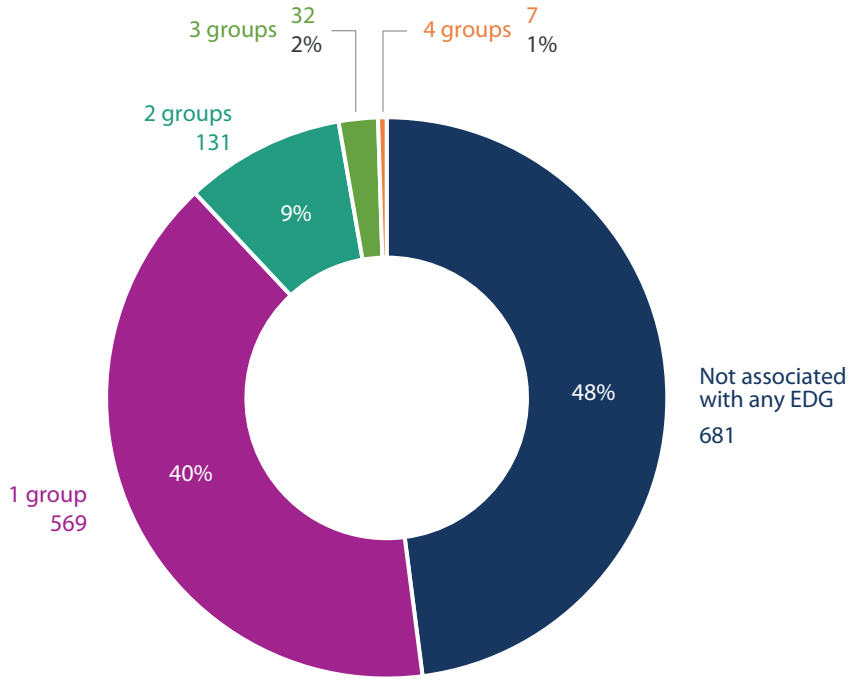
2. What is your gender identity?



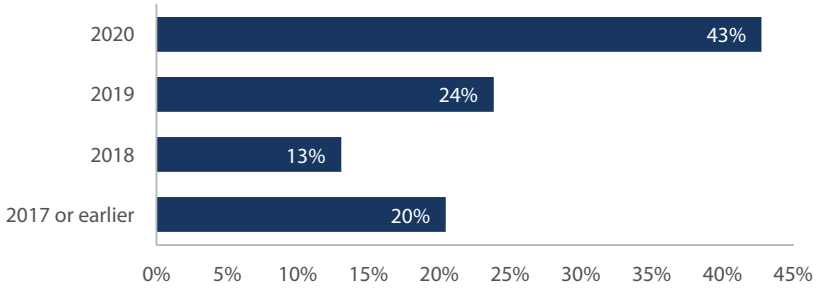
3. Do you identify with any of the following equity deserving groups?



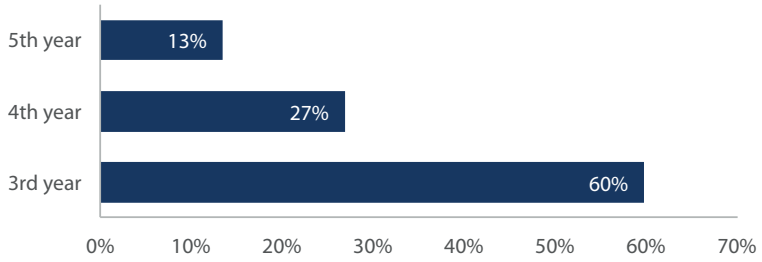
Association with equity deserving groups, n=1420



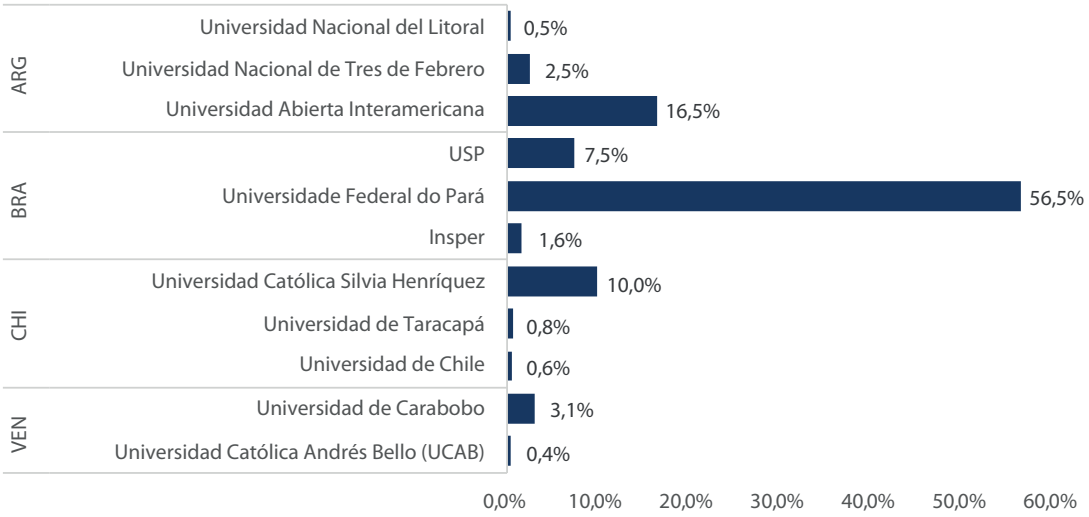
4. This survey is for students who are in the third year or later of their undergraduate degree. In which year did you start your university degree?



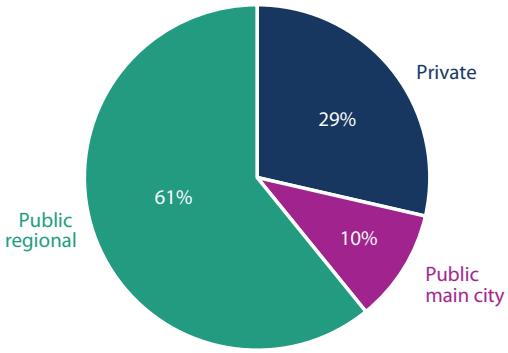
5. Indicate the year of study you completed at the end of 2022



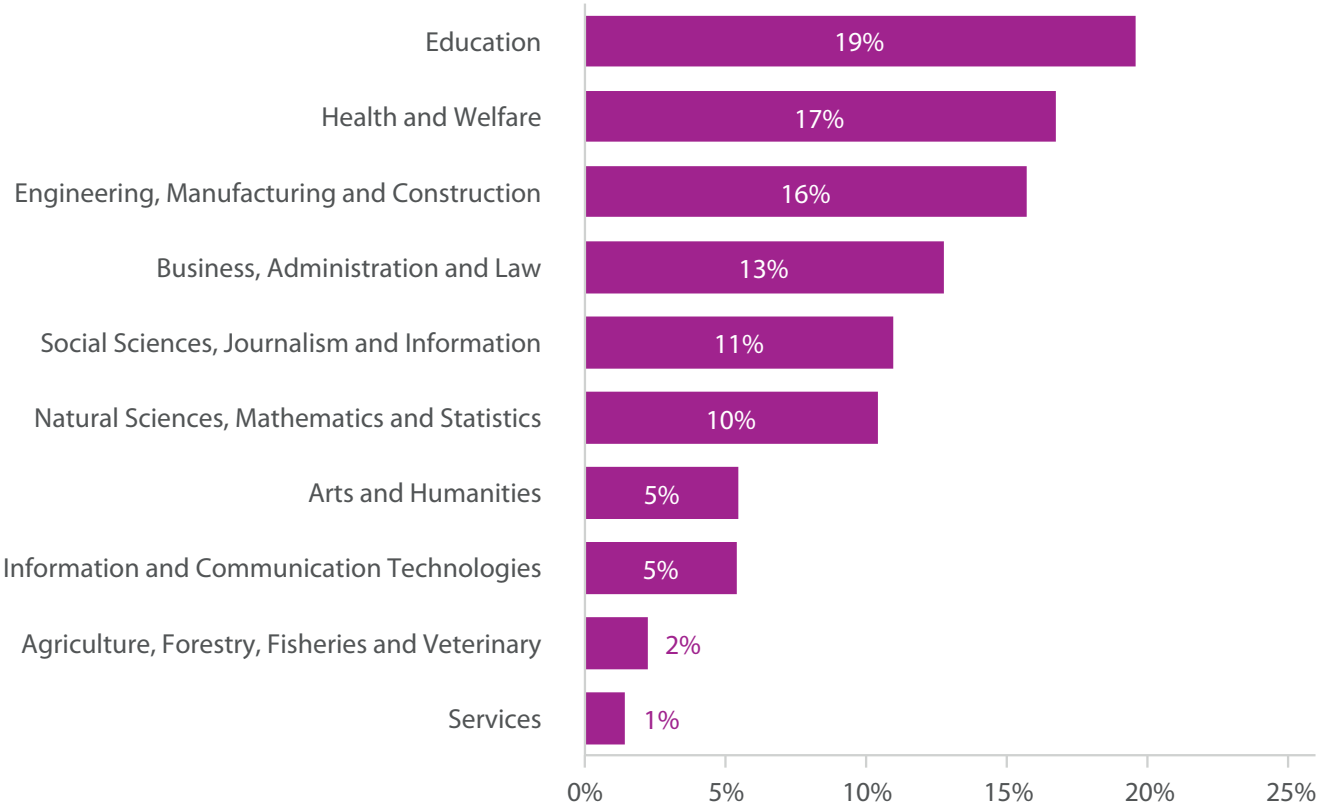
6. What is the name of your university?



Type of higher education institution

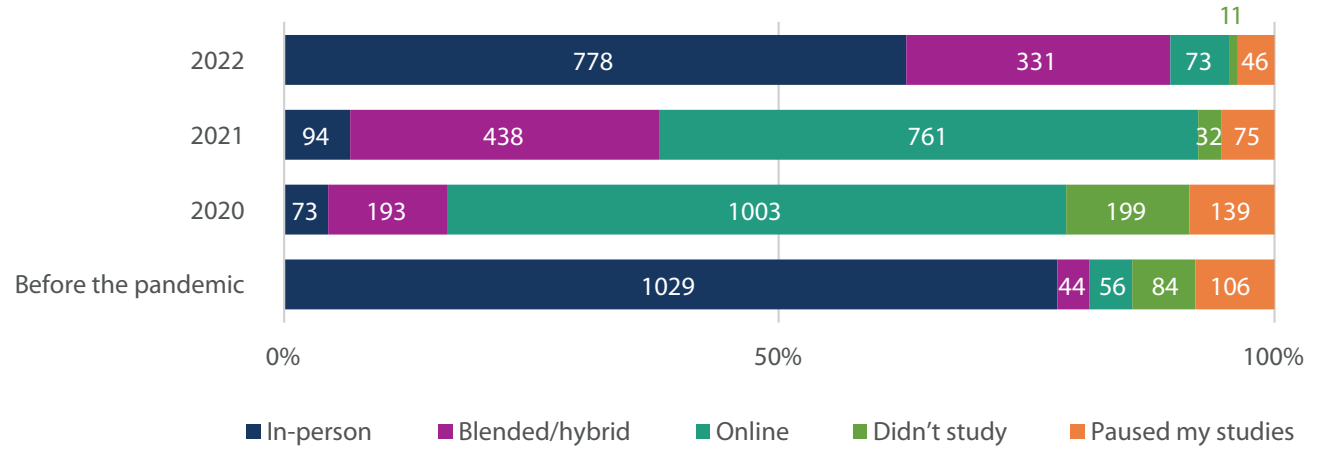


7. What is your main area of study?

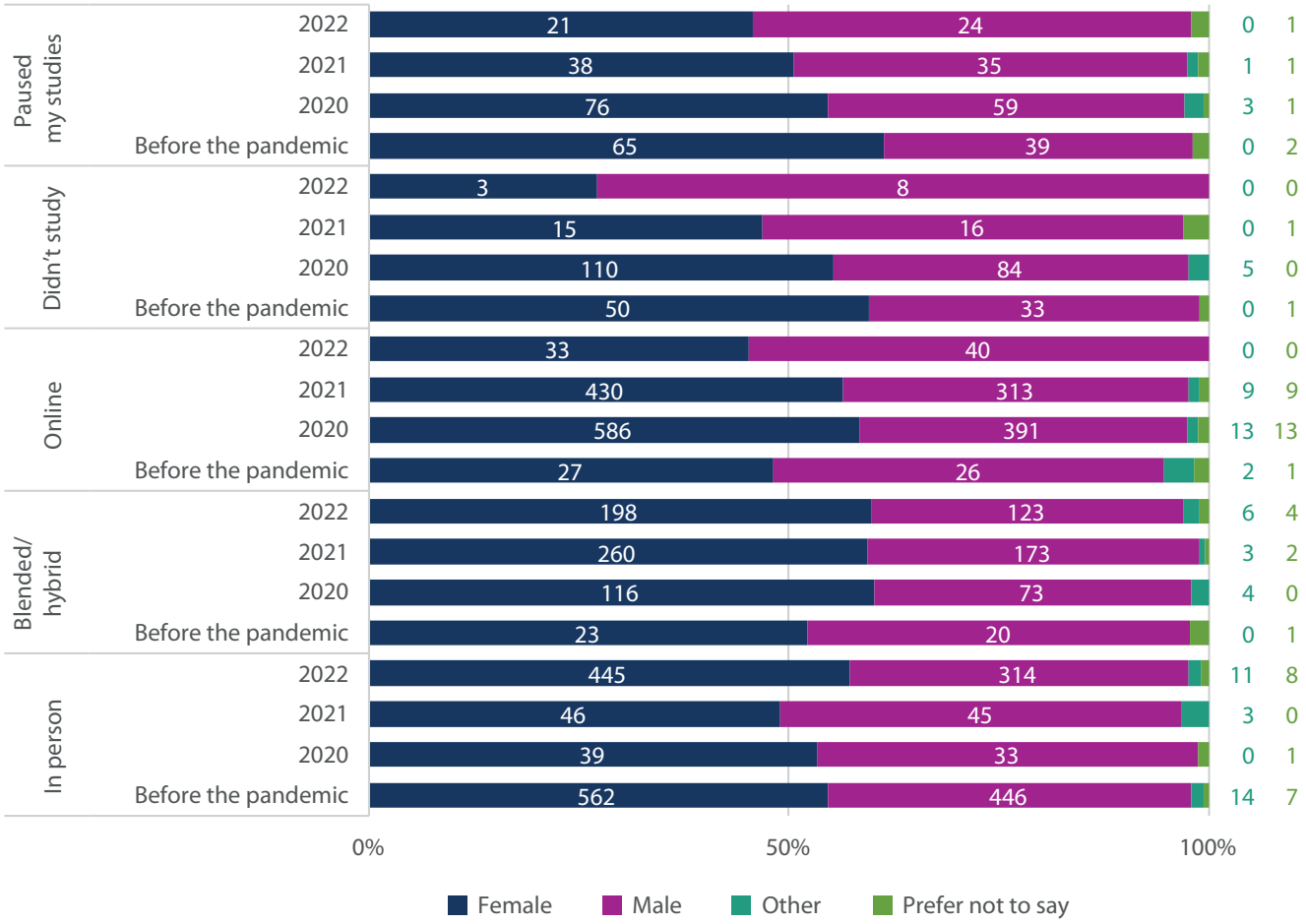


Note: this list is based on UNESCO's classifications of subject areas

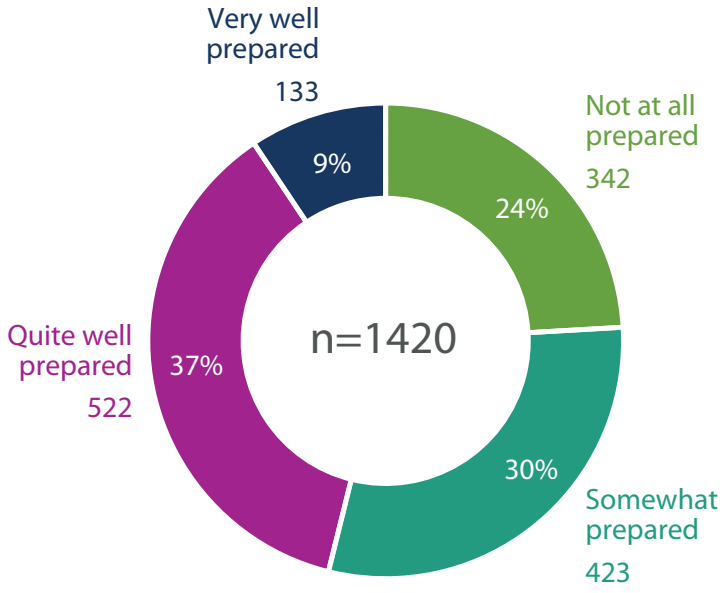
8. What has been your main mode of study in recent years?
If you paused your studies, what was the main reason? (optional)

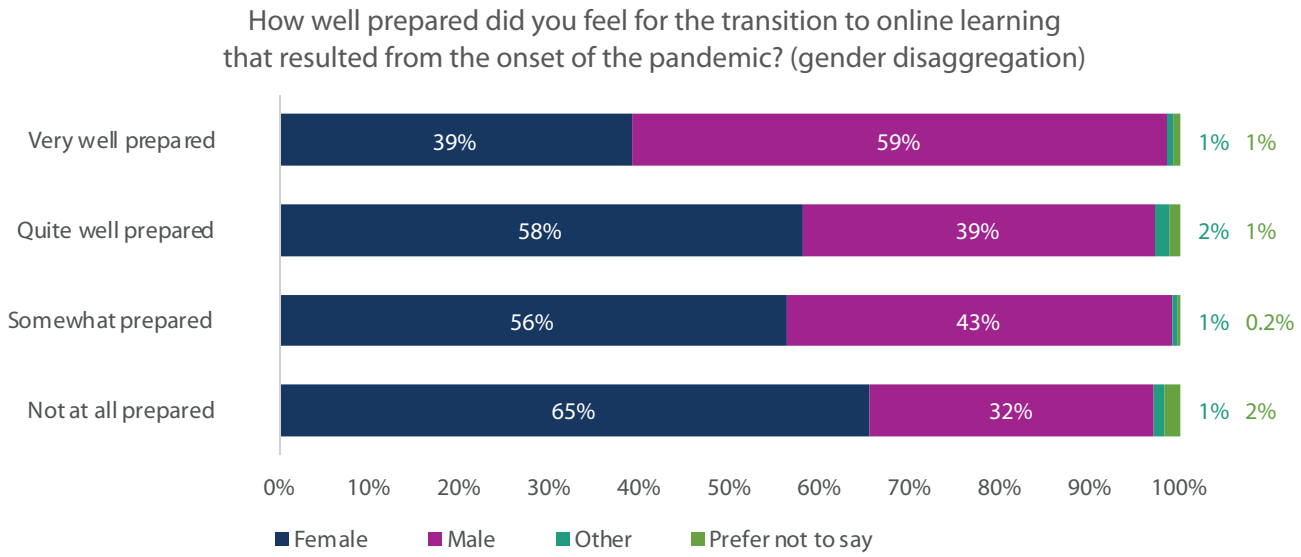


What has been your main mode of study in recent years? (gender disaggregation)

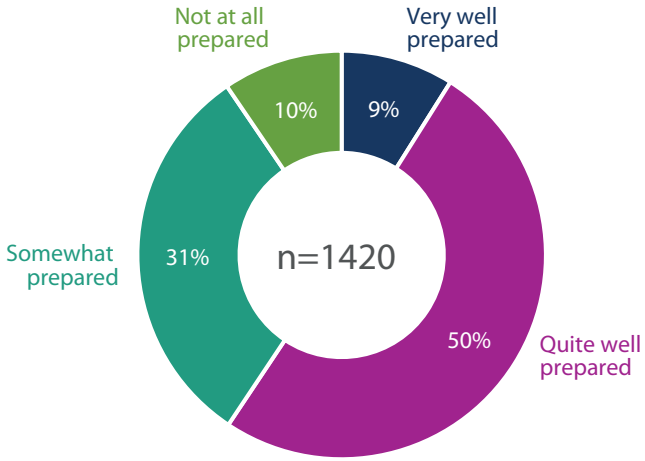


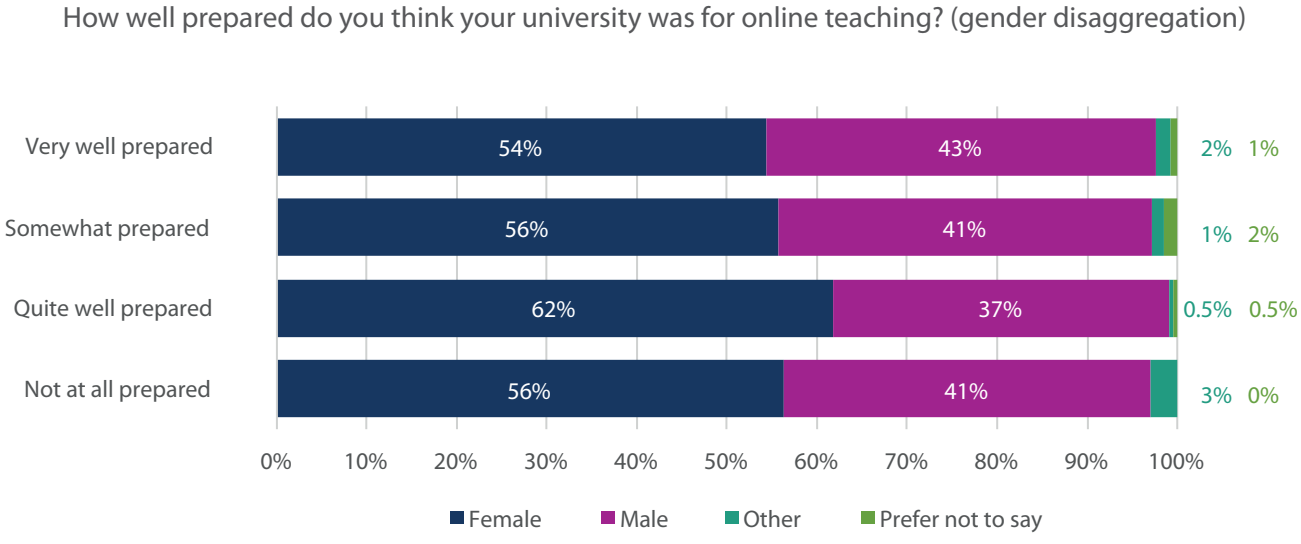
9. How well prepared did **you** feel for the transition to online learning that resulted from the onset of the pandemic?



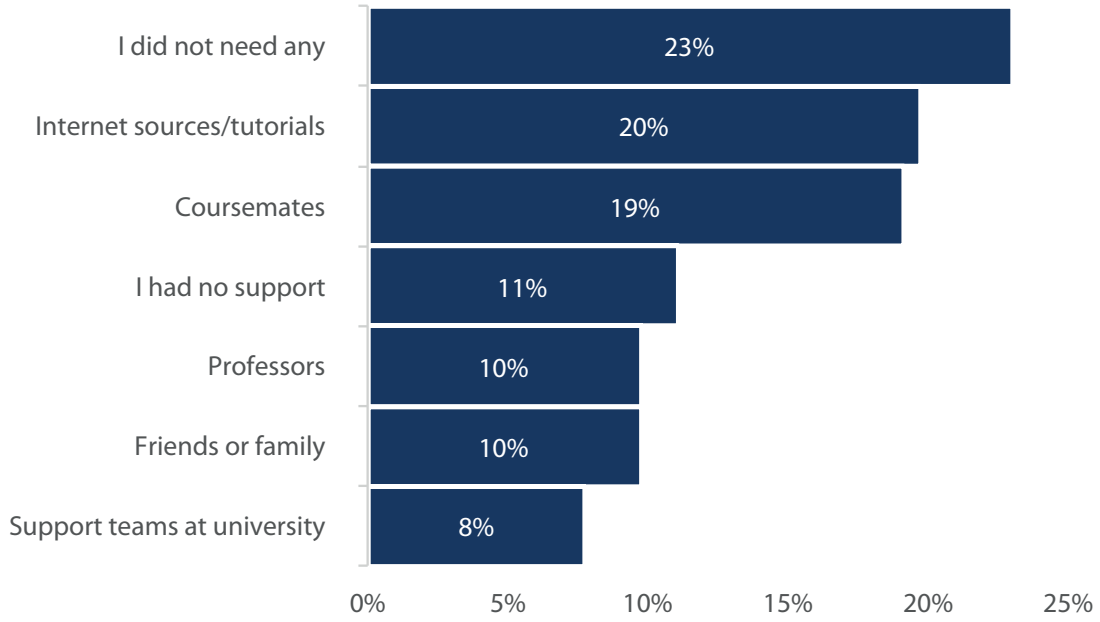


10. How well prepared do you think your **university** was for online teaching?

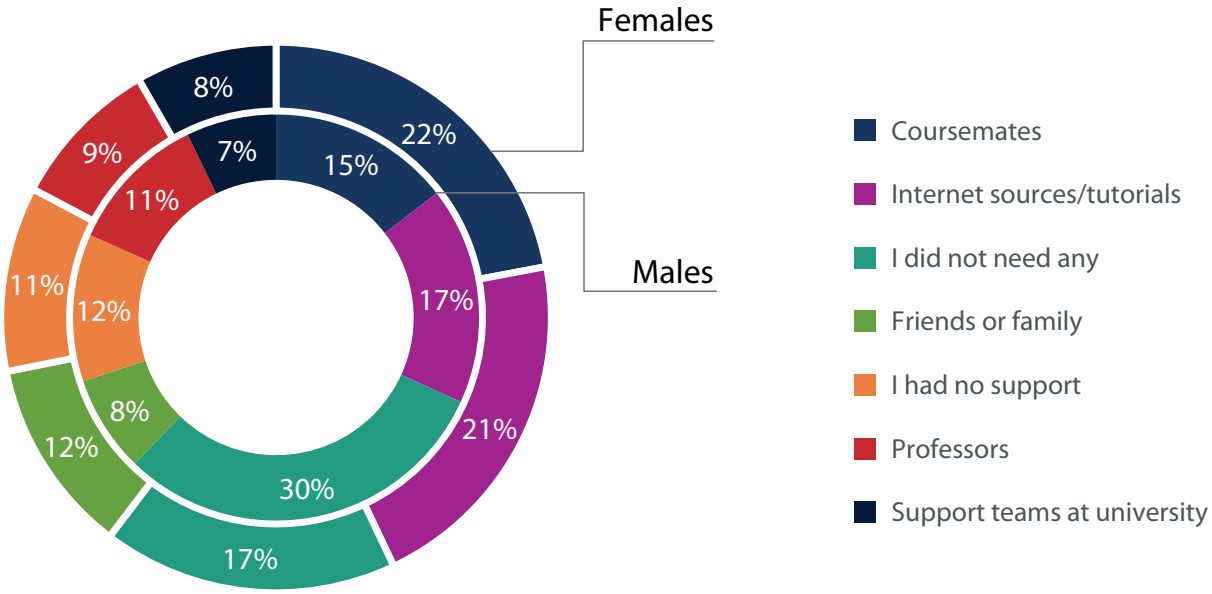




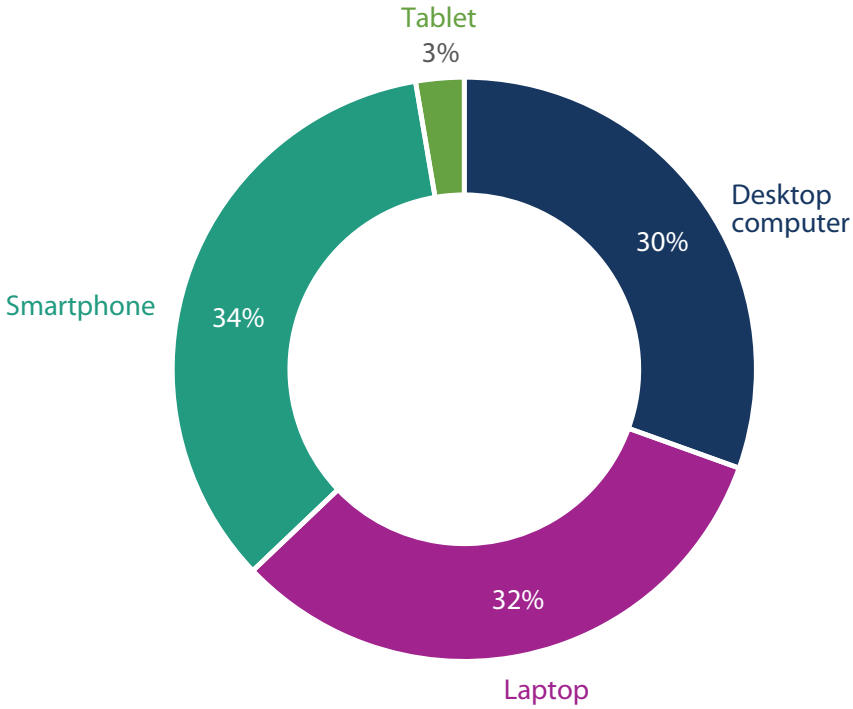
11. What was your main source of technical support for the transition to online learning?



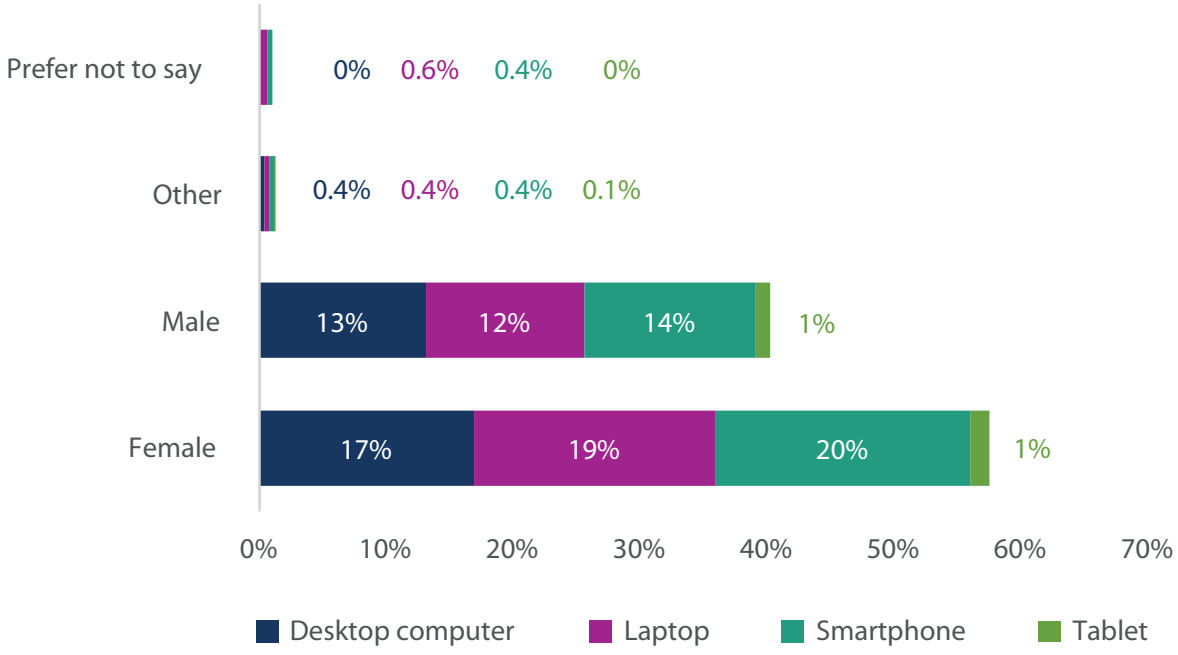
What was your main source of technical support for the transition to online learning? (gender disaggregation)



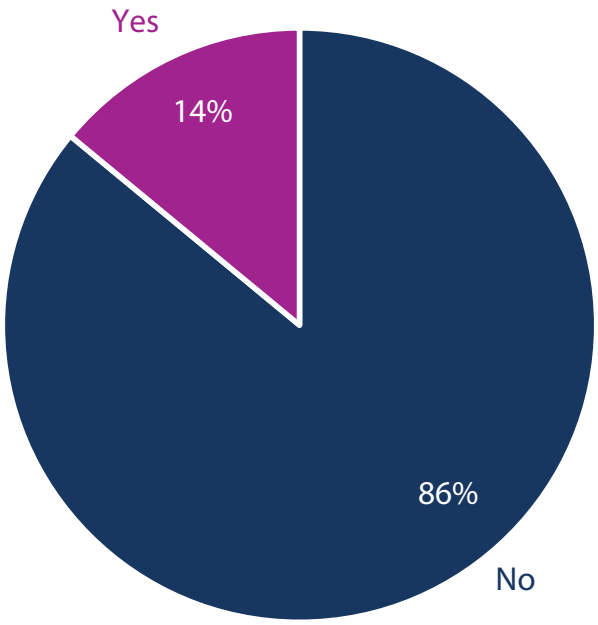
12. What kind of device did you use the most often for learning during 2020 and 2021?



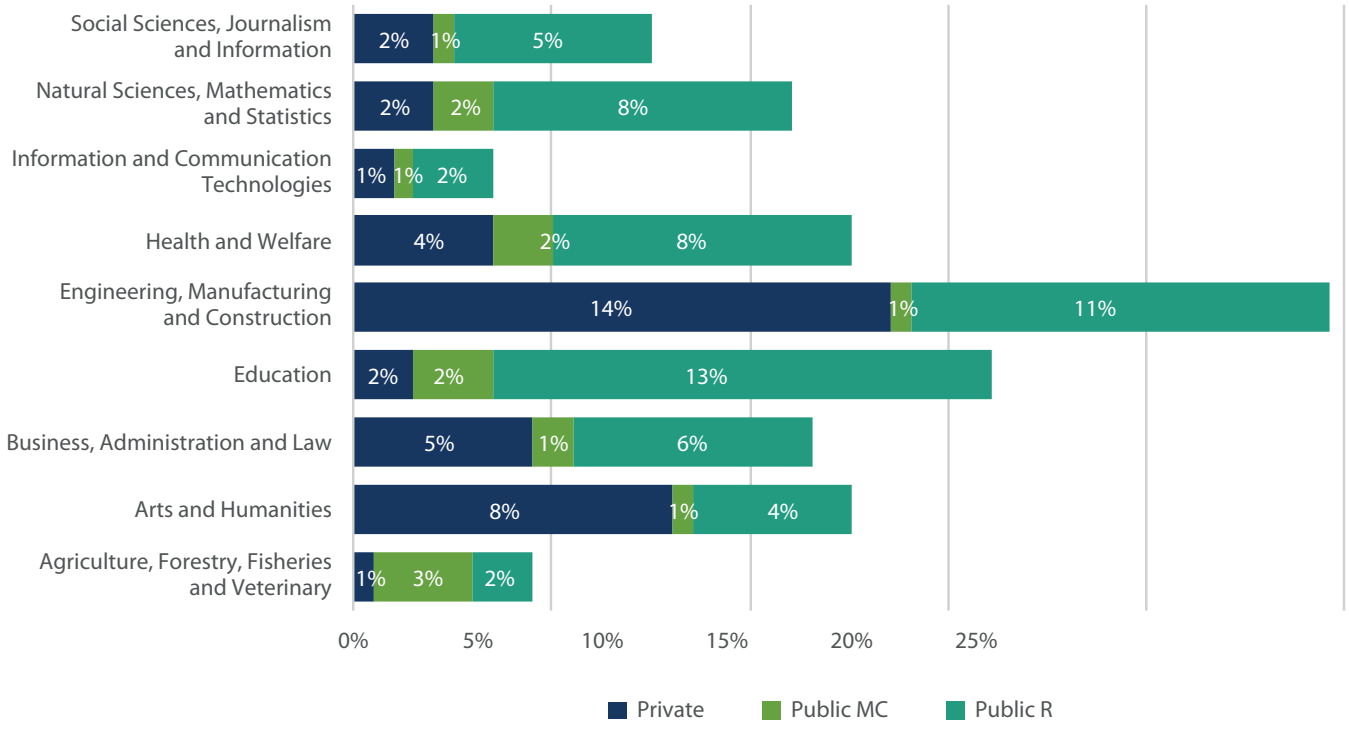
What kind of device did you use most frequently for learning during 2020 and 2021? (gender disaggregation)



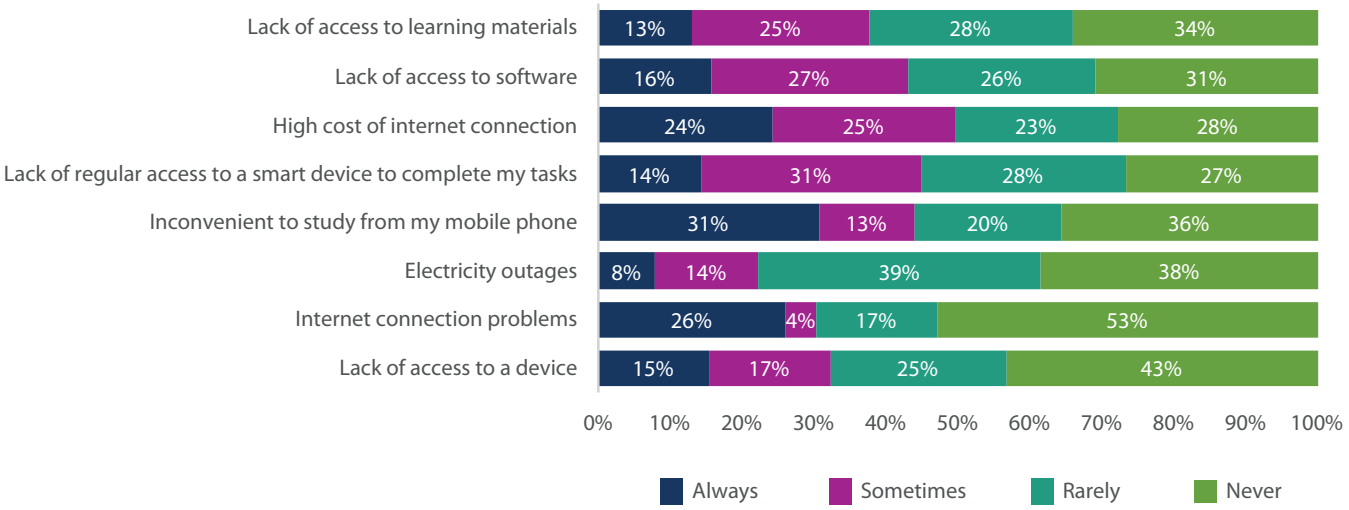
13. Did you participate in any virtual student mobility programmes during 2020 or 2021?



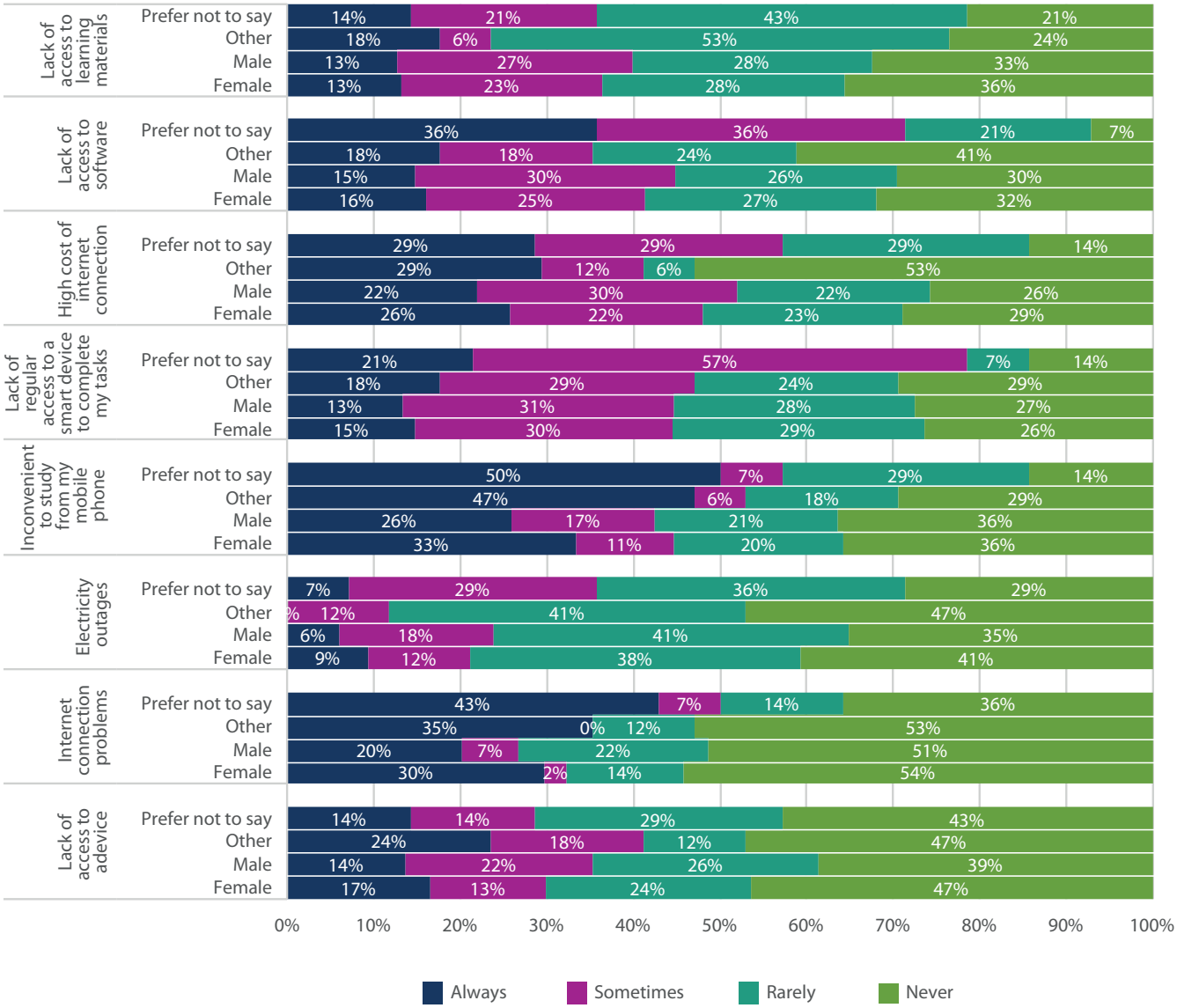
Participation in virtual mobility programs by field of study and university management.



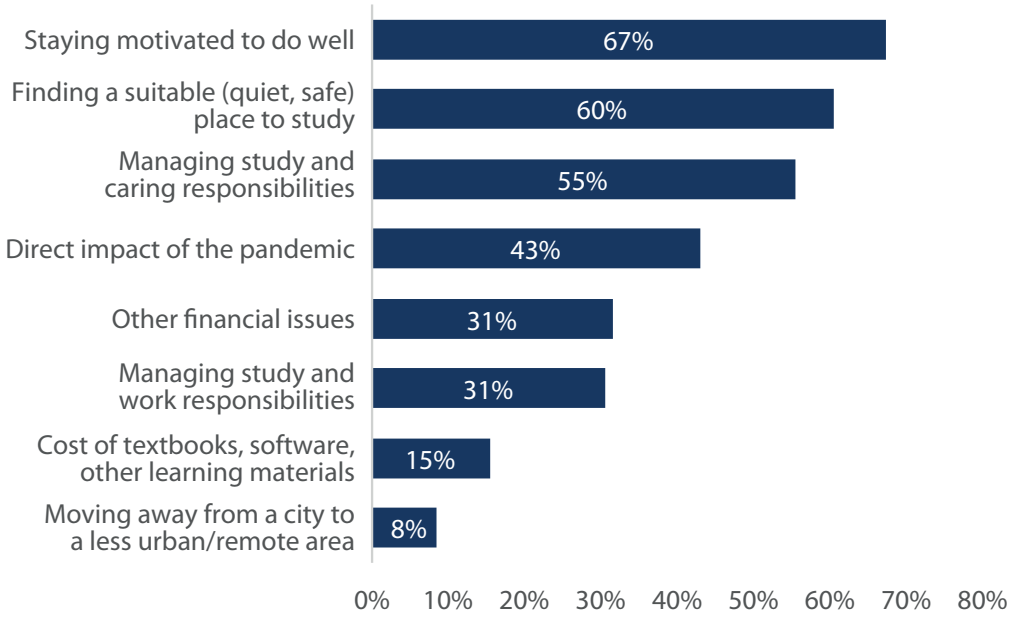
14. How often did you encounter technology-related issues in 2020 and 2021?



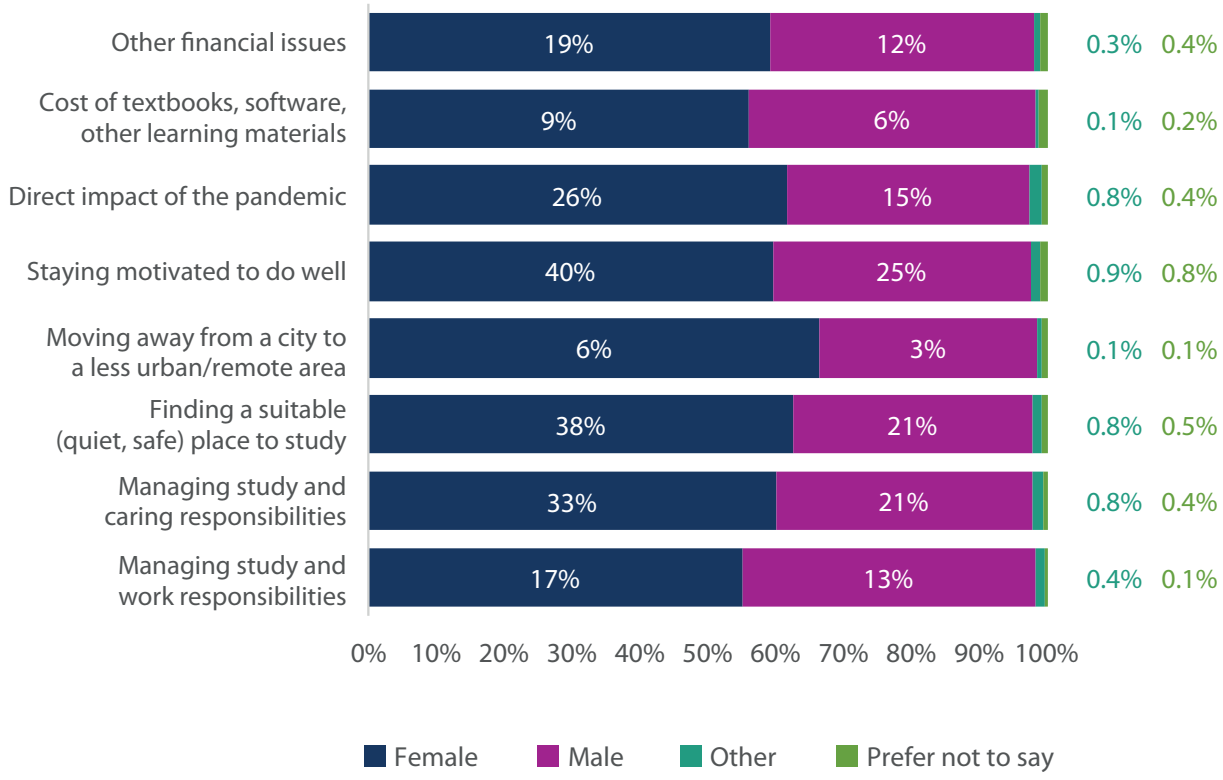
How often did you encounter technology-related issues in 2020 and 2021? (gender disaggregation)



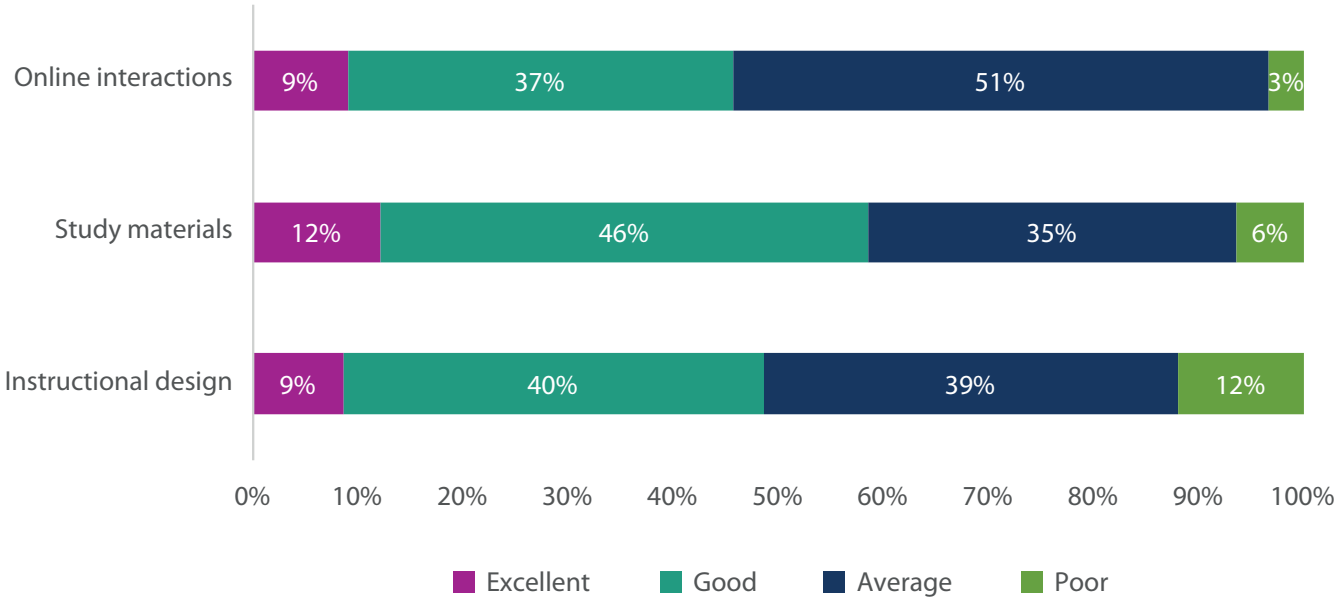
15. What other issues affected your ability to study online during 2020 and 2021?



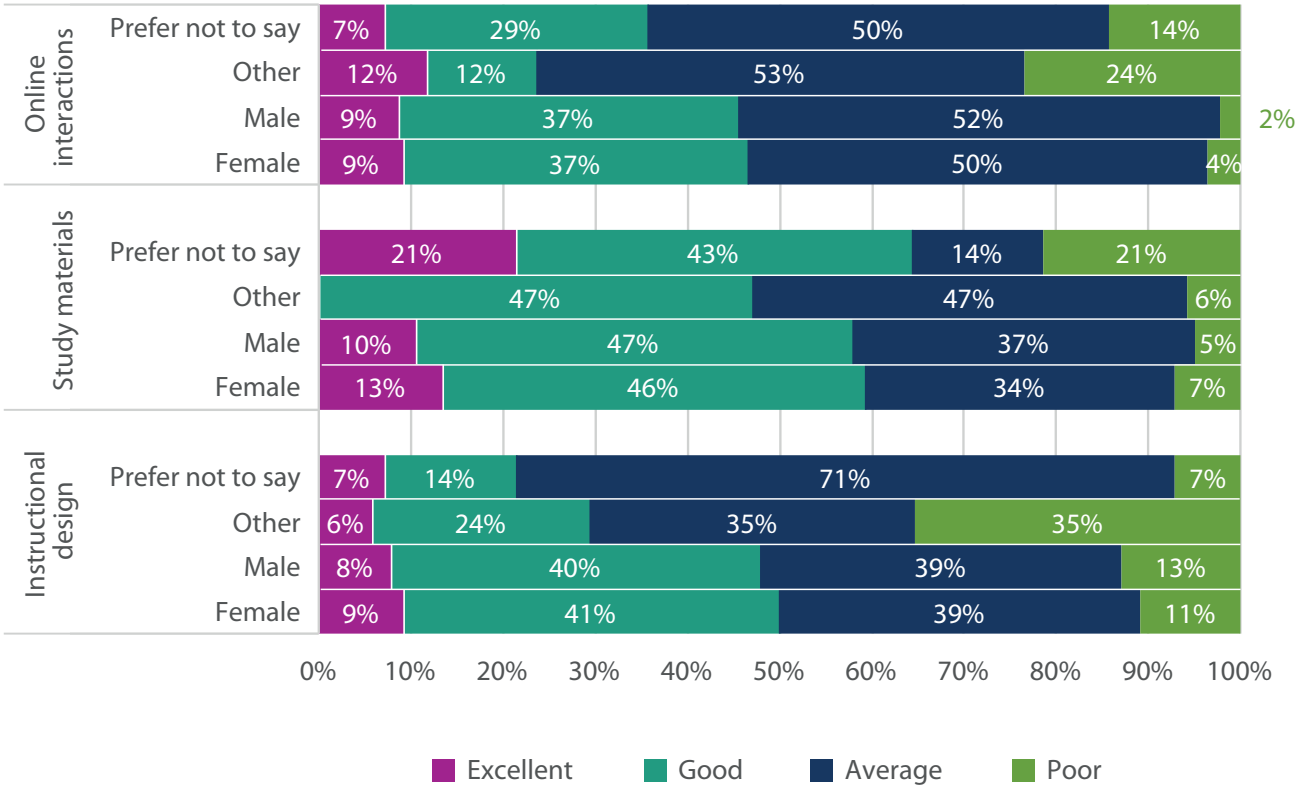
What other issues affected your ability to study online during 2020 and 2021? (gender disaggregation)



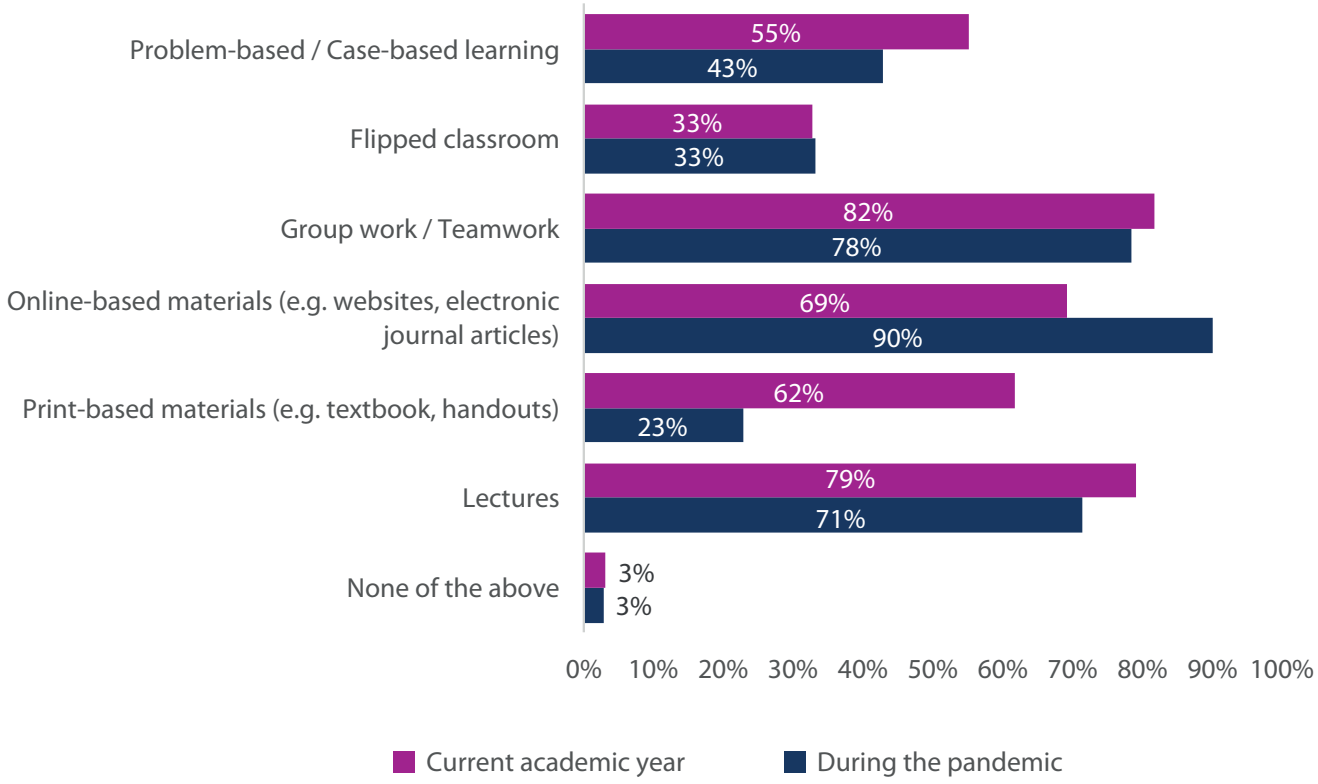
16. During 2020 and 2021, how would you assess the quality of instructional design, study materials and online interactions?



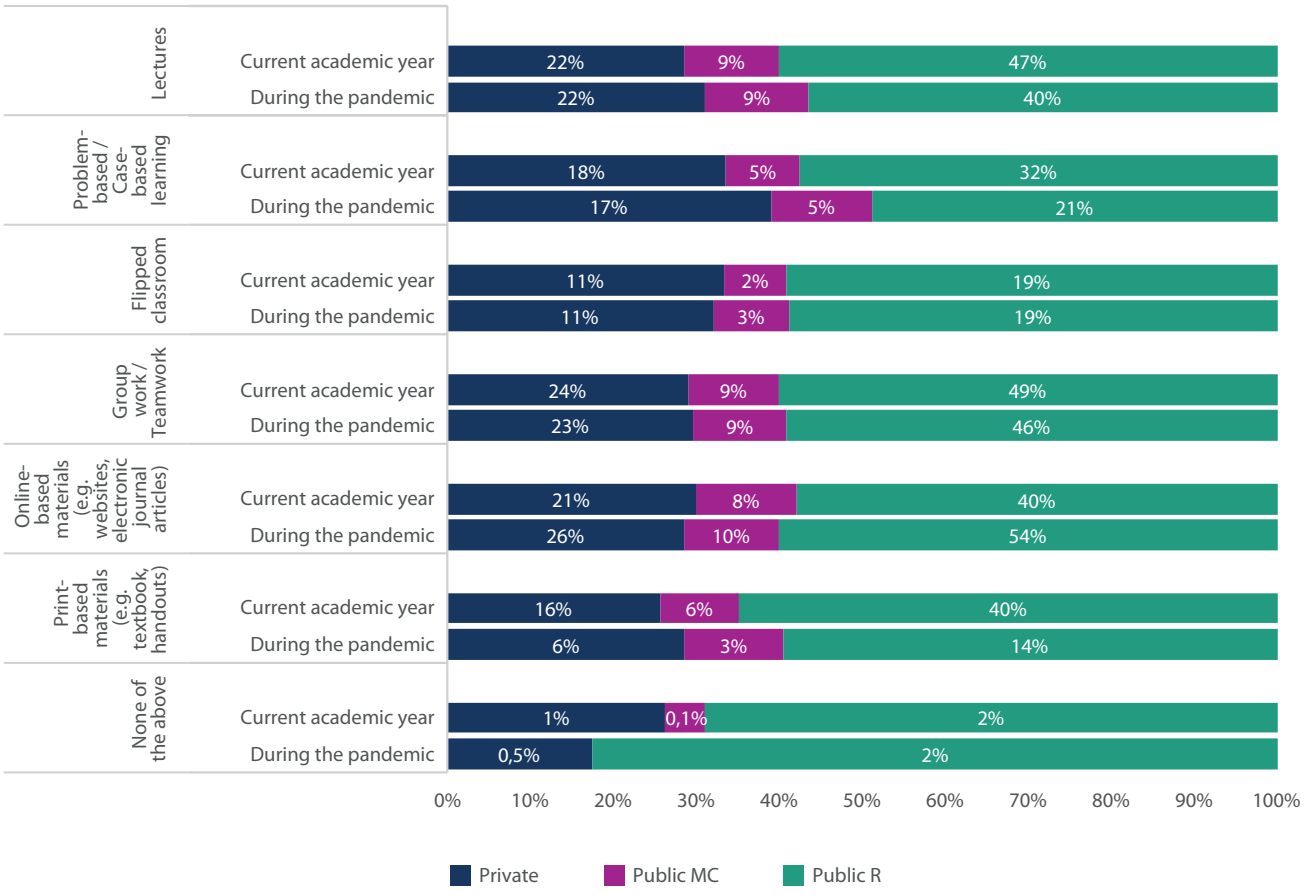
During 2020 and 2021, how would you assess the quality of instructional design, study materials and online interactions? (gender disaggregation)



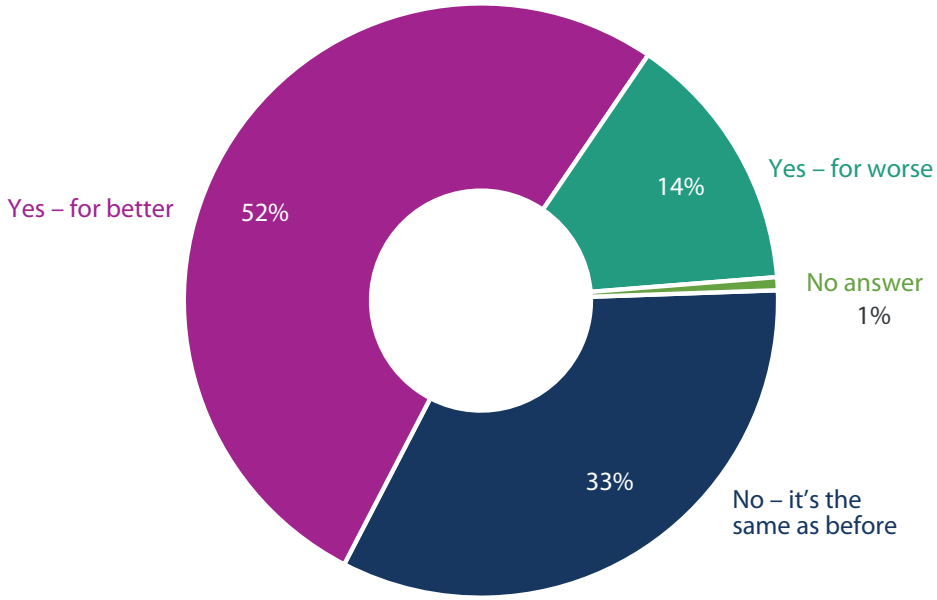
17. Which teaching strategies do your instructors use?



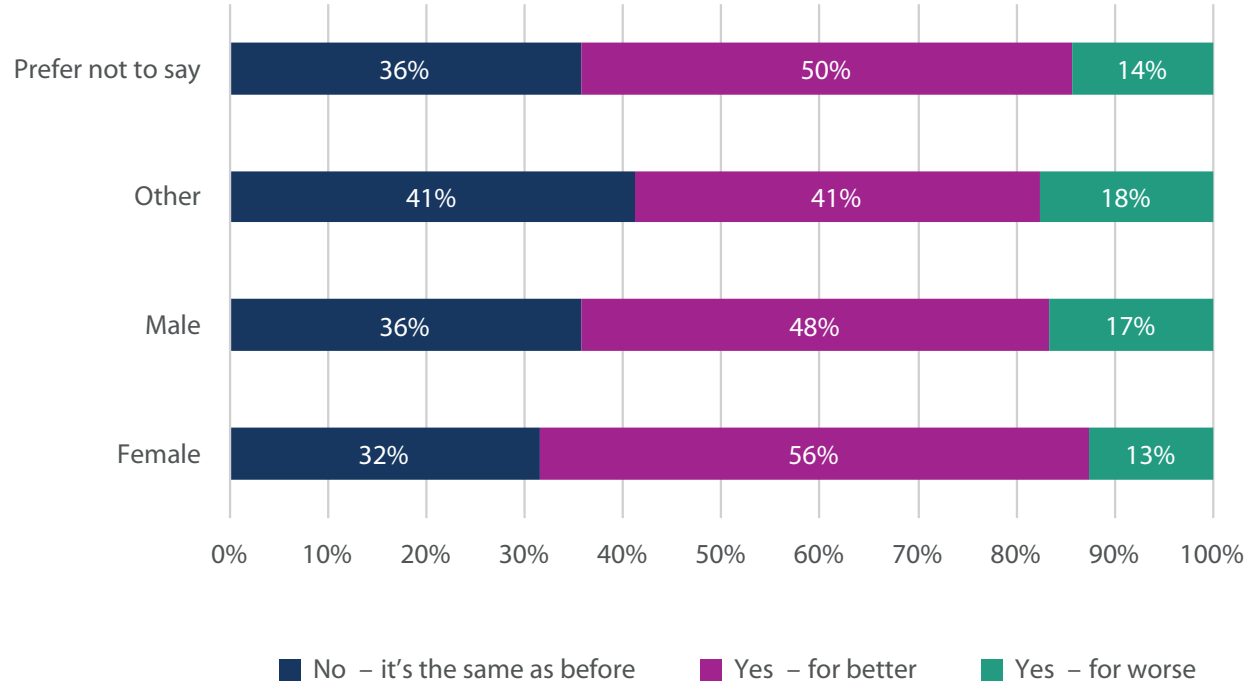
Which teaching strategies do your instructors use? (disaggregation by type of university management)



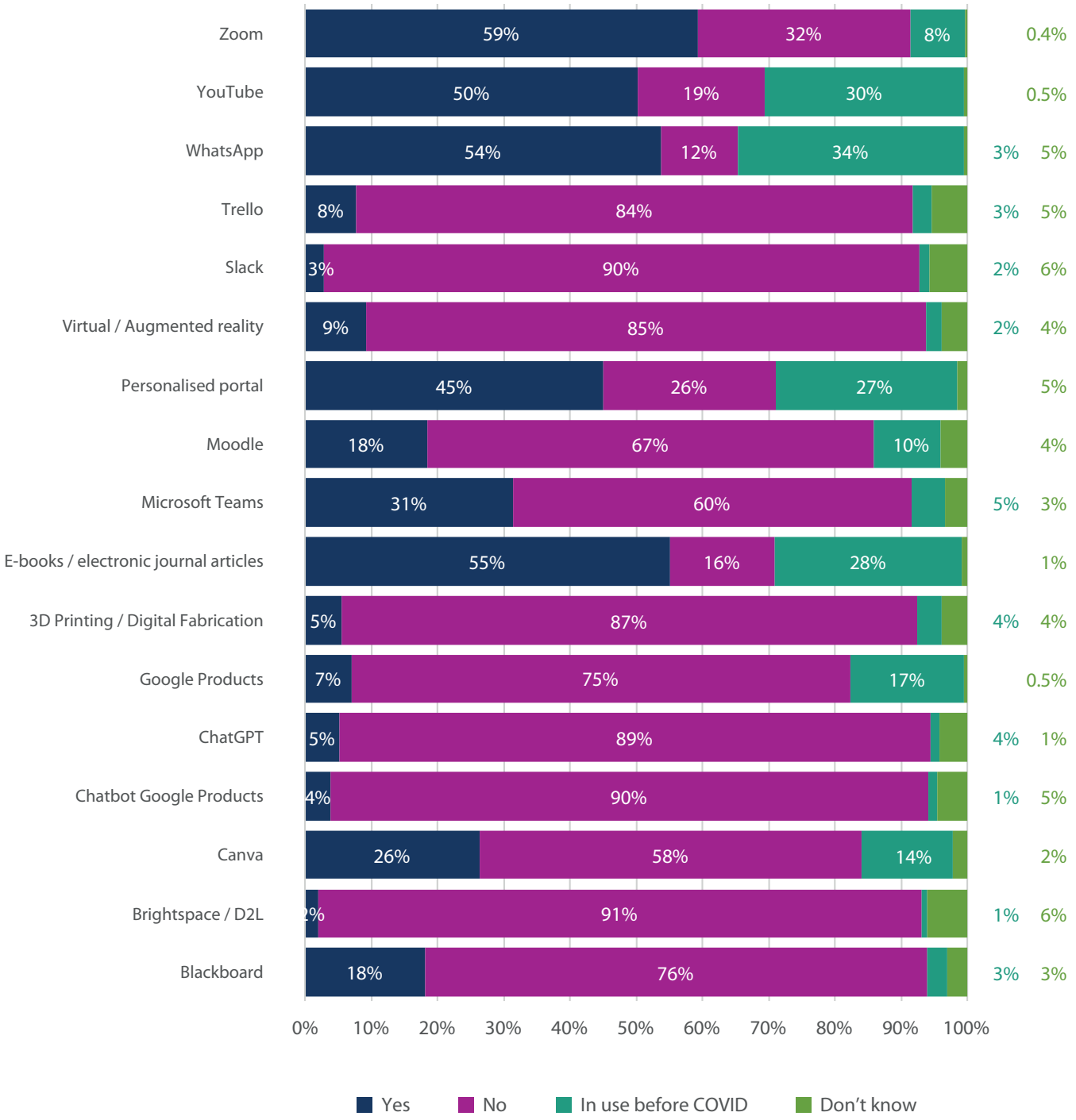
18. Overall, do you feel that teaching at your university has been transformed since the start of the pandemic?



Overall, do you feel that teaching at your university has been transformed since the start of the pandemic? (gender disaggregation)

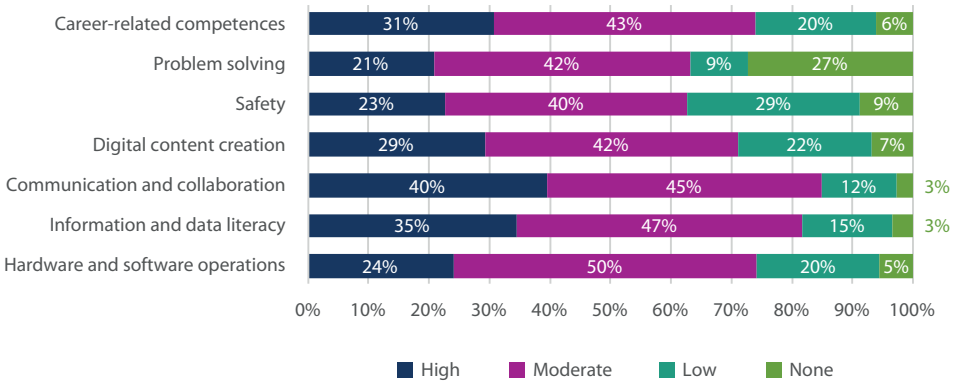


19. Since starting your undergraduate degree, has your university required you to use any of the following technologies for study purposes?

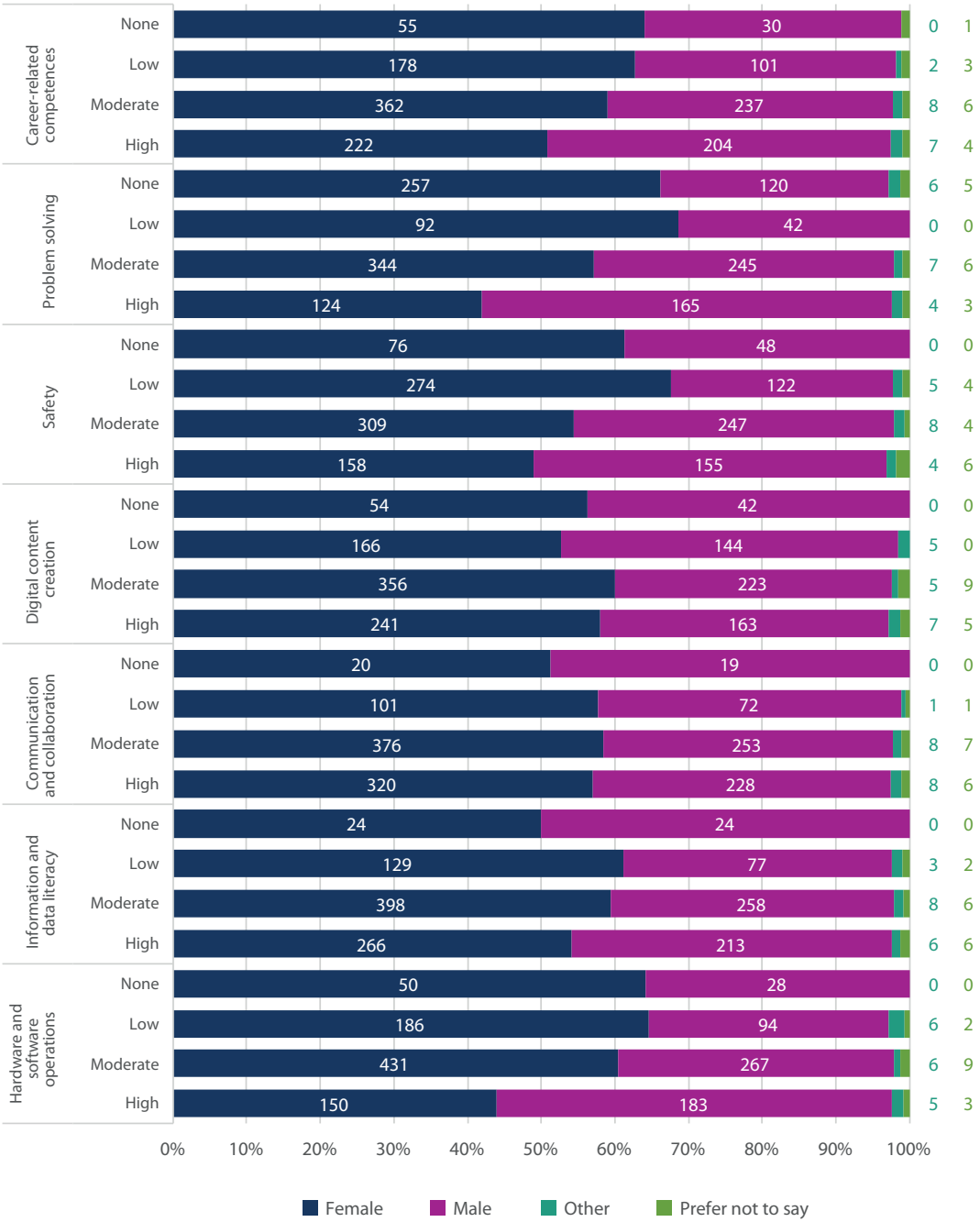


20. During your university studies, how would you assess changes to your digital literacy competences?

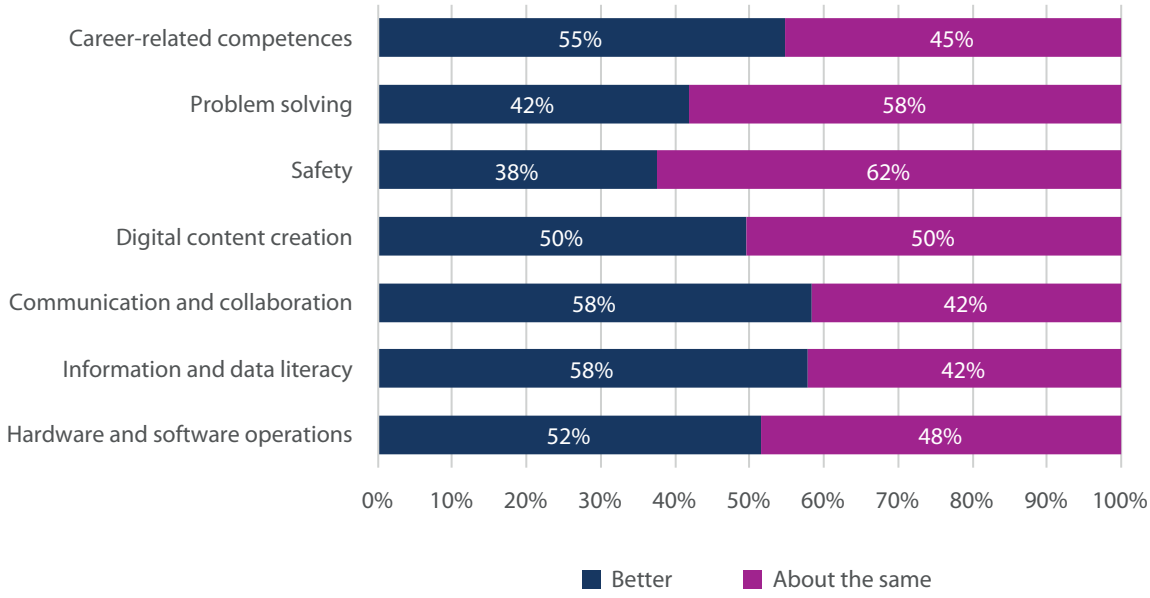
Note: Uses the UNESCO Global Framework of Reference on Digital Literacy Skills



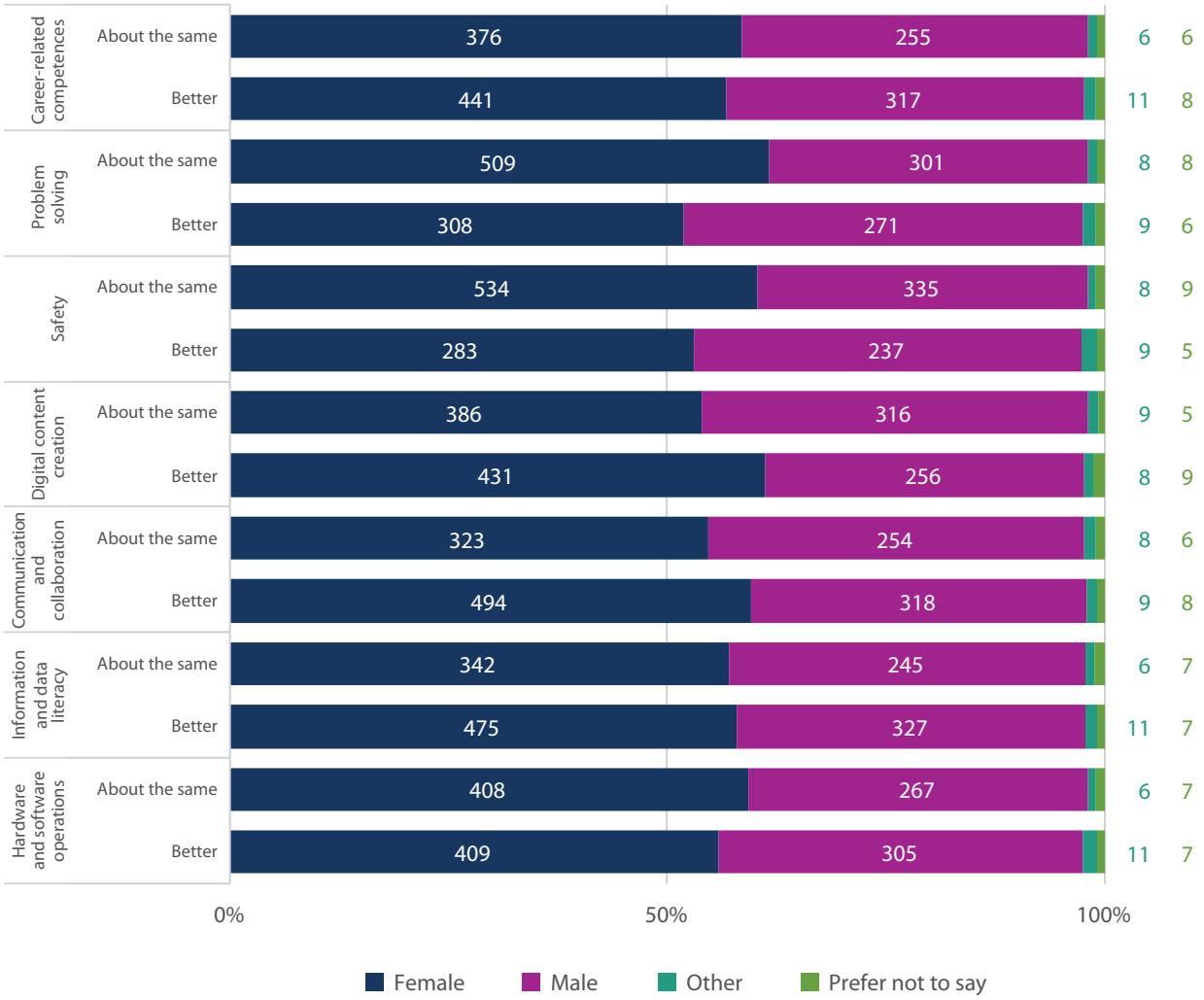
During your university studies, how would you assess changes to your digital literacy competences (skill level when you first enrolled on your course)? (gender disaggregation)



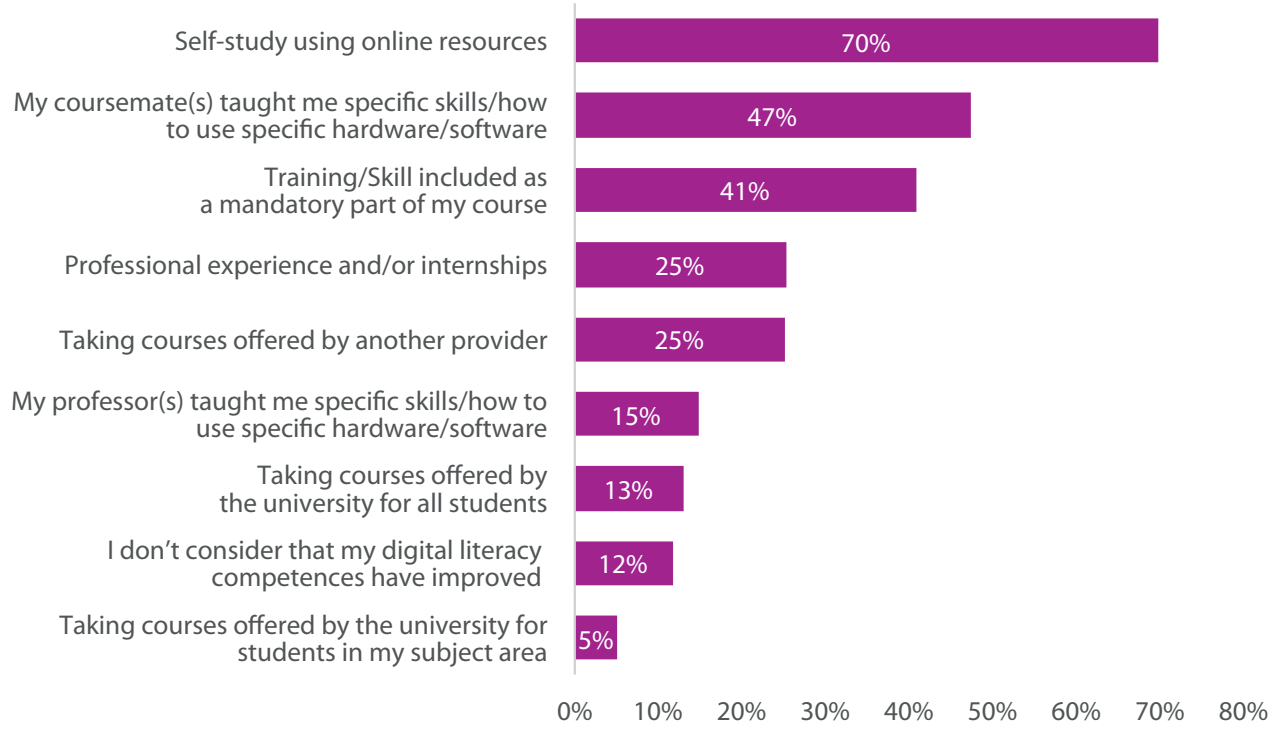
21. During your university studies, how would you assess changes to your digital literacy competences?



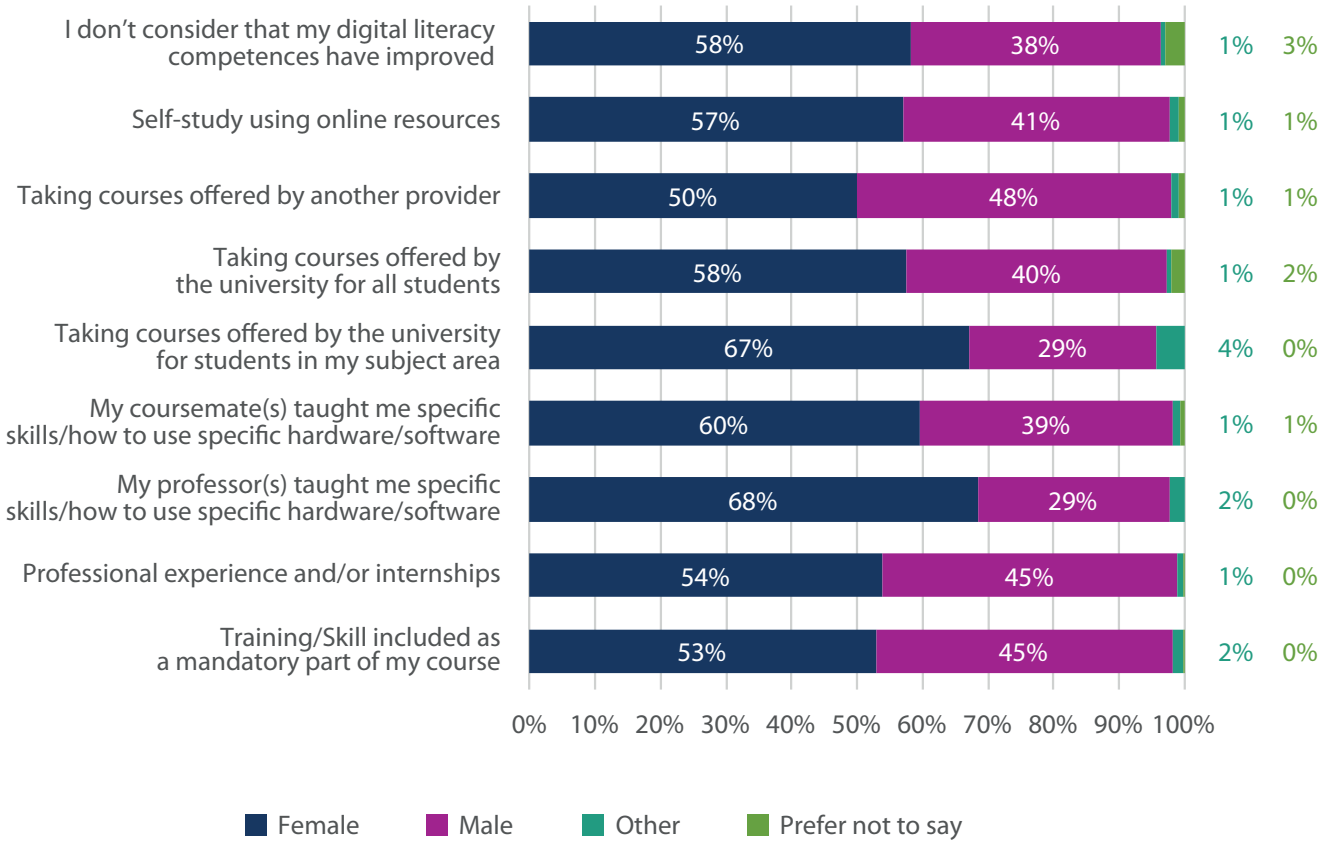
During your university studies, how would you assess changes to your digital literacy competences? (gender disaggregation)



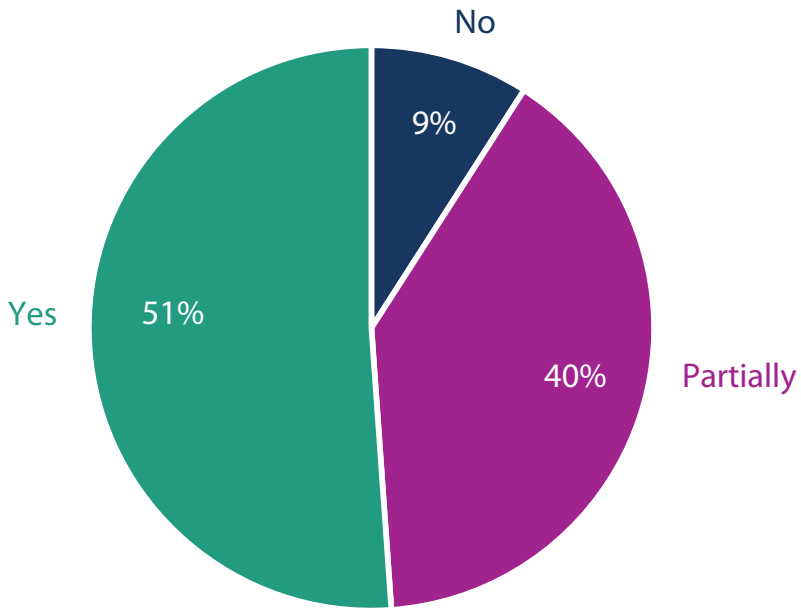
22. During your university studies, in which ways have you improved your digital literacy competences?



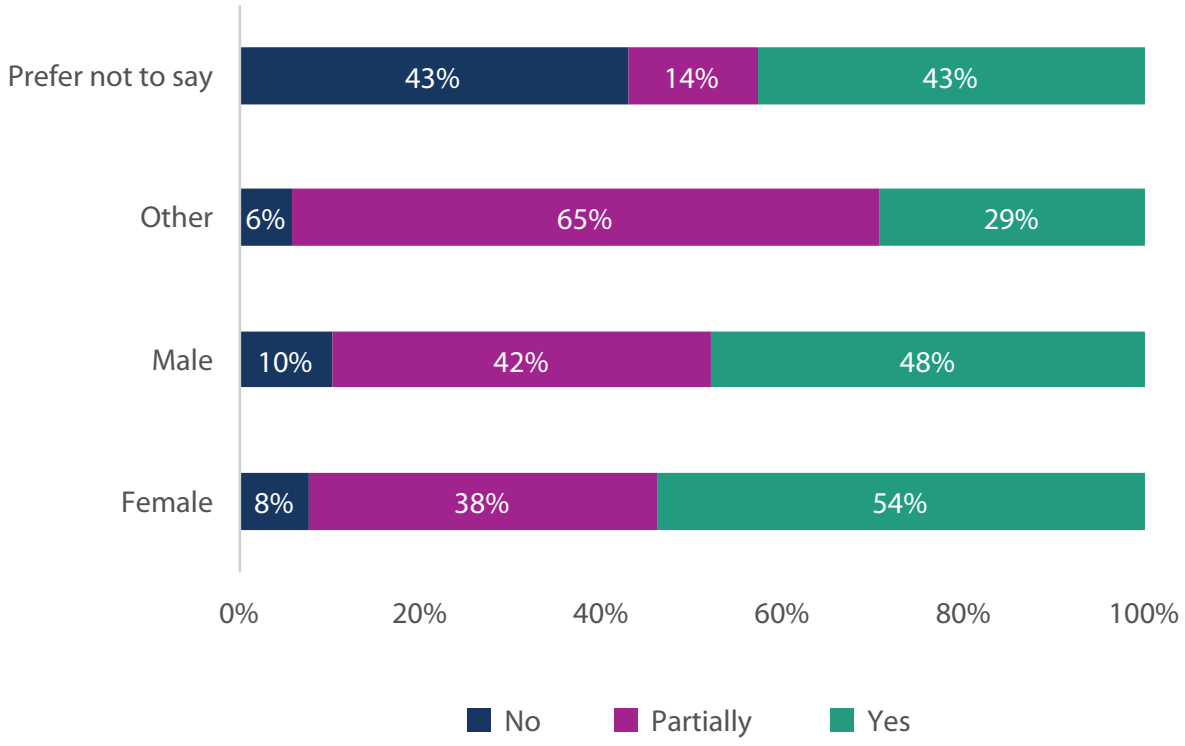
During your university studies, in which ways have you improved your digital literacy competences? (gender disaggregation)



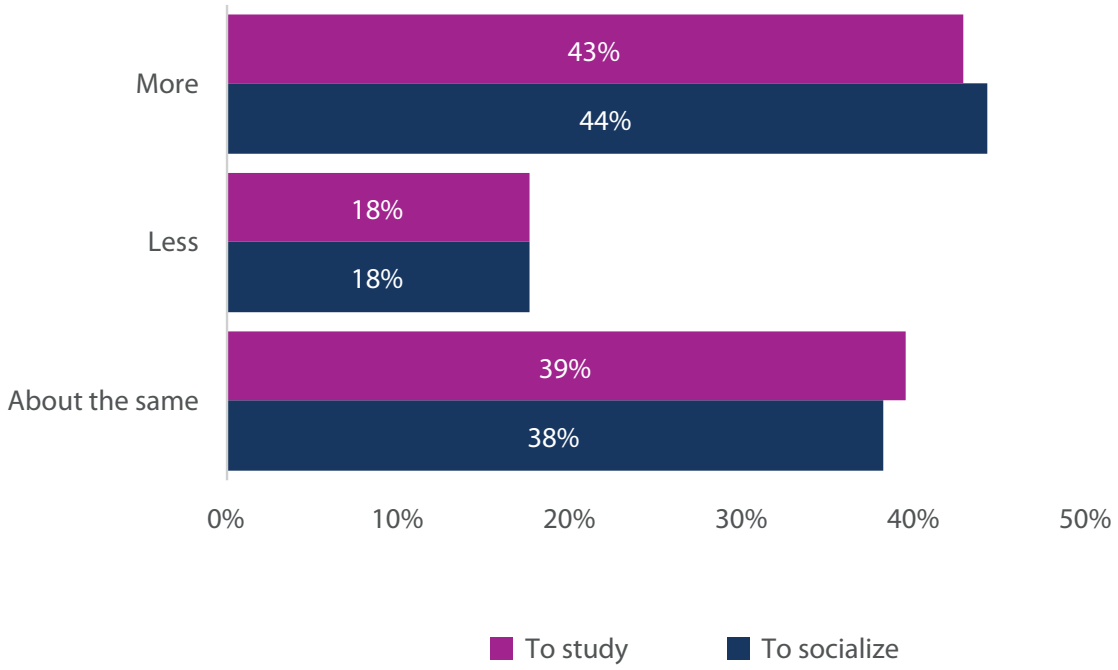
23. Overall, do you perceive that a new learning environment has been set after the pandemic years (2020/2021)?



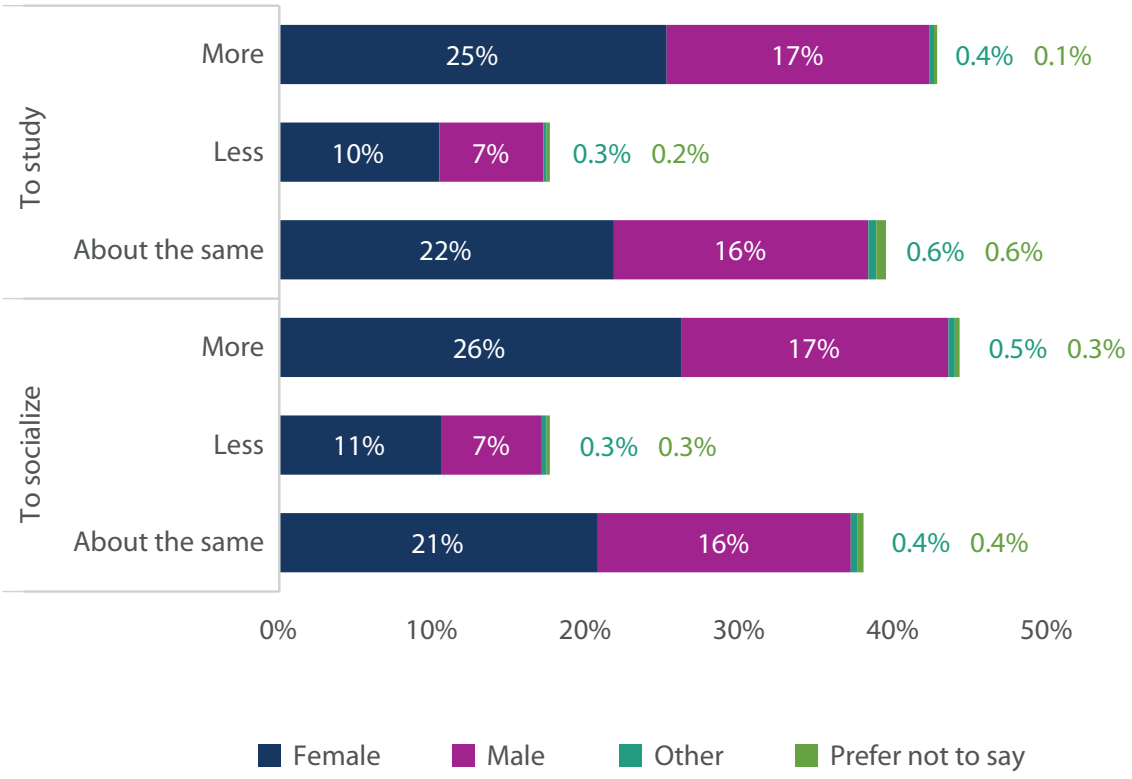
Overall, do you perceive that a new learning environment has been set after the pandemic years (2020/2021)? (gender disaggregation)



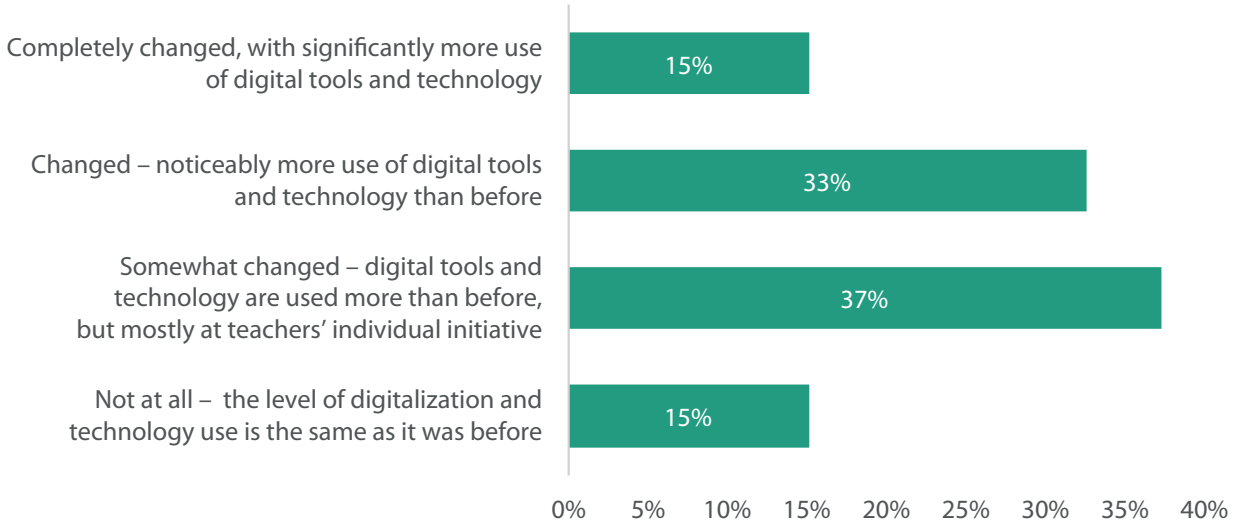
24. Comparing the current academic year to the pandemic years (2020/2021), do you interact with other students on your course…



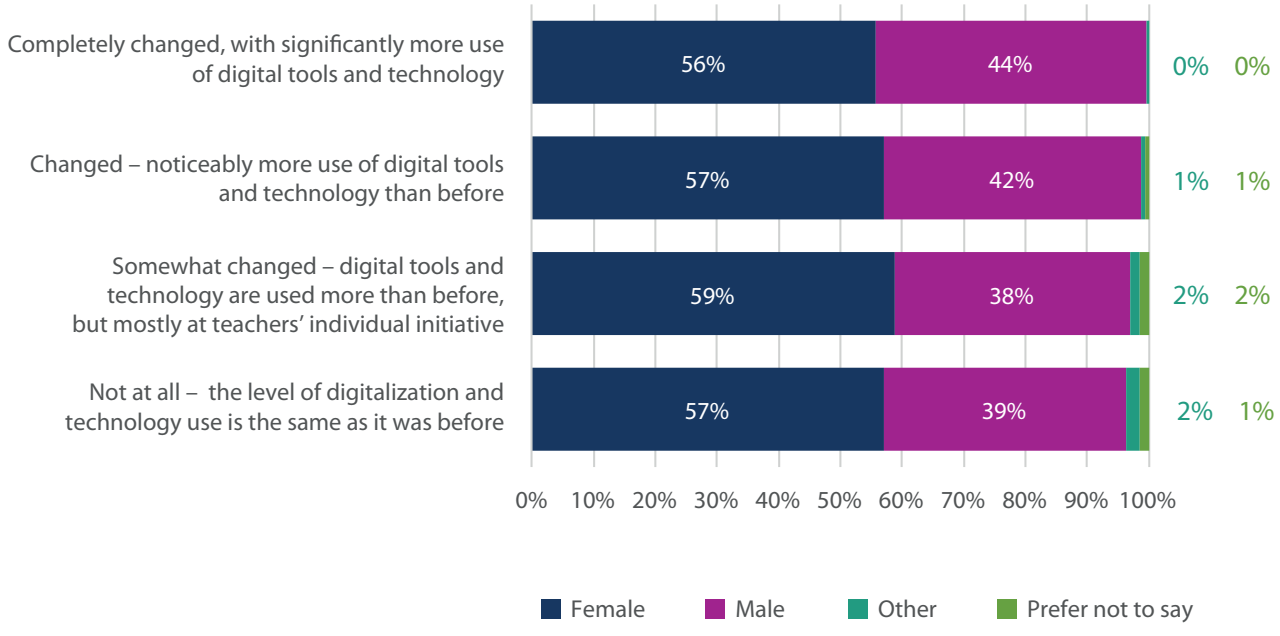
Comparing the current academic year to the pandemic years (2020/2021), do you interact with other students on your course… (gender disaggregation)



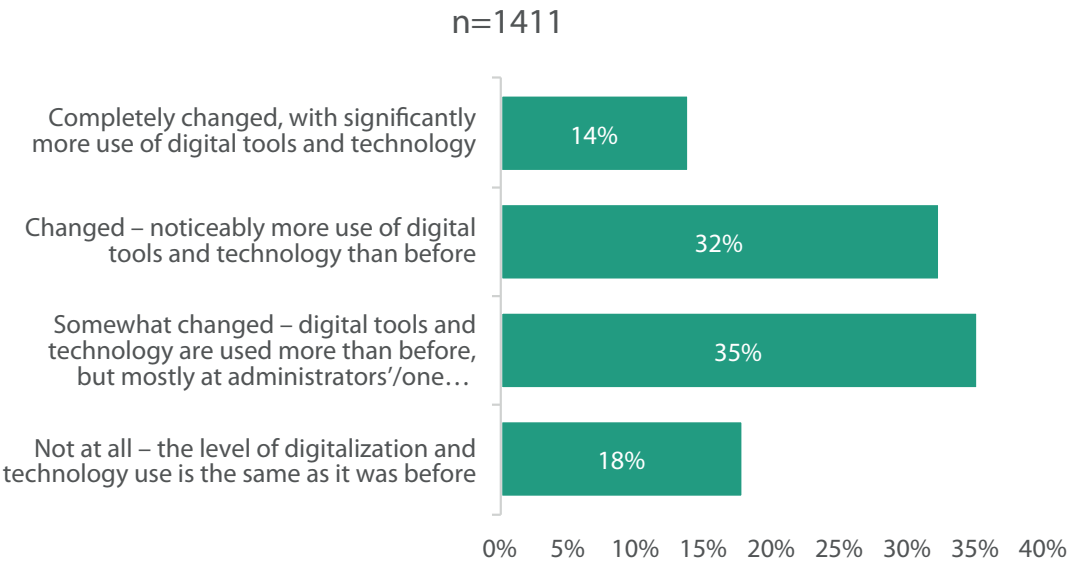
25. Has the digital transformation made by your university during the pandemic (2020 and 2021) changed the way that you are **taught** this academic year?



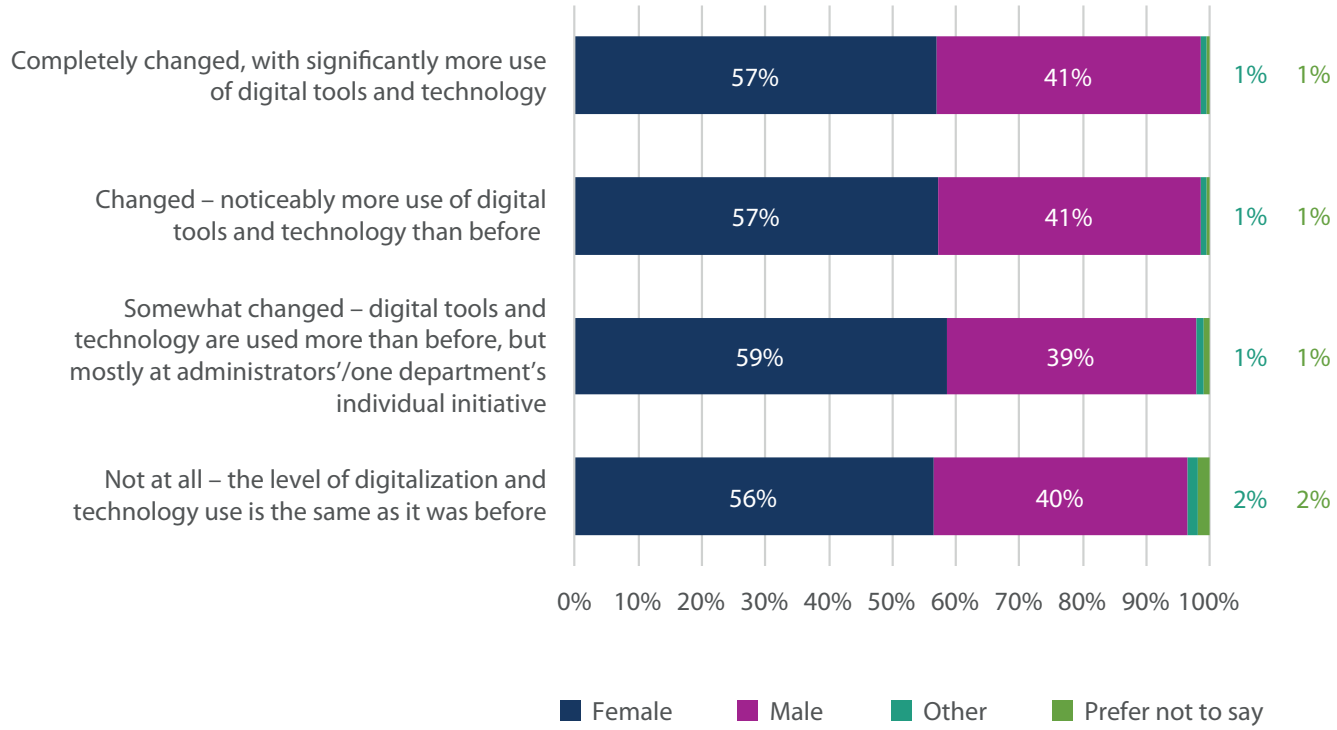
Has the digital transformation made by your university during the pandemic (2020 and 2021) changed the way that you are taught this academic year? (gender disaggregation)



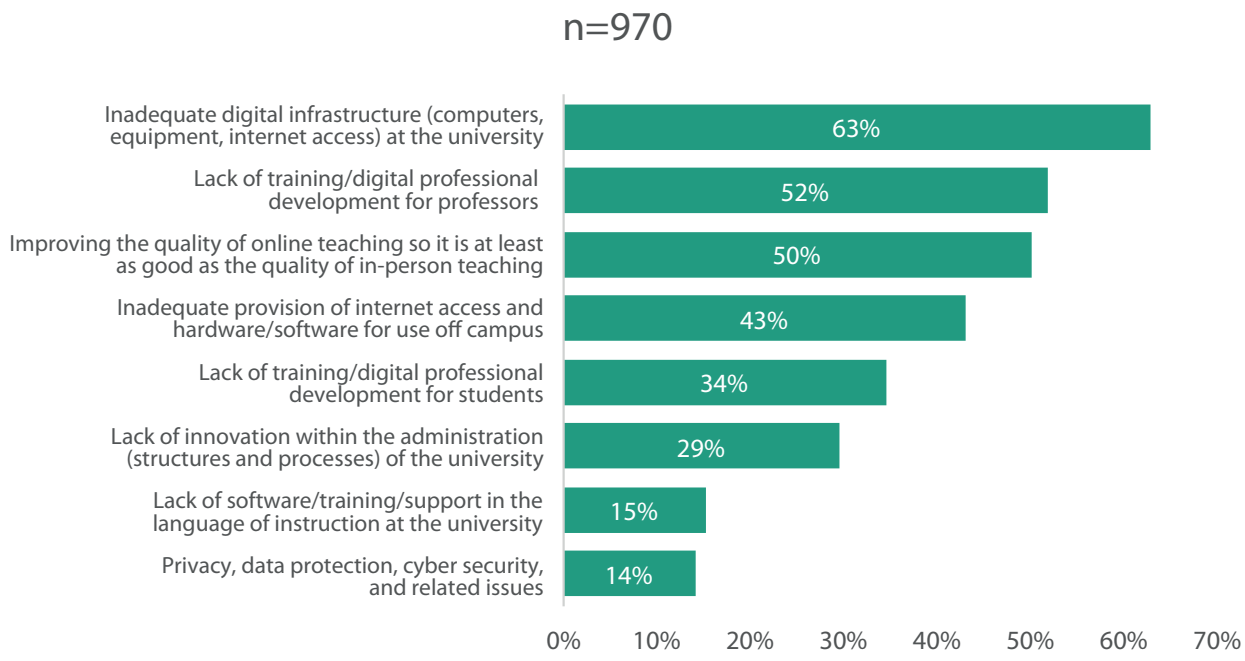
26. Has the digital transformation made by your university during the pandemic (2020 and 2021) changed the way that the university **organizes its processes and student support** this academic year?



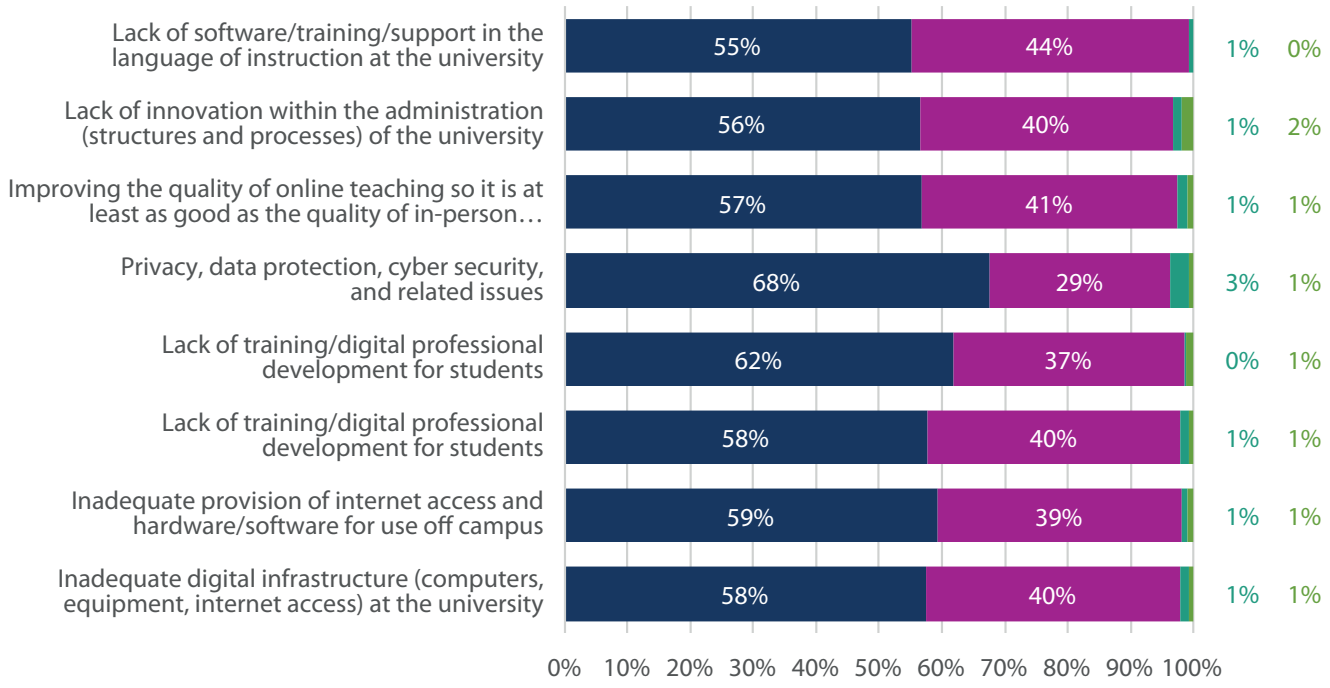
Has the digital transformation made by your university during the pandemic (2020 and 2021) changed the way that the university organizes its processes and student support this academic year? (gender disaggregation)



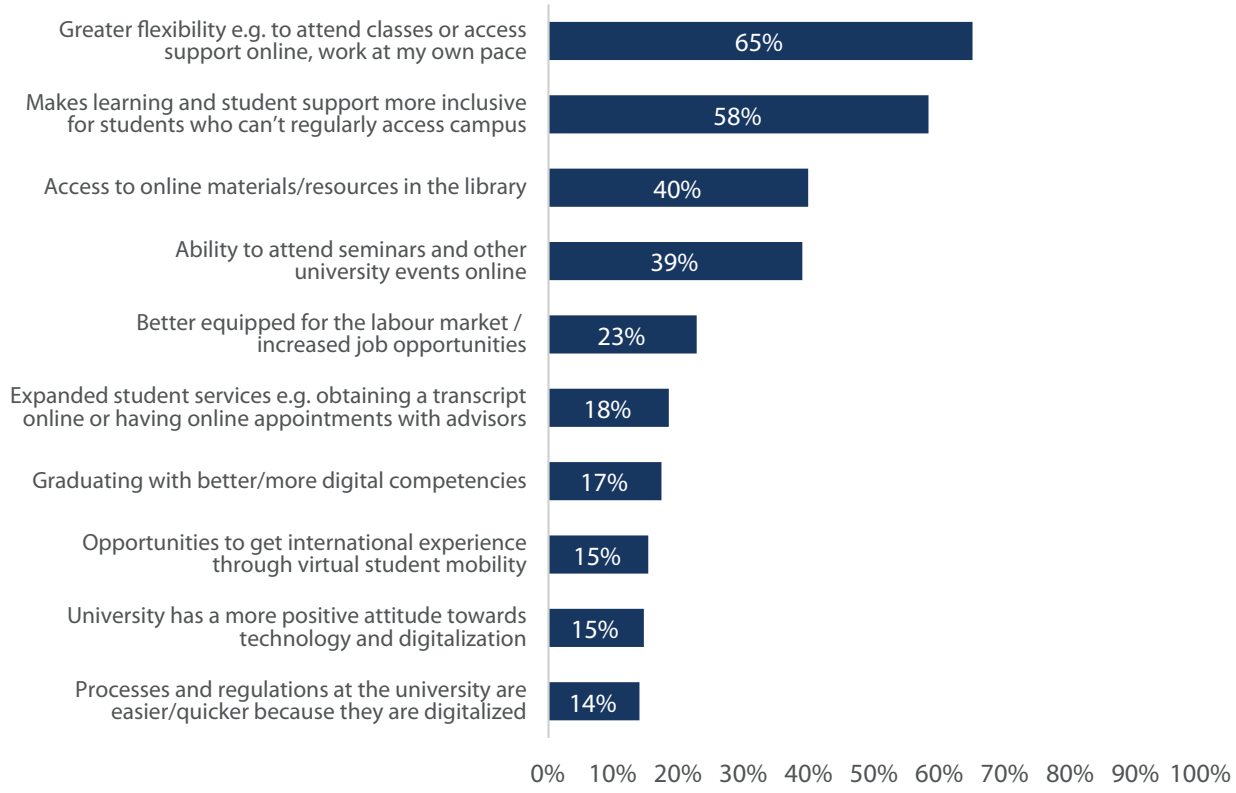
27. What do you think are the three main challenges for further digitalisation at your university?



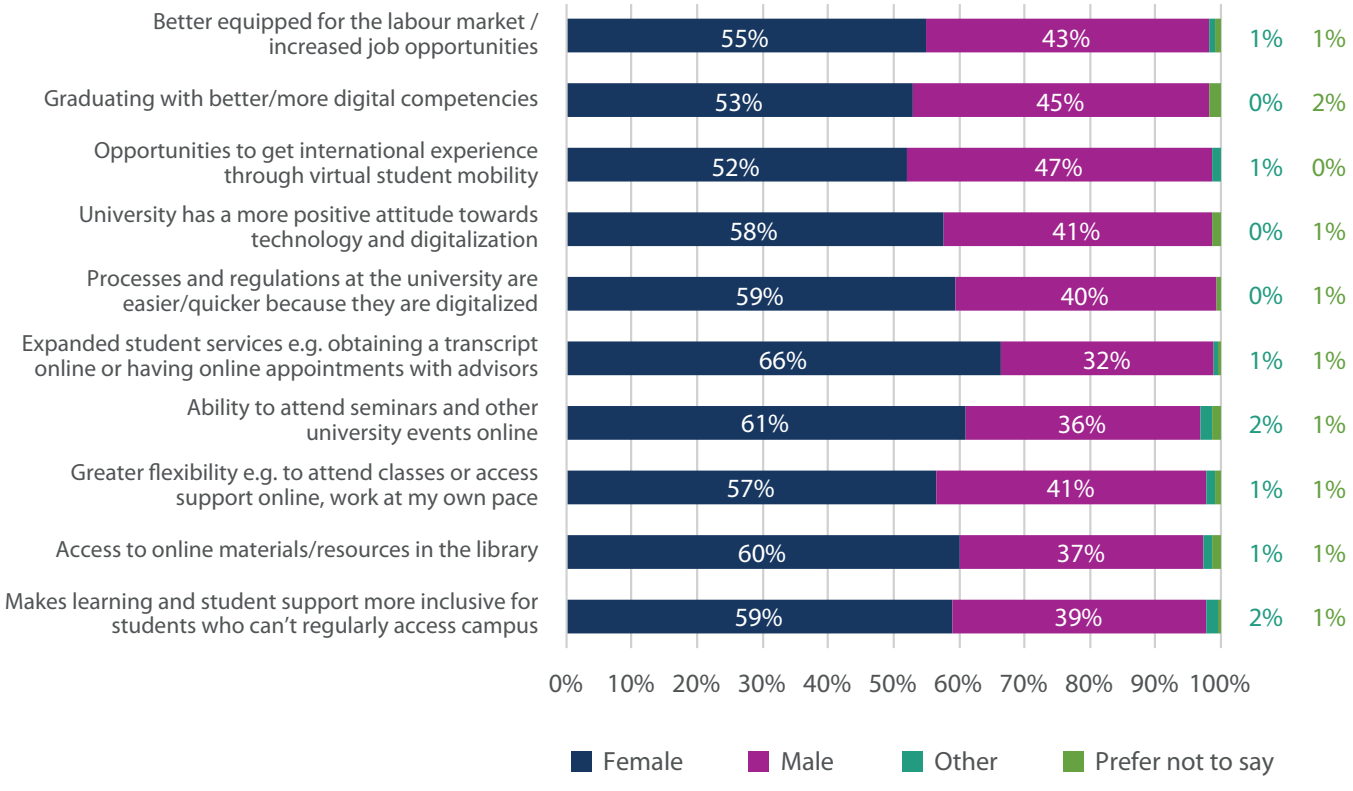
What do you think are the three main challenges for further digitalisation at your university? (gender disaggregation)



28. What do you think are the three main benefits of digital transformation at your university?



What do you think are the three main benefits of digital transformation at your university? (gender disaggregation)



29. What further changes would you like to see at your university in relation to digital transformation? (Optional, free text)

For the analysis of this question, a free coding analysis was conducted to identify the main trends commented on by students. The table below presents the frequency analysis of the generated codes and their associated definitions.

n=488				
Nº	**Code**	**Definition/Concept**	**Frequency**	**%**
1	Infrastructure	Related to digital infrastructure, laboratories, computers, tablets, etc.	161	22,4%
5	Digital and Internet access	Ability to access internet on and off campus to carry out academic activities.	92	12,8%
2	Online learning	Online or hybrid learning	90	12,5%
3	Academic offer	Increase of the academic offer through online learning to improve skills.	66	9,2%
4	Quality of teaching	Quality of teaching refers to the support provided by teachers to online teaching, as well as the skills required by teachers to carry out online or hybrid teaching.	59	8,2%
6	Digital skills	Development of digital skills, management of software associated with the academic area or speciality.	49	6,8%
8	Management	Need for improvement of services associated with the teaching and learning process.	37	5,2%
9	Up to date	Relevance and up-to-date education.	36	5,0%
11	Inclusion	Inclusion, especially of students from disadvantaged or vulnerable backgrounds.	31	4,3%
10	Teacher training	There is a general sense of need to train teachers in order to ensure that the teaching-learning process is more effective.	23	3,2%
12	Mental health & support	Support for the teaching and learning process; funding and help in accessing devices.	18	2,5%
13	Flexible paths	Ability to have access to tailor-made education.	14	1,9%
15	VSM	Development of cooperative programmes with other universities and across the region.	8	1,1%
16	Labour market focussed	Focused and targeted education and skills development for rapid entry into the labour market.	8	1,1%
22	Support research	Digital transformation for supporting research.	5	0,7%
17	Sustainability	Sustainable digitalisation.	4	0,6%
18	AI	Incorporation of artificial intelligence in universities.	4	0,6%
19	Data protection	Data protection and copyright.	4	0,6%
20	Curriculum	Curriculum adapted to current training needs.	4	0,6%
21	University mission	University at the service of society.	3	0,4%
23	In person learning	Classroom-based education.	2	0,3%
			718	**100,0%**

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Higher Education Research and Foresight

Digital Transformation

The UNESCO International Institute for Higher Education (UNESCO IESALC) is one of UNESCO's key education-focused institutes and is the only institute in the United Nations with a specific mandate for higher education. Taking a holistic and integrated intersectoral and cross-sectoral approach to higher education, UNESCO IESALC provides support to Member States through policy-driven and action-oriented research and publications, capacity development, training, advocacy and networking.

The Institute is actively supporting the efforts to establish the overall panorama of digital transformation in education in higher education, advocating for a rights-based approach to technology and connectivity research and capacity-building projects, including this joint research to investigate digital transformation in higher education, undertaken in collaboration with the UNESCO International Centre for Higher Education Innovation (ICHEI).

This report entitled *Transforming the digital landscape of higher education in Latin America and the Caribbean* aims to unlock the potential of digital transformation in higher education in Latin America and the Caribbean, offering practical guidance and policy recommendations on how to transform higher education in ways that are equitable, sustainable, and valuable for the region.

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4 QUALITY EDUCATION

Sustainable Development Goals