

Article

Not peer-reviewed version

Teaching Strategies and Virtual Campus Uses in Higher Education after the COVID-19 Digital Transformation

[Manuel Gil-Mediavilla](#)*, [Fátima Llamas Salguero](#), [Isabel Porras Masero](#), [María-Belén San-Nicolás Santos](#)

Posted Date: 26 September 2025

doi: 10.20944/preprints202509.2246.v1

Keywords: teaching strategies; virtual campus; digital transformation; higher education; COVID-19



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a Creative Commons CC BY 4.0 license, which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

Teaching Strategies and Virtual Campus Uses in Higher Education after the COVID-19 Digital Transformation

Manuel Gil-Mediavilla ^{1,*}, Fátima Llamas Salguero ², Isabel Porras Masero ² and María-Belén San-Nicolás Santos ³

¹ Department of Pedagogy; Faculty of Education of Palencia, Universidad de Valladolid, 34004 Palencia, 5 Spain

² Department of Education Sciences, Faculty of Teacher Training, University of Extremadura 10003 Cáceres, Spain

³ Department of Teaching and Educational Research, University of La Laguna, 38200 San Cristobal de la 11 Laguna, Spain

* Correspondence: manuel.gil@uva.es

Abstract

COVID-19 accelerated the digital transformation of Spanish universities, turning the virtual campus into the backbone of learning; this comparative qualitative study explores how 57 lecturers and 32 students from the Universities of Extremadura (UEX), Valladolid (UVA) and La Laguna (ULL) perceive post-pandemic changes in virtual-campus uses and online instructional designs and converts that evidence into actionable strategies. Four focus groups and ten semi-structured group interviews were transcribed and coded in Atlas.ti, mapped onto a consensual scheme of 14 categories and 42 codes, and the coding was triangulated across institutions to ensure reliability. Results show that the campus is indispensable yet causes an excessive workload, its interactive features remain underutilized, and redesigned teaching blends multimedia resources, automated quizzes and oral defenses, while participation rises when forums are well moderated and synchronous tutoring is offered. Seven recommendations emerge—weekly ECTS workload map, minimum multimodal resource kit, three-step assessment cycle, hybrid tutoring calendar, flipped learning with micro-projects, mixed quiz–oral test and gamified participation—designed to balance flexibility, workload and learning depth and to strengthen student engagement in post-pandemic hybrid education.

Keywords: teaching strategies; virtual campus; digital transformation; higher education; COVID-19

1. Introduction

The 2020 COVID-19 pandemic triggered an unprecedented transformation in higher education worldwide. Universities were among the first institutions to close their physical campuses, leaving millions of students with interrupted face-to-face classes and forcing a sudden migration to emergency remote teaching. This process accelerated universities' digital transformation while simultaneously exposing substantial challenges. International estimates indicate that tens of millions of higher-education students were affected in the first year alone, underscoring the magnitude of the challenge faced by institutions (UNESCO, 2020). In Spain, the suspension of in-person activity revealed difficulties in advancing the digitalization of teaching, while also opening opportunities for more flexible course redesigns (Mula-Falcón et al., 2022). International literature likewise documents global trends toward emergency transitions to digital formats with uneven levels of preparedness across systems and universities, reinforcing the need to comparatively analyze institutional responses (Mospan, 2023).

During the initial lockdown, students primarily relied on the virtual classroom and synchronous videoconferencing, transferring many traditional teaching methods online and leaving more advanced interactive affordances underused (Baladrón Pazos et al., 2020). This pragmatic approach ensured continuity of instruction, but it also exposed technological constraints and limited pedagogical readiness for more innovative online modalities.

In parallel, the term “adapted in-person teaching” emerged to denote the hybrid or blended arrangements implemented in subsequent academic years, combining on-site and virtual instruction (Area-Moreira et al., 2021). However, these policies were designed as short-term emergency measures, without a clear strategic plan for the long-term digital transformation of post-COVID higher education (Mula-Falcón et al., 2022). Recent reviews converge on the need for strategic and equitable digitalization to ensure inclusive access and quality in the new educational landscape (Matsieli & Mutula, 2024).

Since then, debate has oscillated between a return to pre-pandemic normality and leveraging the lessons learned to consolidate more sustainable, student-centered hybrid models. Tejedor et al. (2021) note that the forced virtualization was experienced by faculty as a workload intensification accompanied by digital-competence gaps, whereas students valued flexibility and asynchronous access—partially divergent perceptions that warrant comparative analysis. Consistently, studies focusing on academic work during the pandemic document job strain, increased methodological demands, and the challenges of telework that shaped the faculty experience (Castro-Rubilar et al., 2023).

Against this backdrop, the UNIDIGIT@L project (“La Transformación Digital de las Titulaciones Universitarias. Las Analíticas Académicas, las Subjetividades y el Rendimiento en Tiempos Prepandémicos y durante la COVID-19”) provides the framework for the present study. This inter-university project—publicly funded under grant TED2021-130743B-I00 and carried out at the University of La Laguna (ULL), the University of Extremadura (UEX), and the University of Valladolid (UVA)—integrates three objectives: (a) academic and learning analytics to observe patterns of use and performance; (b) actors’ subjectivities to understand experiences and appraisals during the digital transition; and (c) policy proposals to promote the digital transformation of degree programs. This three-pronged approach contrasts usage data with the perceptions of those who teach and learn, aiming to yield tangible, context-relevant results.

Study 2 of the project—within which the present article is situated and which addresses objective (b)—adopts a comparative qualitative design to explore post-pandemic experiences of faculty and students across the three universities. Focus groups and group interviews were conducted following qualitative rigor criteria (Stake, 2010; Hamui-Sutton & Varela-Ruiz, 2013).

A common matrix of 14 categories and 42 codes was agreed upon, distributed across four analytical dimensions (Table 1): Percepción de cambio en el modelo educativo (PCME) [Perception of Change in the Educational Model]; Percepción de cambio en los usos del campus virtual (PCUCV) [Perception of Change in the Uses of the Virtual Campus]; Percepción de cambio en los procesos y diseños didácticos en el campus virtual (PCDCV) [Perception of Change in Teaching Processes and Designs in the Virtual Campus]; and Percepción de cambio sobre el rendimiento académico (PCRA) [Perception of Change in Academic Performance]. This structure, inherited from Study 1 and adjusted for qualitative analysis, supported systematic comparisons across universities and between groups (faculty vs. students) and underpinned the analytic reduction process (Miles et al., 2019).

Table 1. Dimensions studied focused on students.

Dimension	Categories	Key features
1. Perception of Change in the Educational Model (PCME)	1.1. Educational model	Appraisal of the face-to-face–online transition and of hybrid teaching from the learner’s perspective.
	1.2. Virtual campus	
	1.3. Instructional planning	
	1.4. Hybrid teaching	
	2.1. Time and workload	

2. Perception of Change in the Uses of the virtual campus (PCUCV)	2.2. Resources	Experience of the virtual campus as an environment for organization, communication, and workload.
	2.3. Assignments	
	2.4. Tutoring/Advising	
	2.5. Communication	
	2.6. Support services	
3. Perception of Change in Teaching Processes and Designs in the virtual campus (PCDCV)	3.1. Activities	Perceived adequacy of activities, assessment, and online participation.
	3.2. Assessment	
	3.3. Student participation	
4. Perception of Change in Academic Performance (PCRA)	4.1. Academic performance	Perceived impact on grades and meaningful learning.

Theoretically, the study engages perspectives that locate learning within interaction and technology-mediated connectivity: connectivism (Siemens, 2005), collaborative learning (Dillenbourg, 1999), and networked learning (Harasim, 2017). These frameworks conceptualize the virtual campus as a space for collaborative knowledge construction, where the teaching role is reconfigured toward designing and facilitating experiences, and the student role toward more active, self-regulated participation. This stance aligns with views of the campus as a data- and service-rich ecosystem articulating communication, resources, tasks, assessment, and tutoring (García-Peñalvo, 2021), and it motivates the focus on PCUCV and PCDCV as lenses for understanding hybrid teaching.

Guided by this framing, the present article delimits its focus to the PCUCV and PCDCV dimensions, jointly integrating faculty and student perspectives. This comparative angle enables the identification of convergences with strategic value for institutional planning and techno-pedagogical support (Gamage et al., 2022; Tejedor et al., 2021). As its main contribution, we anticipate that although the virtual campus has consolidated as indispensable infrastructure, challenges persist regarding advanced pedagogical use, workload management, assessment, and participation. Building on this, the article articulates evidence-based recommendations to balance flexibility, quality, and equity in post-pandemic higher education.

2. Materials and Methods

This study employed a multicenter qualitative approach using multiple instrumental case studies (Stake, 2010), encompassing three universities (UEx, UVa, and ULL) within Study 2 of the UNIDIGIT@L project. This design enabled a comparative exploration of faculty and student subjectivities regarding the digital transformation of higher education. Data were collected through focus groups and semi-structured group interviews with both constituencies (faculty and students). A common question protocol was used across all sessions, adapting the wording of certain items to each group’s perspective without altering the analytic dimensions. These qualitative techniques capture the collective construction of meaning around shared educational experiences (Hamui-Sutton & Varela-Ruiz, 2013), offering a dialogic space to reconstruct participants’ experiences of virtual campus before and during the pandemic.

In total, 57 university faculty members and 32 students from diverse disciplines and educational levels participated. Participants were selected through purposive sampling to ensure heterogeneity by field of knowledge (Social Sciences and Humanities, Sciences and Engineering, Health Sciences, among others) and educational level. Most faculty had more than ten years of higher-education teaching experience, whereas the student group included undergraduate and postgraduate participants from various programs, ensuring a broad range of profiles.

Focus groups were organized at each participating university during the 2023–2024 academic year, fostering balanced dialogue among attendees. Whenever possible, sessions were held in person; when not feasible, hybrid or virtual modalities were adopted to facilitate participation. All sessions were recorded with informed consent and later transcribed verbatim using automated transcription tools, whose outputs were manually reviewed to ensure data fidelity.

Qualitative data were analyzed through thematic coding assisted by Atlas.ti (v.24) and chatGPT 4.0. The consensual analytic matrix and the four dimensions decomposed into 14 operational categories (Table 1) guided the process. This common analytic schema yielded 42 codes applied deductively to all transcripts. Using the same set of categories and codes for both groups enabled systematic comparison of faculty and student perceptions and facilitated triangulation across institutional cases while preserving each group's particularities. Coding was conducted by multiple members of the research team: first, separate reports were prepared for each university and group; subsequently, a comparative analysis integrated all results.

The study received approval from the ULL ethics committee (CEIBA 2023-3286). All participants were informed about the study's objectives, and written informed consent was obtained for participation and recording. Collected data (recordings and transcripts) were anonymized prior to analysis to guarantee confidentiality and privacy.

3. Results

3.1. *Perception of Change in the Uses of the Virtual Campus (PCUCV)*

Following the accelerated digitalization process driven by the pandemic, the virtual campus became a central tool at all three universities analyzed (UEx, UVa, and ULL). In the new context, the platform was positioned as a cornerstone for teaching delivery and academic management. This results dimension explores how the uses of the virtual campus transformed based on both faculty and student perceptions, identifying shared patterns as well as differences between institutions.

3.1.1. Time and Workload

The data indicate that the rapid implementation of virtual campus usage led to an increase in faculty workload. The adaptation of materials, configuration of online tools, and heightened student support needs significantly raised preparation time. Although this initial surge in effort tended to decrease once resources were created and reused, the digital transition has transformed the organization of teaching time—necessitating a rethinking of course planning and calling for institutional recognition of the additional effort invested.

Academic workload also increased for students. Digital submissions and online activities, added on top of remaining in-person tasks, extended students' study hours and created tighter deadlines. However, students acknowledged that the virtual environment provided greater flexibility by reducing commuting time and allowing for more autonomous organization of their work.

3.1.2. Resources

Across the cases, the virtual campus consolidated its role primarily as a repository for course materials, ensuring permanent access to documents, presentations, readings, and lecture recordings. This repository function was highly valued by students, as it allowed for self-paced review and reinforcement of complex content. At the same time, participants perceived a need to evolve toward more interactive and multimedia resources (such as simulations or immersive activities) to transform the virtual campus into an experimental learning space rather than just a storage site. Faculty also recognized the potential of these advanced tools to diversify teaching methodologies, but they noted practical limitations due to a lack of training or inadequate technological resources to implement them.

3.1.3. Assignments

The management of digital assignments and online submissions became a key element of pandemic-era teaching. The online modality facilitated continuous assessment and easier tracking of student progress, and it enabled diversification of submission formats. Faculty were encouraged (and often forced) to design practical tasks supported by digital resources such as video and multimedia materials, although it was acknowledged that certain activities—particularly hands-on laboratory

work or other practical exercises—still required in-person participation. Management of large groups was aided by features like attendance-tracking systems and online testing, while new practices such as peer assessment and the use of academic-authorship verification tools were introduced to enhance transparency in the evaluation process.

Students generally perceived digital submission as advantageous due to its simplicity and reliability, and it quickly became a standard practice that helped them organize their academic work. Nonetheless, some drawbacks were noted: for example, students often had to use external tools for collaborative group work; some activities were fragmented or poorly integrated, leading to confusion; and an accumulation of concurrent tasks occasionally generated additional pressure. Clear grading rubrics and timely feedback were highlighted as especially valuable, since they clarified expectations, facilitated better planning, and provided coherence to the learning process.

3.1.4. Tutoring/Advising

Academic tutoring and advising transformed into a hybrid model, combining traditional in-person meetings with virtual sessions via videoconference. This change expanded opportunities for follow-up and enabled more personalized support at flexible times. Faculty appreciated the ability to maintain more flexible scheduling and to keep a more traceable record of student interactions. For instance, instructors could insert comments or annotations directly into submitted assignments and schedule one-on-one meetings at non-standard times—practices that were recognized as significant improvements in providing student support. However, when feedback was reduced to brief messages without clear guidance or explanation, students reported feelings of dissatisfaction and a perceived lack of support from their instructors.

3.1.5. Communication

During the pandemic period, the virtual campus became the primary channel for academic communication. The platform's forums provided spaces for academic discussion and dissemination, and its announcement and messaging tools served as official communication channels for courses. The use of the virtual campus in this way enhanced the visibility of interactions and facilitated coordination between faculty and students. However, certain limitations were noted: the multiplicity of communication channels and notifications (e.g., emails, forum posts, messaging) sometimes led to duplicate messages or unanswered queries, causing confusion and information overload for both students and faculty.

3.1.6. Support Services

The role of technical support services was viewed positively across the universities, as these services were critical in maintaining academic continuity. Participants especially appreciated the prompt resolution of technical issues and the availability of online tutorials or guides that helped them navigate the virtual platform. However, the need was highlighted for extending support service hours and offering real-time support channels (such as live chat or hotline support), as well as for strengthening both initial training and ongoing development in digital competencies and advanced platform usage for users. Remaining challenges include expanding human support resources, maintaining software licenses for key digital tools, and ensuring equitable access to support (for example, making sure all students and staff, regardless of location or schedule, can obtain timely help).

3.2. *Perception of Change in Teaching Processes and Designs in the Virtual Campus (PCDCV)*

Following the forced transition to online environments, all three universities reconfigured their pedagogical strategies within the virtual campus, albeit with local nuances. This results dimension examines how activities, assessment methods, and student participation were redesigned, based on

the comparative perceptions of faculty and students at UEx, UVa, and ULL. The following synthesis highlights common patterns as well as salient differences within each category.

3.2.1. Activities

The initial shift to fully online teaching was abrupt, compelling faculty to improvise without a single guiding model. Each instructor implemented whatever solutions were feasible: in general, synchronous online classes (via video lectures) were combined with assigned tasks or projects, but this early phase was marked by limited clarity and a lack of uniformity across courses. During the subsequent period of hybrid teaching—when on-campus attendance alternated with virtual sessions—participants reported substantial logistical challenges. In large cohorts, rotating weekly attendance created difficulties: for example, some students had to connect to an online class and then travel to campus for an in-person seminar on the same day, resulting in stress and the partial loss of the preceding virtual session. Moreover, in-person classes conducted under strict health restrictions (mask use, social distancing) impeded communication and generated frustration for both students and instructors.

The incorporation of digital tools into teaching accelerated markedly during this period. Faculty made intensive use of multimedia presentations, videoconferencing, and institutional e-learning platforms to sustain instruction. Many explored technology-supported active learning methodologies. For instance, the flipped classroom approach gained traction by enabling students to engage with theoretical content at home (through videos or other preparatory materials) and dedicating live class time to practical or interactive activities. Gamified dynamics and interactive applications—such as online quizzes and tools like Kahoot or Mentimeter—were also introduced to enhance motivation and engagement during remote sessions. Some instructors blended traditional approaches with these new resources; for example, they might assign creative offline activities (e.g., making posters or analyzing current news) to connect coursework with real-world contexts, or organize collaborative projects through Moodle wikis and forums. Notably, the broad availability of materials and resources on the virtual campus became one of the most valued aspects of the experience. Easy access to presentations, documents, and even recorded lectures supported students' self-regulated learning by allowing them to review content at their own pace and reinforce complex concepts. Several students also highlighted that the online environment offered a more controlled setting (e.g., fewer ambient distractions), which in some cases improved their concentration. In this way, a platform previously considered ancillary became a central support for the educational process.

Despite these advances, differences in the adoption of the virtual campus were evident. Not all faculty utilized the platform to the same extent or in the same ways. Some barely engaged with it at all—preferring external tools or limiting their online presence to sharing basic materials—which created confusion as students had to adapt to different channels and practices in each course. Even among those instructors who did integrate the platform, strategies varied widely. In some cases, online teaching was essentially reduced to uploading slide decks with minimal interaction, a practice students perceived as lower in quality compared to traditional in-person classes. In contrast, other instructors maintained fluid communication through the virtual campus and embedded dynamic activities that effectively complemented their face-to-face sessions. The experience also revealed significant technical and training constraints: many instructors had to rapidly familiarize themselves with new technologies, and not all had adequate resources or digital skills, reflecting pre-existing digital divides. Nevertheless, there was broad agreement that the flexibility and potential of the virtual campus made it possible to sustain—and even enrich—teaching under these exceptional circumstances, generating pedagogical innovations with value beyond the emergency.

3.2.2. Assessment

During the lockdown period, assessment methods had to be reinvented almost overnight. Traditional proctored, in-person examinations were quickly set aside: written exams were largely replaced by individual and group assignments, as well as online oral presentations. In some

instances, even attendance and participation in virtual classes were factored into grading schemes. For students, the shift often meant an increased workload, as they had to complete multiple continuous-assessment tasks rather than prepare for a single high-stakes final exam.

Faculty, in turn, faced various challenges when evaluating student learning in virtual settings. The lack of physical invigilation raised concerns about academic honesty, prompting many to redesign assessments toward more reflective or applied questions rather than ones relying on rote memorization. Grading schemes were also adjusted; for example, the weight of a final exam might be reduced in favor of more frequent coursework or project evaluations. Even so, many instructors felt dissatisfied at being unable to ensure that students met all the intended competencies. The extraordinary flexibility afforded during the emergency—such as greater leniency with deadlines and scaled-back expectations—was necessary, but some faculty feared that academic standards had been relaxed excessively. As a result, a perception emerged that students could pass courses without achieving the desired level of mastery. In addition, assessing large cohorts online while maintaining quality standards proved complex: there was often a lack of appropriate tools and insufficient time to provide personalized feedback to a high volume of students.

On a positive note, some good practices in digital assessment also emerged. During the fully online phase, many students received more detailed feedback than they typically had in pre-pandemic classes. In the absence of face-to-face meetings, numerous instructors provided extensive written comments on assignments submitted via the platform, noting strengths and areas for improvement for each student. Students valued this individualized feedback, as it helped them understand their errors and learn from them. Some instructors even shared each student's corrected and annotated exam paper via the virtual campus, increasing transparency in how grades were determined. Collaborative assessment methods were also piloted: for example, one instructor had students collaboratively develop potential exam questions in a discussion forum based on the readings, and later incorporated some of these student-generated questions into the actual final exam. This strategy—although born out of the need to engage students in the assessment process—fostered active participation and joint knowledge construction.

With the gradual return to on-site teaching, some of these changes in assessment practices persisted while others fell by the wayside. Many instructors retained elements of continuous assessment that they had adopted during the pandemic, combining them with a reintroduced in-person final exam. The virtual campus continued to be used for collecting assignments and managing grades, consolidating its role in assessment logistics. However, students noticed that the richness of feedback often declined upon the return to "normal." In several cases, instructors reverted to posting only a final grade with no comments or explanations, in contrast to the detailed feedback provided during the online-only phase. This generated disappointment among students who had become accustomed to receiving formative remarks on their work.

Nonetheless, some instructors permanently adopted the good practices they learned during the pandemic. Although they were in the minority, these instructors continued to provide detailed rubrics, explanations of the grading criteria, and open channels for questions after each exam (for instance, through online forums or follow-up meetings). Such initiatives helped students better understand their mistakes and how to improve, demonstrating the potential of well-implemented digital assessment techniques. In summary, assessment during the period under study became more flexible and diversified, with greater weight given to continuous evaluation. The challenge that remains is to ensure rigor, authenticity, and meaningful feedback—especially as institutions return to predominantly in-person formats.

3.2.3. Student Participation

Student engagement in virtual activities was generally limited unless those activities were tied to assessment. Both faculty and students observed that when an online task (e.g., a discussion forum or optional exercise) did not count toward the grade, most students did not participate actively. For instance, forums were rarely dynamic: few students would consult them on their own initiative, and

most posted only when required to earn points. Without such requirements, online discussions often remained largely dormant.

Even so, the pivot to virtualization opened up new opportunities for participation. By removing geographic barriers and offering greater scheduling flexibility, more students were able to attend academic activities that had previously seen low participation. Increased attendance was noted in events like academic seminars and group advising sessions conducted via videoconference: connecting from home made it easier for those who previously could not attend in person (due to distance or other commitments) to join in. In regular classes, synchronous online tools (such as chat boxes, live polls, or the virtual “raise hand” function) encouraged contributions even from students who were typically passive in a physical classroom setting. According to some instructors, these dynamics helped maintain a sense of community despite the physical separation imposed by lockdowns.

Experiences with remote group work were mixed. Many students took advantage of cloud-based collaborative platforms to organize themselves, share documents, and work together—sometimes extending these collaborative practices beyond a single course. However, coordinating group work virtually also presented difficulties: aligning schedules, distributing tasks equitably, and ensuring everyone’s involvement proved challenging, particularly when team members faced differing personal circumstances at home. The success of collaborative work depended largely on individual commitment and the clarity of the instructor’s guidance and expectations.

It became clear that effective participation in digital environments does not arise spontaneously; it requires intentional pedagogical design and sustained instructional support. One strategy that students reported as effective was incorporating mechanisms to make progress visible on the platform. For example, progress indicators or checklists of completed tasks in the virtual campus motivated many students by providing an immediate sense of accomplishment as they met interim objectives. Likewise, a clear organization of content and deadlines within the virtual campus helped students stay on track and keep up to date with coursework. The instructor’s role in fostering participation was also evident. The most successful cases were those in which the instructor maintained an active, responsive presence: promptly answering questions in forums or messages, offering frequent feedback, and encouraging student input. When instructors cultivated dialogue and interaction, students tended to be far more engaged. Conversely, when the platform was used only to post materials and announcements—without interactive channels—students often became passive, doing only the minimum required tasks.

After the critical pandemic phase, the use of the virtual campus normalized, but this alone did not guarantee higher-quality participation. In fact, several accounts indicate that the overload of notifications and digital content began to produce a sense of saturation, making it harder for students to discern what information was important and contributing to their disengagement.

Faculty and students alike emphasized the need to improve notification systems and information filtering within the platform to avoid such overload. They also underscored the continuing importance of preserving the human dimension of education: practices such as online or in-person office hours, and personalized instructor comments, remain crucial for students to feel supported. This human element can suffer amid large-scale digitalization if not intentionally maintained.

Overall, student participation in the virtual campus reached its highest levels when several factors converged: activities were integrated with assessment, digital tools were used purposefully to facilitate interaction and progress tracking, and the instructor maintained an accessible, communicative presence. When any of these elements were missing, the virtual environment tended to be used more passively—as a simple repository for content and mandatory tasks. These findings highlight that the digital transformation of teaching must be accompanied by robust pedagogical strategies to promote authentic student participation in virtual spaces.

4. Discussion

Based on the above findings, clear patterns emerge from both faculty and student perspectives. While both groups recognize the flexibility and accessibility advantages of the virtual campus, significant challenges have also arisen that need to be addressed in order to improve the sustainability and quality of hybrid teaching. Rather than focusing solely on the difficulties experienced, it is crucial to ground any recommendations in the results of the study, transforming problematic areas into opportunities for improvement.

One key challenge identified relates to coherent curriculum planning, which has been inconsistent across courses and instructors. This lack of coordination generates confusion among students and increases workload, especially when assignment deadlines and assessments are not well synchronized. To address this, it is essential that each course include a detailed teaching guide that clearly outlines the hybrid structure, assessment criteria, deadlines, and an integrated schedule of tasks. Providing such guides would enable students to better organize their time and reduce the stress associated with disorganized or fragmented coursework.

Another challenge highlighted by the study is the need for continuous training in digital competencies. A significant gap in digital tool proficiency was observed between and within the faculty and student groups. While some faculty members quickly adapted to new technologies, others continued to face difficulties, adversely affecting the quality of teaching and learning. To close this gap, it is crucial to implement ongoing training programs—such as micro-credential courses and peer mentoring initiatives—to ensure that all stakeholders have the necessary skills to effectively use the available digital tools. Continuous professional development in digital pedagogy for instructors (and digital literacy support for students) would help level the playing field and improve confidence in using the virtual campus to its full potential.

Inclusive flexibility and active participation emerged as additional areas for improvement. Asynchronous learning provides flexibility for students, but many reported that it can also lead to passive consumption of materials, thus limiting their engagement. To encourage more active participation, we recommend adopting a “dual-thread” model that combines synchronous class sessions with moderated, credit-bearing online discussion forums. This approach would allow all students—regardless of their schedule or location—to actively engage in the learning process by participating in real-time interactions and structured asynchronous discussions. By making participation an integral part of the course (through assessment or recognition) and providing channels for interaction, instructors can foster a more active learning environment even in hybrid or online settings.

A further aspect identified in the results is the importance of balanced workload management. Both faculty and students reported periods of task overload and poorly coordinated deadlines, leading to stress and burnout. To mitigate this, an ECTS-based workload mapping tool or checklist could be used to calculate the actual working hours required for each course and each assignment, allowing instructors to better distribute tasks throughout the semester.

Ensuring that the cumulative demands on students align with the credit hours (ECTS) of a course would help prevent excessive workload peaks. Additionally, this approach could be complemented by using learning analytics on the virtual campus to detect peak periods of student activity and submission traffic. Such data can inform adjustments to course schedules or stagger due dates in a way that balances the workload more evenly, benefiting both students (in terms of time management and stress reduction) and faculty (in terms of grading load).

Another significant area for development is reliable and formative digital assessment. The findings indicate that an over-reliance on automated tests and multiple-choice quizzes can limit deep learning and raise concerns about the authenticity of students' work. To improve the quality of assessment in hybrid and online contexts, we propose combining multiple assessment strategies that complement each other. For example, instructors could use transparent rubrics (shared with students in advance), incorporate brief oral exams or presentations, and utilize randomized question banks for online tests.

This three-pronged approach would help ensure a more rigorous and authentic evaluation of student learning. Publicly available rubrics clarify expectations and standards; oral components provide opportunities for students to demonstrate understanding in their own words (which can also deter cheating); and randomizing quiz items can reduce academic dishonesty and emphasize conceptual understanding over memorization. Together, these strategies allow students to showcase their learning in a more active and meaningful way while maintaining assessment integrity.

Finally, technopedagogical support and well-being should be elevated as institutional priorities in the post-pandemic era. Despite efforts to provide technical support during the transition, participants noted that available services were not always sufficient or easily accessible. To improve this situation, universities should consider expanding the operating hours and coverage of support services, unifying help channels (so that users are not confused about where to seek help), and establishing communities of practice where instructors and support staff can share solutions and tips.

Moreover, implementing a digital well-being program for both students and faculty could help reduce the fatigue associated with intensive technology use. Such a program might include training on self-regulation strategies, guidance on managing screen time and notifications, and promoting a culture of work-life balance even in digital learning environments. By proactively addressing the human and support aspects—technical, pedagogical, and psychological—institutions can improve the overall learning experience and guard against burnout in hybrid education settings.

Throughout this article, we have identified various challenges resulting from the rapid transition to hybrid teaching, and we have proposed concrete solutions that, if implemented, could contribute to building a more coherent, inclusive, and sustainable educational model. Table 2 below summarizes the key recommendations derived from our findings, grouped by area of improvement.

Table 2. Dimensions studied focused on students and teachers.

Recommendation	Identified Problem	Proposed Action
Coherent curriculum planning	Fragmentation of the learning experience due to lack of coordination across courses.	Design course guides that clearly detail the hybrid structure, assessment criteria, and a coordinated calendar for tasks and submissions.
Continuous training in digital competencies	Digital skills gaps among faculty and students.	Implement micro-credential courses and peer mentoring programs to improve the digital skills of all stakeholders.
Inclusive flexibility and active participation	Passive consumption of materials with little meaningful interaction.	Adopt a “dual-thread” model that combines synchronous sessions with moderated, assessed online forums to engage all students.
Balanced workload management	Task overload and uncoordinated deadlines causing stress and burnout.	Use an ECTS-based workload checklist and learning analytics to distribute tasks more evenly throughout the semester.
Reliable and formative digital assessment	Over-reliance on automated tests, limiting deep learning and raising authenticity concerns.	Combine brief oral exams, transparent rubrics, and randomized question banks to ensure authentic, in-depth assessment.
Enhanced technopedagogical support and well-being	Insufficient technical support and lack of measures to address digital fatigue.	Expand support service hours, unify help channels, and introduce a digital well-being program (including self-regulation strategies).

These recommendations not only address the problems identified in our analysis but also propose practical solutions that can be implemented in the short to medium term. The suggested improvements have the potential to strengthen hybrid teaching—ensuring that it is not only flexible and accessible, but also effective and of high quality. By implementing these actions, universities can move toward a more inclusive, sustainable, and equitable educational model, in which both faculty and students maximize the potential of digital tools without losing the essential elements of human interaction and deep learning.

5. Conclusions

This comparative study has examined how university faculty and students perceive changes in teaching strategies and virtual campus use in the post-pandemic context, focusing on two key dimensions: the uses of the virtual campus (PCUCV) and teaching processes and design within the virtual campus (PCDCV).

The findings reveal that the virtual campus is now an indispensable infrastructure for higher education, valued for its flexibility and resource availability, but it also brings challenges related to workload, pedagogical innovation, assessment rigor, and genuine student engagement. Both faculty and students have adapted to new hybrid models of instruction, but their experiences highlight a need for better planning, support, and training to fully capitalize on digital platforms for learning.

Based on these insights, the article puts forward a set of evidence-based recommendations aimed at improving hybrid education. These recommendations include improving curricular coordination (to avoid fragmentation and overload), investing in ongoing digital skills training, fostering active student participation through combined synchronous and asynchronous methods, managing workloads with careful planning and analytics, diversifying assessment to ensure depth and authenticity, and strengthening technical support and well-being initiatives. Each recommendation is designed to directly address issues identified by participants in this study, thus ensuring they are grounded in actual needs and experiences from the field.

It is important to acknowledge the limitations of this research. The study focused on three Spanish universities, which may limit the generalizability of the findings to other contexts or countries with different resources and policies. Additionally, our analysis was confined to two of the four dimensions of the broader project; we did not delve deeply into changes in the overall educational model or academic performance outcomes (dimensions 1 and 4 of the project framework), as those were beyond the scope of this article. There were also some differences in the depth of information obtained across the universities and participant groups—certain topics were more thoroughly discussed in some focus groups than others—indicating that the qualitative data may not cover all issues equally across settings. Future research could expand this comparative approach to include a larger and more diverse set of institutions and could incorporate quantitative measures (such as learning analytics data or surveys) to complement and triangulate the qualitative insights. Further investigation might also explore long-term outcomes of the implemented changes and the effectiveness of the recommended strategies when put into practice.

The post-COVID digital transformation of higher education offers an opportunity to create more flexible and student-centered learning environments, but realizing this potential requires deliberate effort. The experiences of faculty and students in this study underscore that technology alone cannot achieve better learning outcomes without pedagogical and organizational innovation. By addressing the identified challenges with targeted actions—ranging from improved planning and training to new participatory and assessment methods—universities can move toward hybrid education models that are not only resilient in the face of disruptions but also enriching and sustainable in the long run.

Author Contributions: Removed for peer review.

Funding: Removed for peer review.

Institutional Review Board Statement: Removed for peer review.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Removed for peer review.

Acknowledgments: Removed for peer review.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

ULL	University of La Laguna
UEx	University of Extremadura
UVa	University of Valladolid

References

1. Area-Moreira, M., Bethencourt-Aguilar, A., Martín-Gómez, S., & San Nicolás-Santos, M. B. (2021). *Análisis de las políticas de enseñanza universitaria en España en tiempos de COVID-19. La presencialidad adaptada*. Revista de Educación a Distancia, 21(65), 12–28. <https://doi.org/10.6018/RED.450461>
2. Baladrón Pazos, A. J., Corretero Ruiz, B., & Manchado Pérez, B. (2020). *La transformación digital de la docencia universitaria en comunicación durante la crisis de la COVID-19 en España: Una aproximación desde la perspectiva del alumnado*. Revista Latina de Comunicación Social, 78, 265–287. <https://doi.org/10.4185/RLCS-2020-1477>
3. Castro-Rubilar, F., Yévenes-Subiabre, A., Molina-Castillo, S., & Castro-Rubilar, J. (2023). *Docencia en pandemia: Percepciones del profesorado*. Revista de Estudios y Experiencias en Educación, 22(50), 199–213. <https://doi.org/10.21703/rexe.v22i50.1867>
4. Dillenbourg, P. (1999). *What do you mean by collaborative learning?* In P. Dillenbourg (Ed.), Collaborative learning: Cognitive and computational approaches (pp. 1–19). Elsevier. <https://telearn.hal.science/hal-00190240v1>
5. Gamage, S. H. P. W., Ayres, J. R., & Behrend, M. B. (2022). *A systematic review on trends in using Moodle for teaching and learning*. International Journal of STEM Education, 9(1), 1–24. <https://doi.org/10.1186/s40594-021-00323-x>
6. García-Peñalvo, F. J. (2021). *Transformación digital en las universidades: Implicaciones de la pandemia de la COVID-19*. Education in the Knowledge Society, 22, e25465. <https://doi.org/10.14201/eks.25465>
7. Hamui-Sutton, A., & Varela-Ruiz, M. (2013). *La técnica de grupos focales*. Investigación en Educación Médica, 2(5), 55–60. [https://doi.org/10.1016/S2007-5057\(13\)72683-8](https://doi.org/10.1016/S2007-5057(13)72683-8)
8. Harasim, L. (2017). *Learning theory and online technologies* (2nd ed.). Routledge.
9. Matsieli, M., & Mutula, S. (2024). *COVID-19 and digital transformation in higher education institutions: Towards inclusive and equitable access to quality education*. Education Sciences, 14(8), 819. <https://doi.org/10.3390/educsci14080819>
10. Miles, M. B., Huberman, A. M., & Saldaña, J. (2019). *Qualitative data analysis: A methods sourcebook* (4th ed.). SAGE.
11. Mospan, N. (2023). *Trends in emergency higher education digital transformation during the COVID-19 pandemic*. Journal of University Teaching & Learning Practice, 20(1), 50–70. <https://doi.org/10.53761/1.20.01.04>
12. Mula-Falcón, J., Cruz-González, C., Domingo Segovia, J., & Lucena Rodríguez, C. (2022). *Review of higher education policy during the pandemic: A Spanish perspective*. Policy Futures in Education, 21(4), 465–485. <https://doi.org/10.1177/14782103221134188>
13. Siemens, G. (2005). *Connectivism: A learning theory for the digital age*. International Journal of Instructional Technology and Distance Learning, 2(1), 3–10. (Original work published 2004). Retrieved from https://jotamac.typepad.com/jotamacs_weblog/files/connectivism.pdf
14. Stake, R. E. (2010). *Qualitative research: Studying how things work*. Guilford Press.

15. Tejedor, S., Cervi, L., Tusa, F., & Parola, A. (2021). *Los docentes universitarios frente al cambio a la educación virtual impuesta por el coronavirus*. *Sociedade e Estado*, 36(3), 915–943. <https://doi.org/10.1590/S0102-6992-202136030004>
16. UNESCO. (2020). *Education: From COVID-19 school closures to recovery*. Retrieved from <https://www.unesco.org/en/covid-19/education-response/initiatives>

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.