Teachers' and students' perspectives on the intensive use of technology for teaching and learning

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Abstract

The health crisis caused by COVID-19 compelled university teachers to adapt their learning scenarios to new technology-mediated contexts. This paper analyses teaching and learning experiences, strategies and lessons learned during the lockdown period at the Faculty of Education of the Universitat Autònoma de Barcelona (N=29 teachers, 227 students). The results reveal that participants experienced difficulties (lack of literacy in online pedagogies and work overload among lecturers; privation of physical presence and fluent communication among students). Teachers acquired knowledge around digital technologies and are predisposed to learn about innovative teaching methods supported by technologies. Students are dissatisfied with the learning experience, although they value the opportunities for flexible learning and saving time on commuting. Teaching strategies were less innovative and active than usual, and usually involved a combination of synchronous time for lectures and resolving problems, and self-study. Nevertheless, students valued more traditional teaching strategies (i.e. combinations of lectures and tutoring). The paper concludes that the teachers' view of the use of digital technologies has improved, although training is needed to make effective use of such technologies for active learning and innovative approaches to teaching.

Keywords: distance education; teachers' perceptions; students' perceptions; learning scenarios; higher education; lessons learned

Resum. *Perspectives de professorat i alumnat sobre l'ús intensiu de la tecnologia per a l'ensenyament i l'aprenentatge*

La crisi sanitària provocada per la COVID-19 va instar els i les docents a adaptar els seus escenaris d'aprenentatge als nous contextos mediats per les tecnologies. Aquesta investigació analitza les experiències i les estratègies d'ensenyament i aprenentatge i les lliçons apreses durant el confinament a la Facultat de Ciències de l'Educació de la Universitat Autònoma de Barcelona (*N* = 29 professors/ores, 227 alumnes). Els resultats revelen que els i les participants han experimentat dificultats (manca de coneixements sobre pedagogies en línia i sobrecàrrega de treball —professorat— i privació de presència física i comunicació fluida —alumnat). L'equip docent ha desenvolupat coneixements sobre tecnologies digitals i està predisposat a aprendre metodologies d'ensenyament innovadores assistides per tecnologies. L'alumnat està insatisfet amb l'experiència d'aprenentatge,

tot i que valora les oportunitats per a un aprenentatge flexible i l'estalvi de temps en els desplaçaments. Les estratègies didàctiques han estat menys innovadores i actives del que és habitual; generalment, una combinació de temps sincrònic per a lliçons i resolució de dubtes i de treball autònom. Tot i això, l'alumnat valora les estratègies didàctiques més tradicionals (és a dir, combinació de lliçons i tutories). La conclusió principal és que la perspectiva del professorat sobre l'ús de les tecnologies digitals ha millorat, tot i que cal formar-lo en el seu ús efectiu per a l'aprenentatge actiu i la innovació educativa.

Paraules clau: educació a distància; perspectives del professorat; perspectives de l'alumnat; escenaris d'aprenentatge; educació superior; lliçons apreses

Resumen. *Perspectivas de profesorado y alumnado sobre el uso intensivo de la tecnología para la enseñanza y el aprendizaje*

La crisis sanitaria provocada por el COVID-19 instó a los y las docentes a adaptar sus escenarios de aprendizaje a los nuevos contextos mediados por las tecnologías. Esta investigación analiza las experiencias y estrategias de enseñanza y aprendizaje y las lecciones aprendidas durante el confinamiento en la Facultad de Ciencias de la Educación de la Universidad Autónoma de Barcelona (N = 29 profesores/as, 227 alumnos/as). Los resultados revelan que los y las participantes han experimentado dificultades (falta de conocimientos sobre pedagogías en línea y sobrecarga de trabajo —profesorado— y privación de presencia física y comunicación fluida —estudiantes—). El equipo docente ha desarrollado conocimientos sobre tecnologías digitales y está predispuesto a aprender métodos de enseñanza innovadores asistidos por tecnologías. El alumnado está insatisfecho con la experiencia de aprendizaje, aunque valora las oportunidades para un aprendizaje flexible y el ahorro de tiempo en los desplazamientos. Las estrategias didácticas han sido menos innovadoras y activas de lo habitual; generalmente, una combinación de tiempo sincrónico para lecciones y resolución de dudas y de trabajo autónomo. Sin embargo, el alumnado valora las estrategias didácticas más tradicionales (es decir, combinación de lecciones y tutorías). La conclusión principal es que la perspectiva del profesorado sobre el uso de las tecnologías digitales ha mejorado, aunque es necesario formarle en su uso efectivo para el aprendizaje activo y la innovación educativa.

Palabras clave: educación a distancia; percepciones del profesorado; percepciones del alumnado; escenarios de aprendizaje; educación superior; lecciones aprendidas

Summary

1. Introduction

The unexpected arrival of COVID-19 shook the foundations of face-to-face universities. Early research into the impact of the pandemic reported a positive view among students of online learning, as a result of its flexibility and the possibility to study at any time (Lall & Singh, 2020), while highlighting the lack of co-curricular activity as the main drawback. Jegede (2020) identifies the negative effects experienced by students in higher education (e.g. financial budget, reduction of manpower, and the cancellation of academic conferences). Results of an international study (Izumi et al., 2020) have demonstrated that universities were little prepared for an emergency, although respondents considered that the response to the emergency was timely and open.

In terms of the strategies used and the lessons learned during lockdown, la Velle et al. (2020) conclude that the pressure for universities to quickly adapt to the new context resulted in little opportunity to consult, collaborate or reflect. They propose that teachers plan and teach well-structured lessons and make accurate and productive use of assessment. Bao (2020) suggests improving support for online students by offering effective information, adequate teaching support, high-quality participation and a technical contingency plan. Scull et al. (2020) recommend using various tools to differentiate the curriculum and to optimise the participation of all learners. More specifically, Quezada et al. (2020) suggest integrating short lectures, video clips, small group instructions, speakers and webinars; recording sessions and uploading explanations using voice or video; using videoconferences before and after classes to provide socio-emotional support; and creating a departmental learning resource website for faculty members. Karalis (2020) offers several recommendations for educational emergencies, including the creation of a crisis management team to implement and evaluate solutions. Murphy (2020) reflects on the danger of normalising emergency e-learning, and distinguishes it from other forms of e-learning that may provide wider access to those students who cannot attend face-to-face education.

Such immediate transition to the online mode has been labelled "emergency remote teaching (ERT)", and is aimed at providing temporary, timely access to instruction during an emergency (Hodges et al., 2020). Albó et al. (2020) demonstrate that ERT impacted positively on the expansion of the technology-enhanced learning domain among teachers simply for communicating and meeting basic requirements rather than for pedagogy. Later, "intermittent face-to-face teaching" emerged as an alternative to physical attendance, with a range of uses of technologies for flexible teaching (Valdivia & Noguera, 2022). We understand course-related solutions generated to adapt to distance learning to be learning scenarios. A learning scenario is an educational situation designed with consideration for the environment, learning objectives, methodologies and learners, with special attention to digital technologies (Mari et al., 2008). Studies have reported general models for the adoption of distance learning (Mishra et al., 2020) or lists of technologies implemented

(Elfirdoussi, et al., 2020; Hurajova et al., 2022; Buch et al., 2020). Few studies have analysed learning scenarios. For instance, Lee et al. (2022), following the activity theory model, discuss the "teaching systems" created by 14 teachers in terms of their artefacts (e.g., handbook, video lectures, communication tools), objects (course delivery models), subject (online teachers), rules (fully online delivery), community (teachers) and division of labour.

The present paper analyses teaching and learning experiences, strategies and lessons learned during lockdown. The results of this research may contribute to boosting the discussion of the effective adoption of digital technologies in face-to-face higher education. Given recent events, will face-to-face education continue to be only physical? Is there a new paradigm of hybrid education that uses both environments, depending on teaching and learning needs?

The main objectives that have guided this study are:

1. To explore the views of teaching experts and students of education regarding the intensive use of technologies.
2. To identify distance learning scenarios generated in the context of the department of Theories of Education and Social Pedagogy.
3. To describe the lessons learned regarding the use of digital technologies in face-to-face education.

2. Method

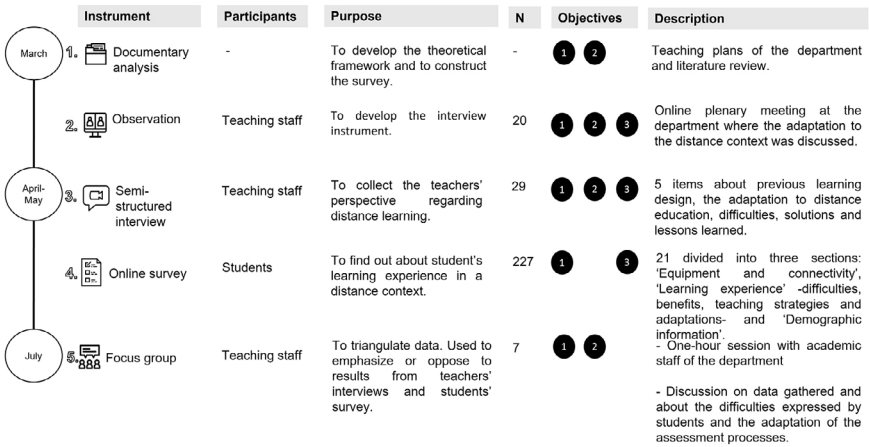
2.1. Method, setting and participants

Research followed the multiple-case study method (Yin, 2018). Participants were academic staff and students at the Faculty of Education at the UAB. During the spring semester of the academic year 2019-2020, the Faculty of Education had 31 teaching experts in the Theories of Education and Social Pedagogy Department (TESP), 866 undergraduate students studying 26 courses (Pedagogy, Social Education, Primary Education, Early Childhood Education) and 120 master's degree students (Educational Psychology, Research in Education, Teaching in Secondary Schools). The total sample obtained in the survey was 29 teachers, 218 undergraduate students and 9 master's degree students. 97% of the students were between 18 and 30 years old. The response ratio was 93.54% of teachers, 30.08% of undergraduate students and 8.62% of master's students.

2.2. Research instruments and data collection

Figure 1 summarises the instruments used for data collection (documentary analysis, observation, interview, survey and focus group discussion). The instruments used for the teachers' interviews, the student survey and the focus group discussion are accessible online (<https://ddd.uab.cat/pub/estudis/2020/231272/Appendix_Noguera_Valdivia_ERT.pdf>). The survey comprises 21 questions divided into three sections (equipment and connectivity, learning

Figure 1. Research instruments



Source: Own elaboration.

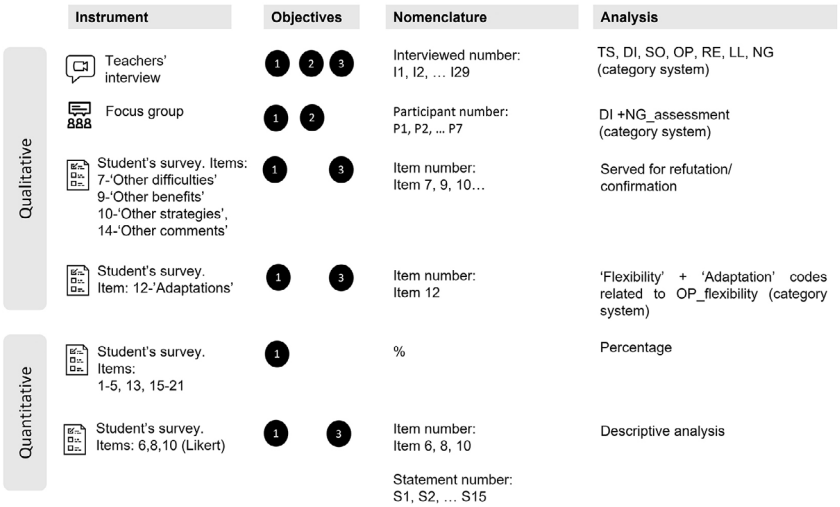
experience – difficulties, benefits, teaching strategies and adaptations – and demographic information). It includes closed-answer questions (e.g., *Yes/No*), open-answer questions (e.g., *What teaching adaptations do you value positively?*), multiple-choice questions (e.g., *What devices did you use: mobile, tablet, desktop computer, laptop?*), and Likert scale questions (e.g., labelled from 1 *strongly disagree* to 5 *strongly agree*). It should be noted that the validity of the student survey relies on previous research and instruments regarding distance education and e-learning, which were used to inform the section on learning experience with regard to instruction and social interaction (Faderogaya & Chantagul, 2019; Martin et al., 2020), benefits and challenges (Felea et al., 2018; García, 2017, 2019; Kattoua et al., 2016). Regarding reliability, all Chronbach's α coefficients for the Likert scales are between 0.7 and 0.8 (question 6 (difficulties)=0.768, question 8 (opportunities)=0.817, question 10 (strategies)=0.817) and can be considered acceptable for exploratory research (Charter, 2003).

2.3. Data analysis

The interviews, the focus group discussion and the open-answer responses to the survey were analysed qualitatively using Atlas.ti v8 software (institutional license). A thematic analysis was conducted to code and process the interviews. Six categories were created: teaching strategies (TS), difficulties (DI), solutions (SO), opportunities (OP), reflections (RE) and lessons learned (LL). Each category contained four to twelve codes. Nine non-grouped (NG) codes were transversal to the other categories.

Figure 2 summarises the process of qualitative and quantitative data analysis. Regarding the mandatory open-response question 12 (adaptations), a

Figure 2. Data analysis



Source: Own elaboration.

deductive process of categorisation (word ranking) was conducted, resulting in two categories: flexibility and adaptation. These categories were treated in relation to the "opportunities" category, "flexibility" subcategory from the category system. Quantitative responses were analysed using Jamovi open-source software version 2.0.0.0. Data from questions not based on Likert scales are presented as a percentage. A descriptive analysis was conducted for those questions based on Likert scales (questions 6, 8 and 10). Data from these questions are presented based on mean, standard deviation and coefficient of variation.

The validity of data analysis in this study relies on the process of triangulation (investigator, data source, techniques and perspectives) (Patton, 1999). Three researchers with different backgrounds and academic ranks participated in data analysis. The data source are the informants (teachers and students), scientific literature and institutional documentation. Several techniques were used: documentary analysis, observation, interviews, survey and focus group discussion. The phenomenon was studied from different perspectives (individual and group) and at different points during the academic year 2019-20.

The results obtained through responses to the survey are not sufficient to generalise and could not be representative of the entire population. Nevertheless, we consider that they throw light on the feelings of students and are useful when compared with the views of teachers. The findings presented below seek to describe the specific case of the teachers and students of the TEPD department who participated in the study.

3. Results

The results are presented with regard to the first two objectives of the study. The third objective served to structure the discussion.

3.1. Perceptions of teaching experts and education students in a context of intensive use of technologies (O1)

3.1.1. Teachers' perspective

In terms of teaching strategies, the actions undertaken refer to the creation of information resources (generating instructions or reducing information from the course materials), flexibility (time, submissions and grouping) and teaching coordination. Other comments mention the reduction of requirements or connecting the topic of the course with the reality of lockdown:

> I found myself having to simplify the PowerPoints, to focus on the essential information. It is necessary to leave in the ideas that are essential and take out what is accessory. There is a debugging of information. (I4)

The difficulties that teachers most experienced were related to work overload, technological problems (with videoconferencing tools and the Moodle platform), and the anxiety caused by the sudden transition to virtual teaching (the lack of online teaching knowledge and the lack of digital skills). Most comments refer to synchronous communication difficulties and the rise of e-mails and tutoring. To a lesser extent, other aspects mentioned are improvisation, uncertainty, difficulties in identifying students using Microsoft Teams, students' lack of self-management skills, and the non-existence of guidance from coordination teams:

> Working hours are lost. Tutoring schedules no longer exist. The meetings per group have increased. Students are distressed and have lost autonomy. Also, being in lockdown seems like you have to be available all the time. (I28)

Regarding solutions, the most common was to explore various tools to meet pedagogical requirements and generate support among work colleagues. Some participants said they had undertaken training in tools and strategies and had also asked for help from colleagues and relatives. As for actions aimed at improving the students' experience, teachers used the chat tool to encourage student participation in videoconferencing sessions, and offered resources in different formats. Other solutions included providing more support to students, forcing students to participate, or offering written material.

In the interviews and focus group discussion, most teachers considered the new technological learning that was developed (particularly videoconferencing tools) to be an opportunity. A certain number also considered that the situation favoured flexibility (as both teachers and students were at home and could be more open to changes) and systematisation (as the distance mode required

more structure and order). Some teachers saw distance teaching as an opportunity to get to know the students more, to rethink the courses, or to increase class attendance and participation. Concerning future improvements, participants suggested reviewing the format of contents, offering more instructions, conducting videoconferencing sessions, or delimiting the use of communication channels. One of the recurring observations was about having more notice, in order to be able to adapt the course to the online mode:

> It is essential to better manage time, because they need the materials in advance. To do that properly, you need to have a long-term scenario and to be able to plan it. Having more time, I could organise it better and introduce more practical elements of analysis. I would reduce lectures and use synchronous time for knowledge exchange. Currently, sessions are more intended for solving problems than focusing on the learning process. (I18)

Even in the case of teachers with more limited digital skills or with little interest in technology, there was a predisposition to continue using the technologies once they returned to face-to-face teaching. As participants noted: "It is not as limiting as I thought" (I16) and "It must be complementary" (I15). In general, despite their initial reluctance and fears, teachers experienced fewer difficulties than expected and thought that some changes would last beyond the pandemic. Others, however, expressed their fears about the impact of technologies in teaching and the need for regulating privacy aspects.

3.1.2. Student perspectives

In terms of demographic composition, the majority of students (97%) were in the 18-30 age group and studied full time (80%). A large proportion of students considered themselves to be intermediate technology users (high-intermediate 56%, low-intermediate 24%). Most of the students who answered the survey were studying for degrees in pedagogy (29%), followed by early childhood education (21.6%), primary education (19.8%) and social education (19.8%). These differed in the sample studying for the double degree in early childhood and primary education, and for those studying for a master's degree.

In terms of equipment and connectivity, 59% of students reported having used a laptop to follow classes (40% used a mobile phone, 13% a desktop computer and 10% a tablet) and 92% used a Wi-Fi connection. 57% said they had experienced connectivity issues, 74% said they had a suitable physical environment for following classes, and 60% did not share a computer with others. The intensive use of videoconferences connected through Wi-Fi may explain the connectivity issues.

Tables 1, 2, 3 and 4 summarise the descriptive statistics (mean [M], standard deviation [SD] and coefficient of variation [CV]) of the questions based on Likert scales (1= *strongly disagree* to 5 = *strongly agree* for questions 6 and 8, and *Not useful at all* to *Extremely useful* for question 10) for difficulties, opportunities and teaching strategies experienced during the adaptation of classes to distance learning. Table 1 compares the M and SD for each element.

Table 1. Comparison of mean and standard deviation for elements concerning student perspectives on the difficulties, opportunities and strategies experienced

	N=227	
	M	**SD**
Difficulties scale (Question 6)	3.92	0.52
Opportunities scale (Question 8)	2.79	0.69
Strategies scale (Question 10)	3.05	0.59

Source: Own elaboration.

Table 2. Descriptive statistics for question 6, concerning students' perceptions of the difficulties experienced during distance learning

		N=227	
Statement	**M**	**SD**	**CV**
S1. Disorientation	4	1.02	0.26
S2. Work and family balance	3.68	1.23	0.33
S3. Time self-regulation	4.05	1.04	0.26
S4. Understanding new organisation	3.79	1.05	0.28
S5. Work overload	4.11	1.02	0.25
S6. Few motivating activities	4.08	0.95	0.23
S7. Lack of situated learning	3.73	0.98	0.26
S8. Digital skills	2.37	1.15	0.49
S9. Teachers' physical presence	4.02	0.96	0.24
S10. Fluidity in communication	4.18	0.87	0.21
S11. Classmates' physical presence	4.56	0.95	0.17
S12. Preference for face-to-face courses	4.54	0.76	0.17

Source: Own elaboration.

The difficulties element was rated highly (M=3.92) and fairly homogeneously (SD=0.52); the opportunities and strategies elements both have a mean close to 3 (2.79 and 3.05, respectively) and a standard deviation under 0.7 (0.69 and 0.59 respectively). It can be interpreted that the majority of students experienced a range of difficulties and were not very positive about the opportunities and strategies they experienced.

For question 6 (*Which aspects of distance learning have been particularly difficult*), the majority of students declared that they mostly experienced all the difficulties presented (Table 2). The mean for all statements (hereafter "s") is greater than 3.6 points, which indicates students considered that they experienced numerous difficulties during distance learning, particularly with reference to the lack of physical presence (s11) and communication (s12). Indeed, in the end, they affirmed that they preferred face-to-face courses (s10). The

only statement valued below 3 is digital skills (s8), which do not appear to be a disadvantage. The CV for all questions is below 0.3 (except for question 8, for which it is 0.5), indicating that responses are fairly homogeneous.

In the open answers, participants described a variety of difficulties (e.g., lack of teaching coordination, reorientation of academic practices, group work, reading-based teaching, lack of feedback, mental health, poor self-explanatory presentations, assessment, less active learning). Many participants considered that the classes were little adapted to their situation. In this regard, some of the teachers interviewed expressed the contrary, stating that they had to lower standards as "I cannot act as if nothing had happened" (I7) and "To get adapted to them" (I18).

Regarding the obstacles experienced by students, during the focus group, teachers speculated about the reasons why students may have made their complaints. These included the context of the global crisis, the situation of uncertainty and the lack of pedagogical adaptation to the virtual context.

For question 8 (*Which aspects of learning at a distance have been particularly beneficial?*), the mean for the majority of statements (e.g., self-paced learning, learning control, feeling supported by the teacher) is below 3 points, which reveals students found few opportunities with this mode of learning (Table 3). The statements regarding the possibility of continuing learning (s1), interaction with classmates (s6) and saving time in commuting (s2) obtained the highest rates, which indicates that they considered those elements to be the most beneficial. The CV is under 0.4 in all cases, which shows a homogeneous response for all questions. Regarding the open answers for question 8, students emphasised the concern and empathy of some teachers, videoconferencing sessions, having more time, not having an attendance list, the recording of lectures, and receiving information on the situation at the educational level.

Table 3. Descriptive statistics for question 8 concerning students' perceptions of the opportunities experienced in distance learning

		N=227	
Statement	**M**	**SD**	**CV**
S1. Continue learning	3.42	1.06	0.31
S2. Save time in commuting	3.02	1.34	0.44
S3. Self-paced learning	2.85	1.16	0.41
S4. Learning control	2.47	1.10	0.45
S5. Teaching support	2.52	1	0.40
S6. Interaction with classmates	3.35	1	0.30
S7. I feel motivated by technologies	2.41	0.97	0.40
S8. Time spent to learn to use tools	2.98	1.11	0.37
S9. Learning quality	2.16	0.99	0.46

Source: Own elaboration.

Regarding teaching strategies (question 10), participants mainly experienced lectures (e.g. videoconferences, recordings or presentations), tutoring through videoconference, resolution of problems (e.g. videoconference and e-mail), written material, forums and autonomous learning activities. Of the solutions, (*Which teaching strategies have been particularly useful?*), the best rated are those referring to tutoring through videoconference (s10), lectures via videoconference (s3) and lessons through video recordings (s1). In contrast, forum discussions (s8), PowerPoint resources (s2) and written material (s7) are the worst-rated (Table 4). The majority of statements scored under 3, which indicates students, in general, found the strategies implemented by teachers of little use. The CV is under 0.4, which demonstrates a high homogeneity of students' responses for all questions. In the open response question, participants considered strategies of co-evaluation, feedback of projects, and the use of Drive to share content to be useful.

For the open question about teaching adaptations (question 12), students most valued (with 94 responses) making courses more flexible (with reference to submissions, time, assessment, videoconferences, tutoring, syllabus, and assignments). They particularly appreciated adaptations in the form of vide-

Table 4. Descriptive statistics for question 10, concerning students' perceptions on the teaching strategies used in distance learning

Statement	N*	M	SD	CV
S1. Lecture through video recording	180	3.54	1.06	0.30
S2. Lecture with PowerPoint support	214	2.50	1.14	0.46
S3. Videoconference (lecture)	209	3.63	1.04	0.29
S4. Videoconference (resolving doubts)	208	3.57	1.04	0.29
S5. Videoconference with professional presenters	108	3.45	1.16	0.33
S6. Videoconference (learn to use software)	76	2.91	1.17	0.40
S7. Written material	194	2.53	0.93	0.37
S8. Forum discussion	188	2.43	1.04	0.43
S9. Autonomous learning activities	211	2.57	0.95	0.37
S10. Videoconference (tutoring)	212	3.77	0.95	0.25
S11. Phone calls (tutoring)	48	3.27	1.12	0.34
S12. Monitoring through WhatsApp	49	3.06	1.13	0.37
S13. Chat (solving doubts)	122	2.87	0.96	0.34
S14. E-mail (solving doubts)	221	2.84	0.97	0.34
S15. Monitoring through shared documents	133	3.29	1.09	0.33

* This question included the answer "not experienced". Respondents who selected this response have not been considered; hence, the N value varies for each statement. Calculations have been made taking into account the total of participants who experienced each strategy.

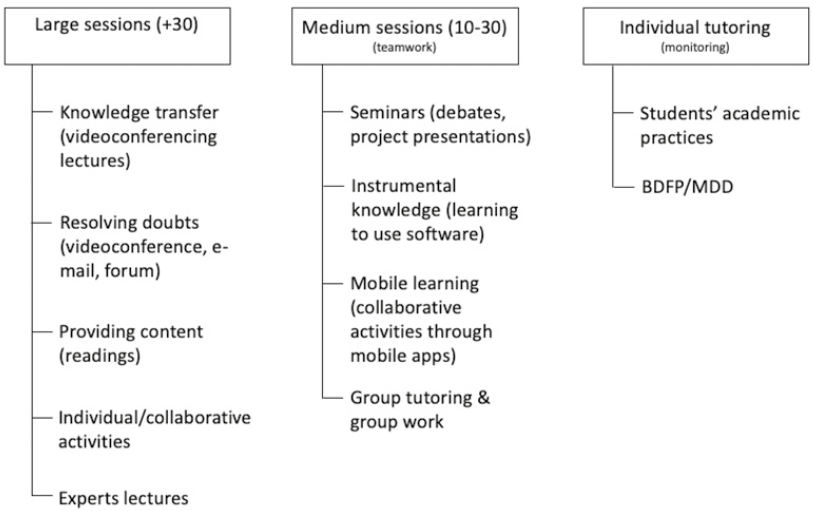
Source: Own elaboration.

oconferences (57 responses), lecture videos (37 responses), fluent communication (28 responses), evaluation (22 responses), and online tutoring (21 responses). Concerning the delivery teaching mode that they would prefer in the event of a new lockdown (question 13), 34% of students would prefer all classes to be face-to-face, while 31% would prefer each course to be blended. 21% would prefer some classes to be face-to-face and others to be remote. Only 14% favoured all classes being remote.

3.2. Collection of distance learning scenarios (O2)

Figure 3 shows a classification of the distance learning scenarios generated by teachers, based on the results of the interviews and the focus group discussion. A complete version of this analysis can be accessed at <https://ja.cat/BB9u9>. The classification is based on the teaching methods used, organised by group size: large (over 30 students), medium (10-30 students) and individual tutoring. In general, teaching was offered mainly synchronously by videoconferencing (with a combination of explanations and resolving problems) and supported by information resources (readings and audio-visual presentations) into the LMS (Learning Management System). Students carried out continuous individual and group activities. The assessment solutions included exam reviews, monitoring, assessment, feedback and use of evaluation instruments.

Figure 3. Distance learning scenarios



Source: Own elaboration.

4. Discussion, lessons learned and proposal

Educational technologies have been positioned as a frontline emergency service (Williamson et al., 2020). According to Crawford (2020), the sudden transition to distance learning was mainly based on providing explanations and content, while the reflection on online pedagogies took place after the end of the semester. Nevertheless, some changes derived from the techno-pedagogical adaptation will be maintained beyond the pandemic. Consequently, the first lesson learned is that the intensive appropriation of technologies has modified the teachers' perspective on their utility, and is making them rethink teaching. Perhaps the advances achieved during the pandemic will be a catalyst for the necessary development of digital skills among teachers (and students of education).

In common with Albó et al. (2020) and Almerich et al. (2016), our findings demonstrate that this crisis has diminished the reluctance of teachers to use technology, as they have been forced to learn, practice and use them with their students. Hence, the contextual factors have had a positive impact on ICT skills (including technological and pedagogical skills). In our study, faculty members demonstrated the benefits of using digital technologies, and a number of them consider that using time spent with large groups for giving lectures no longer makes sense. This is the second lesson learned. The majority of teachers expressed their intention to adapt their classroom approach by using digital technologies to promote the autonomous development of knowledge through resources and activities, and making use of synchronous face-to-face sessions for active learning and communication. This proposal for an adapted approach to the classroom fits in with the needs expressed by students who missed the physical presence of their classmates and suffered because of the difficulties for maintaining fluid communication. They also considered that learning activities were less meaningful and active. Hence, it seems that the digitalisation of education has made teachers and students reconsider pedagogical practices, and to envisage a more active learning.

Emergency remote teaching (ERT) has forced teachers to implement diverse solutions and strategies to continue teaching (e.g. creating information resources in several formats, increasing flexibility, coordinating with workmates, and exploring tools). Nevertheless, several teachers reported feeling distressed and insecure about their teaching. The third lesson learned is that new knowledge is needed to teach online, or in blended mode, as the strategies and knowledge that teachers have are not sufficient for such a new context. According to Crawford (2020), participating teachers and students expressed concerns about the quality of online teaching in terms of learning design and ethics. Different learning scenarios were generated; however, there is a practical aspect based on group dynamics and the loss of immediate feedback which teachers were not able to transform quickly into a digital context and which students missed.

The students participating in this study did not feel motivated by the use of technologies at the educational level. The fourth lesson learned is that stu-

dents still preferred replicating traditional modes of teaching, whether they used technologies or not. They appreciated content-based learning in an audio-visual format supported by teaching explanations and the individualisation of learning. One of the interpretations of the double-side preferences expressed by students may be that they want to learn better (through active and meaningful learning) but work less (through lecture/content-based learning), which can be associated to the characteristics of the Y and Z generations.

Considering the results discussed above, the objectives of this research have been achieved. The views of teaching experts and students of education have been analysed and discussed, reaching a general view of the experiences of the main actors. Despite the critical view of students, it is beyond doubt that teachers made great efforts to adapt to distance education and find teaching solutions. According to Murphy (2020), ERT cannot be normalised. The results of our study, in accordance with previous research (la Velle et al., 2020), demonstrate that teachers reacted quickly to permit students to continue learning, although their teaching practices were quite traditional and less innovative and active than usual. Now is the time for reflection, to emulate good practices and learn from mistakes in order to improve the effective use of technologies in face-to-face education.

5. Conclusions, limitations and future research

First, there is a unique opportunity for institutions to train their teachers, as they are currently sympathetic to the benefits of digital technologies and the need for a shift in teaching methods. Second, course redesign must remove the distinction between face-to-face and online learning. Undoubtably, the future will be hybrid. Face-to-face universities must design their courses with the benefits of the two worlds and ensure that new designs will resist intermittent and interchangeable delivery modes derived from future crises. Third, education has changed forever. Even those education students who are reluctant to use innovative teaching methods and technologies will need to be more competent in digital technologies for teaching and creative problem-solving. Future educators need to have these skills transversally and continuously incorporated into their education programmes.

From a research point of view, further research should be conducted with a larger sample of students and teachers from diverse disciplines. The major implications of this study for researchers are, first, to reconsider the distinction between face-to-face and distance learning and investigate the teaching modes that are arising, such as ERT and intermittent face-to-face teaching, and their implications for education. Second, to embark on a new line of research into the new training needs of teachers. The constraints and contexts we have known have been dramatically changed, and a new uncertain future is coming. We need to be prepared from the academic and research world to cope with the new and immediate demands society will demand of us.

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