



Challenges and opportunities for equity in education

Main barriers to accessing and using Ceibal tools for children and adolescents in Uruguay



Executive summary





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Ceibal

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Digital Bridges for Educational Equity stands for "Puentes digitales para la equidad educativa", an initiative of Ceibal and UNICEF that aims to develop digital solutions and generate conditions for an inclusive and quality education in Uruguay and the region.

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Foreword

The success of the Plan Ceibal in Uruguay shows the potential of public policies to reduce the digital divide among children and adolescents, boost the quality of learning and promote educational continuity.

During the COVID-19 pandemic, its coverage enabled the education system to implement flexible distance and blended learning systems, adaptable to different contexts. In 2020, 88 per cent of students had access to its virtual learning platform, which ranked fifth for website traffic nationally. However, there were marked differences in student participation during this period, with some gaps widening and others emerging.

This experience prompted an alliance between Ceibal and the United Nations Children's Fund (UNICEF Uruguay) aimed at discovering and reducing the main barriers to using the Ceibal ecosystem by all students, focusing on the most

vulnerable population. This alliance resulted in the Digital Bridges for Educational Equity project and this publication plays a fundamental part in the process of finding solutions.

It aims to provide an overview of the current situation regarding technologies for education and to contribute to evidence-based decision-making and the development of new strategies, promoting better responses to post-pandemic challenges in terms of equity.

Ceibal has undoubtedly achieved outstanding results as an instrument of innovation, making it an international benchmark in educational policies for digital inclusion. The lessons learned set out in this report are intended as a tool for Ceibal and UNICEF Uruguay to inform the design and continuous improvement of innovative and inclusive policies in the country and throughout the region.

Introduction

This document summarizes the main findings of the diagnostic study conducted by UNICEF Uruguay and Ceibal to identify the main barriers hindering access to and use of Ceibal's digital resources, with a particular focus on the most vulnerable children and adolescents. The objectives of the study were to:

- Describe student and teacher participation profiles in Ceibal's digital resources.
- Quantify, characterize and locate those with limited or zero participation.
- Identify the main barriers affecting student access to and participation in Ceibal's digital resources.
- Suggest strategies to improve participation in Ceibal's digital resources for the most vulnerable and to enhance Ceibal's contribution to learning.
- Analysis of secondary quantitative data, based on data from the platforms, information on educational paths, data on equipment and connectivity, evaluations and household surveys.
- Production of primary information, based on surveys and interviews with school-based actors (students, teachers, headteachers and families) and leaders in the education system.
- Analysis of the CREA platform, interfaces and functionalities; use by students and teachers; and user surveys.

The results of the study informed the design of new intervention strategies as part of the Digital Bridges for Educational Equity project, promoted by Ceibal and UNICEF. This project seeks to promote the development of digital solutions and create conditions for inclusive and high-quality education.

The methodology used was based on four components:

- Documentary and bibliographic review, including rules and regulations, Ceibal studies and reports, and documents based on national and international studies.

Through fieldwork, we sought to gather the voices of school-based actors (headteachers, teachers, students and their families) and other actors in the education system (inspectors and supervisors, officials from the National Administration of Public Education (ANEP), Ceibal technical and pedagogical experts). Two data collection strategies were used to develop the quantitative approach: self-assisted surveys (face-to-face) and telephone surveys. The qualitative approach was carried out through (synchronous virtual) interviews. The reference period analysed is 2021, which combined one semester of distance learning with one semester of face-to-face study. The fieldwork was carried out between April and May 2022, in a sample of public educational establishments in the primary and lower secondary subsystems. We conducted approximately 3,000 surveys, 55 interviews with school-based actors and 10 semi-structured interviews with qualified informants (school inspectors, ANEP officials and Ceibal technical and pedagogical experts).

The profile of educational exclusion in Uruguay

Analysis of the main educational indicators provides an obvious framework of interpretation with which to understand the scope of student participation in the digital resources offered by Ceibal, since these form part of an education system with strong dynamics and structural inertia that preceded and survive the pandemic.

The Uruguayan education system is characterized by high levels of school attendance in primary and secondary education: the latest available data show that, in 2019, 89 per cent of children aged 3–5 years, 99 per cent of children aged 6–11 years, 98 per cent of adolescents aged 12–14 years and 89 per cent of adolescents aged 15–17 years were enrolled in the education system. Learning outcomes are also well positioned in the regional context, according to student performance in international evaluations. In addition, in the years prior to the pandemic, the country showed an upward trend in school attendance at the primary and lower secondary levels, and a reduction in inequality gaps due to sex, income and area (rural/urban).

However, these positive results coexist alongside other indicators that raise a number of alarms: high levels of failure and over-age students, along with low completion rates in upper secondary education. In 2019, only 42 in every 100 young people aged 20–23 years had completed upper secondary education, one of the lowest percentages in Latin America. Given the historical levels of universal access to primary education in the country, these data show that more than half of students drop out at some point between finishing primary school and the end of upper secondary education.

On the other hand, data from the Ceibal platforms and the fieldwork give us an idea of the phenomenon of

educational disengagement during the pandemic¹.

The data obtained from the use of the CREA platform show that, in 2021, around 49,000 students did not access the platform during the first semester, when remote learning was the prevalent mode. If we add the 133,000 students who connected to the platform less than once a week, it seems that more than 180,000 students were either totally or partially disengaged from the educational offer provided via the CREA platform. In relative terms, this represents one-third of primary and secondary school students enrolled in public schools (33 per cent) and was most prevalent in the initial years of primary and upper secondary education. This percentage does not include children and adolescents who were out of school in 2021.

In 2021, around 49,000 students did not access the platform during the first semester.

The fieldwork made it possible to dig deeper into the situations in which students lost contact with schools during the remote teaching period in 2021. In the case of primary education, 7.2 per cent of the family members surveyed stated that their children had stopped following classes for more than two consecutive weeks. In secondary education, the situation was much worse: 53 per cent of students reported having stopped connecting or attending

¹ In the context of remote learning, disengagement is understood as students failing to maintain the required frequency of communication with the educational establishment in order to have at least partial contact with the teaching projects. This concept responds to the need to identify situations of educational exclusion in the complex framework of distance learning.

classes for more than two consecutive weeks while face-to-face attendance was suspended. Twenty-eight per cent (around half of these disengaged students) said they had stopped attending classes for a few weeks, while 9 per cent had not attended for around a month and 16 per cent had been disengaged for more than a month.

Some variations can be seen in the incidence of situations of prolonged disengagement. These variations relate to the profile of the students, their homes and the schools they attend. For example, not having a computer or tablet at home, feeling little affinity with the school, having to repeat a grade, being over-age, the sociocultural context of the school or their parents' educational level were all associated to a greater extent with situations of prolonged disengagement.

When applied exclusively to the school population, the surveys portray only situations of temporary withdrawal from school during 2021. Even so, it is noteworthy that among the secondary students who stated they had been disengaged from classes and assignments for more than a month, four in ten said they had only been able to partially resume classes. In many cases, re-affiliation with the educational establishment is therefore fragile and there is a risk of disengagement.

When asked about the causes of their disengagement, lower secondary students gave the following as the main reasons: "I wasn't interested in the classes" (51 per cent) and "I didn't understand the assignments I had to do" (42 per cent). The gap between student and teacher perceptions of this issue is striking. Teachers indicated that student disengagement was mainly due to a lack of computer, Internet connection, quiet space or digital skills.

Profile of access to and use of Ceibal's digital resources

Analysis of platform data regarding access to and use of Ceibal's digital resources demonstrates the following:

1. CREA was the most-used platform

CREA was the main means of accessing the teaching projects set by the teachers. While other platforms were used to supplement CREA, there are no cases of other Ceibal platforms being used independently of CREA. Some aspects of the use of each resource are summarized below:

- **CREA:** Ninety-three per cent of primary and secondary school students logged on to CREA at least once during 2021. Those who used the platform logged on an average of seven days a month between March and December.
- **Matific:** During 2021, just over half of primary students logged on to Matific at least once. Two in three students in grades four to six accessed the platform. The frequency of use was relatively low: on average, students logged on four times during the year.
- **PAM:** Relatively little use was made of PAM. Although it was used by 30 per cent of students in primary grades four to six and in lower secondary school, the frequency of access was very low: most only accessed PAM one or two days during the year.
- **National Library:** The data show a low frequency of access and use relative to other platforms. Nearly three in four students never logged on to the platform in 2021.

2. There was significant variability in the level of CREA use

Analysis of the frequency of weekly access to CREA shows that about half of students logged on to the platform between

March and June 2021, with an average access rate of two or more days per week.

This percentage is close to 60 per cent in primary grades four to six and in lower

secondary school but drops to 32 per cent in the first years of primary school. This decline is to be expected given that children at this stage are still acquiring basic literacy skills.

In fact, more than 40 per cent of students in primary grades four to six and in lower secondary school connected more than three days per week, while 26 per cent connected less than one day per week on average and 7 per cent never connected at all. Interestingly, the differences within schools were greater than differences between them, i.e. inequalities were expressed more intensely within institutions than as differences between them. This raises the question as to why the opportunities to access CREA were so dissimilar among students in the same school.

Ninety-three per cent of primary and secondary school students logged on to CREA at least once during 2021.

Inequalities were expressed more intensely within institutions than as differences between them.

3. Teacher use appears to set the pace for student use

The information on teacher access to CREA by educational level shows very similar behaviour

Teachers' use of CREA can therefore be considered one of the main factors in explaining the differences in student use.

over time to that analysed for students: access was more concentrated in the first months of the academic year and experienced a sustained downward trend in the second semester. In general, teacher use was higher than student use in

both percentage and frequency of access, which is to be expected. Interestingly, this difference is not very marked (between one and two days per fortnight on average) and student and teacher use assumes a similar profile over time. Teachers' use of CREA can therefore be considered one of the main factors in explaining the differences in student use.

4. Most of the students disengaged from CREA were concentrated in a small number of schools

An investigation was conducted to determine where the greatest number of students who did not use CREA was concentrated, with a view to establishing targeting criteria with which to guide policy. The results indicate that the students who were disengaged from CREA were not concentrated in schools with low access or in vulnerable contexts. Rather, they were in institutions where the average CREA access had been medium or high: at least twice a week. The characteristic most strongly associated with the greatest number of students disengaged from CREA was the size of the school; no other variable carries as much weight, and this reinforces the diagnosis of inequalities within institutions.

5. CREA use fell steadily as face-to-face learning returned and gaps widened

CREA use in the second semester of 2021 was marked by a progressive decline in usage in two ways: i) each month the percentage of students who stopped using the platform increased; and, ii) for those who continued to use it, the frequency of use was much lower. The data show that those who used CREA with medium and low intensity during the first semester stopped using the platform earlier, while those who had used it more managed to maintain high average use during the second semester.

It is important to highlight that, during the second semester, not using CREA was not associated with exclusion from the educational community but rather use of the platform provided a support tool or complement to the teaching projects developed in the classroom. In this sense, it seems that use in the second semester was mainly associated with teachers' decisions to continue using the platform, a decision that seems to have been made more frequently in schools with a higher sociocultural level. This indicates that teaching practices could be deepening the contextual inequalities associated with platform access and use.

6. During the second semester, in primary schools, CREA helped support educational continuity for students who did not attend face-to-face classes

The data indicate that the CREA platform allowed continuity of learning for a group of children who had difficulties in sustaining face-to-face attendance in the second semester of the year. Around one-third of students in grades one to three with high levels of absence and some three-quarters in grades four, five and six accessed the platform regularly.

The students who benefited from this strategy were vulnerable for different reasons, so its effect would have been compensatory.

The use in the second semester was mainly associated with teachers' decisions to continue using the platform, a decision that seems to have been made more frequently in schools with a higher sociocultural level.

Non-attendance was strongly associated with being over-age (the more over-age the students were, the more classes they missed) and sociocultural context (schools with a lower context also tended to have lower levels of attendance). Schools with higher-than-average numbers of over-age students

also had high levels of non-attendance.

Unfortunately, only primary attendance data are available and the findings cannot necessarily be extrapolated to secondary education.

The relationship between CREA use and average attendance in the second semester is a question that still needs to be answered.

On the other hand, analysis also allows us to identify some variables associated with different levels of CREA use.

a. Variables associated with teacher use of CREA

CREA platform allowed continuity of learning for a group of children who had difficulties in sustaining face-to-face attendance.

Teachers older than 55 years tended to use CREA less intensively than younger teachers. Frequency of access was higher among younger teachers, although they tended to perform fewer actions per month,

which implies a less intensive use of the platform. Younger teachers also stood out from the rest as they had the highest frequency of use of the "I like it" resource as a mark for some instances of student participation. Teachers at primary schools in more vulnerable contexts also showed a lower frequency and intensity of use, as did male teachers.

b) Variables associated with student use of CREA²

The factors most correlated with student use of CREA were:

- **Sociocultural context:** Students from schools in the poorest quintile were affected by a double exclusion: they accessed CREA less often and, those who did access the platform, used it less frequently. Of every 100 students who did not access or stopped using CREA, 61 attended schools in quintiles 1 and 2 (data only available for primary schools).
- **Use of CREA by teachers:** There was a close relationship between teacher use and student use of CREA. Use of the platform by teachers, not only in terms of frequency but particularly intensity, was a strong determinant of student use (data only available for primary schools).
- **Over-age status:** The data show profound differences associated with CREA access and use in students who were over-age. Each year of over-age was associated with a drop in the average number of days of use. For example, in lower secondary education, in April, 98 per cent of students of theoretical age accessed CREA, while

² Some characteristics can only be analysed for the primary level due to the lack of available information for secondary schools.

only 80 per cent of students with two years of over-age and 62 per cent of those with three or more years of over-age did so. This difference is apparent even when the data are checked for sociocultural context.

- **Area (urban/rural):** In rural areas, access to CREA was generally very low, both among students and teachers. For example, in April,

93 per cent of students in grades four to six in urban areas accessed CREA compared with only 80 per cent in rural schools. This 13-point difference increased to 22 points in June. There is a significant group of schools in rural areas whose average platform access was less than once a week, which was practically unheard of in urban areas (data only available for primary schools).

Barriers to full use of Ceibal's digital learning resources

This chapter aims to identify the main **barriers** to participation in Ceibal's digital resources. The discussion is structured around three groups of barriers:

- Barriers to the **digital environment** offered by CREA.
- Barriers related to **students' conditions** for accessing and using digital resources.
- Barriers related to **teachers' conditions** for offering good technological-pedagogical projects.

It is important to point out that, given its exploratory nature – as is appropriate to a pandemic context for which there is little research background – the purpose of this study is to provide an initial evaluation of each of the factors, identifying which are most relevant and what their main characteristics are. We therefore intend to give a general overview that will enable us to identify certain themes that can be further explored in future studies. The study does not seek to provide solutions to these specific barriers but rather to propose initial answers and avenues for reflection on these phenomena.

It is important to note that the order used to present barriers does not reflect a weighting of their importance; rather, all the barriers help to explain the phenomenon analysed. In order to present the different barriers, the findings in the literature are combined with results from the field work.

Barriers to the digital learning environment offered by the CREA platform

The results of the evaluation of the digital environment offered by CREA are generally very

satisfactory. The pedagogical potential of the CREA platform is clear, as it contains a suite of valuable tools for content creation and management, communication and evaluation. These attributes give CREA the potential to function as a virtual learning environment (VLE).

However, there are some barriers in relation to the digital environment. The following is a summary of the main findings related to the two main barriers analysed with respect to the digital environment: i) the variability of user experience according to teacher use; and ii) accessibility difficulties.

Browsing experiences varied greatly, as they depended on the way in which teachers organized their courses

There were broad differences in the styles used by teachers to organize course content. Folder organization was time-consuming for teachers and not everyone used them in the same way. The interviews indicate that not all students accessed the content in CREA in a sequenced, orderly and clear fashion, and that the organizational criteria varied greatly from area to area.

It's a bit confusing, there are lots of folders and lots of links within the folders, which confuses the children, you have to be there watching over them. I got by with one folder for materials, and another for videos.
(Primary school teacher)

Each teacher arranged them as they saw best, I ordered them by week.
(Primary school teacher)

The results of the student survey provide food for thought as to the differences in the CREA user experience for primary and lower secondary school

students: while 84 per cent of primary school students state that it was easy for them to find the necessary steps to complete their tasks, this proportion drops to 55 per cent for lower secondary students. These data raise questions about the extent to which the CREA browsing experience was comfortable and intuitive for lower secondary school students, especially considering that while primary school students' activity was centred on a single course, lower secondary students had a CREA course for each subject. Moreover, the content was organized differently within each course, depending on each teacher's style and projects.

Sosa and Ambrosi's (2021) study on the role of the teacher in the COVID-19 context also identified the need to find ways to organize educational platform content so that families can understand and monitor the education process. The study also identified the need to investigate ways to make the organization of the virtual classroom more user-friendly.

It would be beneficial if the design, development and delivery of courses followed the same guidelines for each educational level, to ensure coherence and consistency between areas or disciplines, without limiting the potential for personalization and innovation of the spaces created by teachers.

Limitations to accessibility for students with disabilities

A generic analysis of the platform's web accessibility and its content was conducted from the perspective of the teacher and the student as platform users and content creators, i.e. from the point of view of platform usability, which is the focus of this research. This analysis was based on the

parameters established in the international Web Content Accessibility Guidelines (WCAG) 2.1 but no technical analysis was performed using advanced tools that would review the platform code and report accessibility issues.

The platform includes some functionalities that facilitate access for different types of users and comply with the WCAG guidelines. For example, it is possible to choose a menu option in CREA using only the keyboard, which is relevant for ensuring platform access for users who are blind or have low vision, according to the principle of operability reflected in the WCAG 2.1 standards. It is also possible to insert descriptions of images and share content in multiple formats to facilitate equal access among the greatest number of users, which is also in line with the standards noted above.

However, there are some limitations; **for example, it is not possible to add subtitles to videos uploaded to CREA.** It is also **not possible to change the colour of the section titles** (green), which does not guarantee a high contrast, nor to change the font size or typeface. It is, however, possible to format the titles or headings of content pages, which ensures the correct structuring of the information. It can also be seen that, **when zooming in, it is not possible to automatically adjust** the content to the screen (responsiveness), which does not comply with the guidelines set out in point 1.4 of the WCAG 2.1 standards.

These last two limitations could be addressed by a recent feature added to the CREA platform, which appears to have potential but needs to be properly explored and tested: the Immersive Reader tool for HTML content pages (page, task text). This tool "uses proven techniques to improve reading for people, regardless of age or ability" (Microsoft,

2022). It allows you to change the colour theme to a high contrast, identify elements of a sentence in the text, use the picture dictionary and translate the text into another language.

Using the resources available in CREA to promote accessibility for students with disabilities (e.g. uploading resources with transcriptions and audio descriptions, using resources that can be read by screen reading software) requires knowledge and dedication on the part of teachers. This is crucial to improving the usability and accessibility of the platform.

Barriers related to students' conditions for accessing and using digital resources

This section presents the barriers detected concerning the minimum conditions that students need in order to be able to fully access and use digital resources. These are grouped into two main conditions: **technical conditions**, such as equipment and connectivity, and **personal and family conditions**, such as digital skills, the ability to solve tasks autonomously, family support and motivation.

Limitations in the technical conditions for accessing digital resources

The interviews and background analysis tell us a lot about the extent of the effort made by the education system to provide each student with access to an educational proposal during the suspension of face-to-face attendance caused by the pandemic. In addition to the 1:1 delivery of devices (one per child) at various points during their education (which has taken place since 2007), Ceibal provides numerous ways to access its free technical service

for equipment maintenance and repair.³ It also provides schools with a stock of devices to be used as a library. In many cases, these were made available to students during the pandemic, both in the schools themselves (which were open during working hours) and loaned to students who did not have a device for whatever reason.⁴

Despite these strategies, interviews with students, teachers and families reveal numerous cases in which students did not have Ceibal devices in working condition. Fourteen per cent of families in the first grades of primary school stated that they did not have a computer, notebook or tablet to monitor the assignments set. On average, 23 per cent of students claimed not to have a computer or tablet available for homework. Meanwhile, 22 per cent of primary school teachers and 25 per cent of secondary school teachers stated that very few of their students had a computer, mobile phone or tablet on which they could do their assignments whenever they wanted.

Although receiving equipment from Ceibal is mentioned in all cases, this equipment was often not used because it was in poor condition. The main difficulties reported were hardware related: breakage, for which they did not take the devices to be repaired; theft, for which they did not file a report and follow the relevant procedure to request a replacement; and lack of spare parts,

3 Ceibal has repair centres located throughout the country. Users take their machines to be repaired and receive a notification once it has been fixed and is ready to collect. It also has a technical service that regularly visits educational establishments to repair equipment. It is also possible to mail the equipment to Ceibal. In this case, once the device has been repaired, it is returned via the same mail delivery company by which it was received.

4 Materials were also produced in paper format for students who were unable to access the digital projects.

which delays the repair of the equipment. Repeated breakage of equipment and loss or breakage of the charger were mentioned fairly frequently by the interviewees. It is important to note that, in several situations, families were not clear what to do in the event of loss or breakage of the charger.

In many cases, children do not have a computer. Basically, computers have been delivered, they have been repaired, but they have broken again or have broken beyond repair. For example, this year, out of 26 children, there are only 5 working computers, so this complicates matters. There are some computers in the school that have come from Ceibal but now, for example, they don't work, or they don't have a charger, or they are blocked, or something, I don't know.

(Primary school teacher)

Tablets, in particular, are the device most frequently noted as being problematic by secondary school students and teachers. They were described as cumbersome, slow, weak to pick up Internet signal and very fragile.

Connectivity issues were mentioned less often than equipment difficulties. However, a lack of data with which to connect was often cited as a barrier to participating via the platforms.

Although CREA browsing does not consume data, a minimum amount of data is required to log on. In addition, if teachers post links to external resources in CREA, such as to YouTube videos, students need and consume data to view them.

Using WiFi in the vicinity of schools, having educational establishments open during working hours and using technology centres were among the many strategies mentioned by the interviewees

to overcome these difficulties. However, not all students and teachers were able to make use of these strategies during the suspension of face-to-face classes.

Barriers related to students' conditions for remote and hybrid working using technology

To analyse the conditions of students with respect to remote and hybrid working using technology, three dimensions are proposed. These focus on: i) the **fundamental skills for managing in digital environments**, which are linked to students' literacy and basic digital competences; ii) **family support**, related to the knowledge available in the student's environment and the availability of adults to support by helping students at the primary and lower secondary school levels; and iii) **motivation**, a dimension which includes two sub-dimensions – motivation associated with the school in general, i.e. students' conformity and affinity with the educational establishment; and motivation for learning with technology. It is these aspects that will be used to assess students' interest in educational projects and their expectations in the post-pandemic context with regard to continuing the use of digital resources.

A lack of data with which to connect was often cited as a barrier to participating via the platforms.

In relation to the fundamental skills needed to cope in digital environments, the evidence indicates that some students have certain difficulties associated with reading comprehension and reading on screen that could be affecting their experience of using the platforms. According to the Aristas 2020 assessment, 18 per cent of sixth grade students are in the two lowest performance levels for reading, and this

percentage rises to 32 per cent in schools in the least favorable socioeconomic contexts.

Some limitations were also observed in students' digital competences. According to the 2018 edition of the International Computer and Information Literacy Study (International Association for the Evaluation of Educational Achievement – IEA, 2020), in Uruguay, 33 per cent of secondary school students assessed were below level 1 in computer and information literacy. This means that, at the time, these students did not have a working knowledge of computers as tools and were unlikely to be capable of creating digital information products without support and guidance. The study also shows a wide disparity in the results, indicating that the lack of digital skills is much more pronounced in some sectors of the population.

According to the student survey conducted as part of this study, 24.8 per cent of primary school students and 28.4 per cent of secondary school students indicated that they find it more difficult to understand when using the computer for school activities. This situation may be partly caused by a lack of digital skills but it could also be related to a lack of reading skills since students who do not read very well and those who do not enjoy reading were more likely to state that learning using Ceibal platforms made it more difficult for them to understand. In the words of one student:

CREA is useful for some things but really for students who study. When you get assignments, papers and so on, it is easier to listen to a teacher telling you, they can tell you everything, and in the end you understand. But with CREA, you have to read it and sometimes you don't understand.

(Secondary school student)

In terms of students' motivation, they were asked **whether or not they liked their school**. The responses were very different between primary and lower secondary students. Two in 10 primary school students and 4 in 10 lower secondary school students said they were dissatisfied with their school. Differences were also observed between secondary school and technical school students, the latter being the most critical. One quote from the interviews illustrates this complex situation:

[On returning to face-to-face classes] I was typical, I wanted to go back to school, I don't know why, to see my friends, you know. But, as time went by, for example, as the year was coming to an end, I wanted to leave, I don't know, I just wanted to leave. But, yes, I liked it much better like that [face-to-face] than via Zoom.

(High school student)

24.8 per cent of primary school students and 28.4 per cent of secondary school students indicated that they find it more difficult to understand when using the computer for school activities.

We looked at different variables that could help define the level of student satisfaction with their school. In this sense, the level of satisfaction was lower for schools in Montevideo than for schools in other parts of the country. It was also lower in schools with lower levels of promotion through the grades and among students who have to repeat the school year.

The surveys revealed some striking data **regarding students' liking and motivation for learning with technology**. On the one hand, learning using the computer was assessed very positively: close to 80 per cent of students at all levels stated that they

learned more and found it more fun to learn using a computer. On the other hand, around one in five children did not feel this way, and this is a warning that should be taken into account.

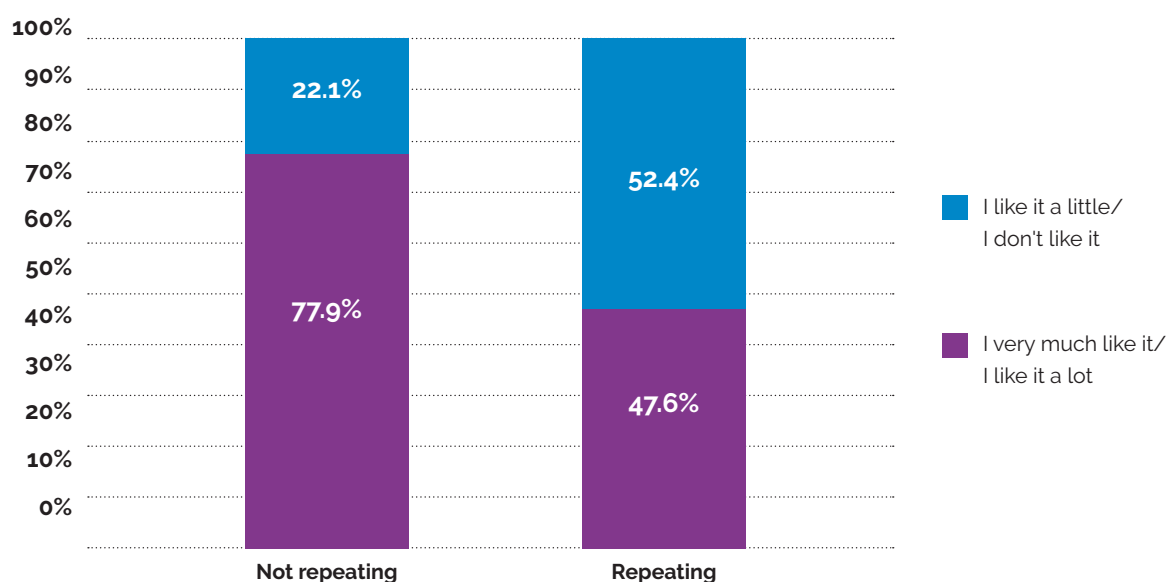
As the focus of the question shifted from liking learning with technology in general to **the specific activities they did on the platforms** in 2021, the level of satisfaction indicated by the students appears to drop. Students provided somewhat troubling assessments of the activities conducted on the platforms during the pandemic, especially at the lower secondary level. Fewer than half of lower secondary school students and around two-thirds of primary school students stated that they found what the teachers were offering them interesting. In several cases, students seem to have felt that what they were being asked to do was complicated and that they did not learn by doing the activities.

When shifting the focus of the question specifically to **how much they liked using CREA**, satisfaction levels were strikingly low, especially at the lower secondary stage. While 80 per cent of primary school students said they liked using CREA, this dropped to 31 per cent among lower secondary students.

Several variables that help define how much students liked using CREA were explored. The results indicate that the opportunities for using CREA seemed to have a strong impact on students' appreciation of the platform: a higher frequency of CREA usage was related to a greater liking of the platform.

Likewise, at the lower secondary level, a liking for using CREA was lower among those who suffered from a lack of availability of devices, although this was not a decisive aspect. These data reinforce

Figure 1. Percentage of lower secondary school students according to whether they liked using CREA and whether they were repeating a grade



Source: Prepared by the authors based on responses to surveys on student use of CREA.

the hypothesis that more and better opportunities to use CREA could substantially improve students' assessment of this platform.

The data also indicate that a liking for using CREA was much lower among students who were repeating grades. The differences in their assessment are very broad and warrant a more in-depth investigation to shed light on the adequacy of the proposals made by teachers via the CREA platform in relation to the learning needs of students with greater academic difficulties.

Lastly, it is also relevant that the use of other educational platforms does not seem to compete with the liking for using CREA. The lower secondary school students who most used other platforms were also those who most liked using CREA.

On the other hand, student surveys show that one in every three primary school students and two in every three lower secondary school students are not interested in continuing virtual learning environments combined with face-to-face classes once the pandemic situation has returned to normal.

Barriers related to teachers' conditions for producing good technological-pedagogical projects

This section presents a set of barriers related to the role of teachers and outlines their impact on the planning and design of powerful technological-pedagogical projects. It also addresses barriers associated with institutional support for the use of Ceibal resources.

Barriers related to the role of teachers

This section explores a series of barriers related to the **role of teachers**, who are key players in

the process of integrating digital resources to enhance learning.

Four sets of barriers are noteworthy. First, barriers related to teachers' digital skills, involving situations centred on **poor digital competence** and a superficial knowledge of Ceibal resources and their applications. Second, **barriers related to pedagogical competence**, in which **inefficient strategies for teaching in diversity** and a tendency to **develop outdated practices can be detected**. Barriers centred on **teachers' technological-pedagogical competence** occupy the third place and include situations related to difficulties in the informative, practical, communicative, tutorial and evaluative dimensions of technological-pedagogical practices. Finally, the report addresses a **motivational dimension** that refers to a dislike of teaching with technology on the part of teachers and lecturers.

Barriers related to teachers' digital competence

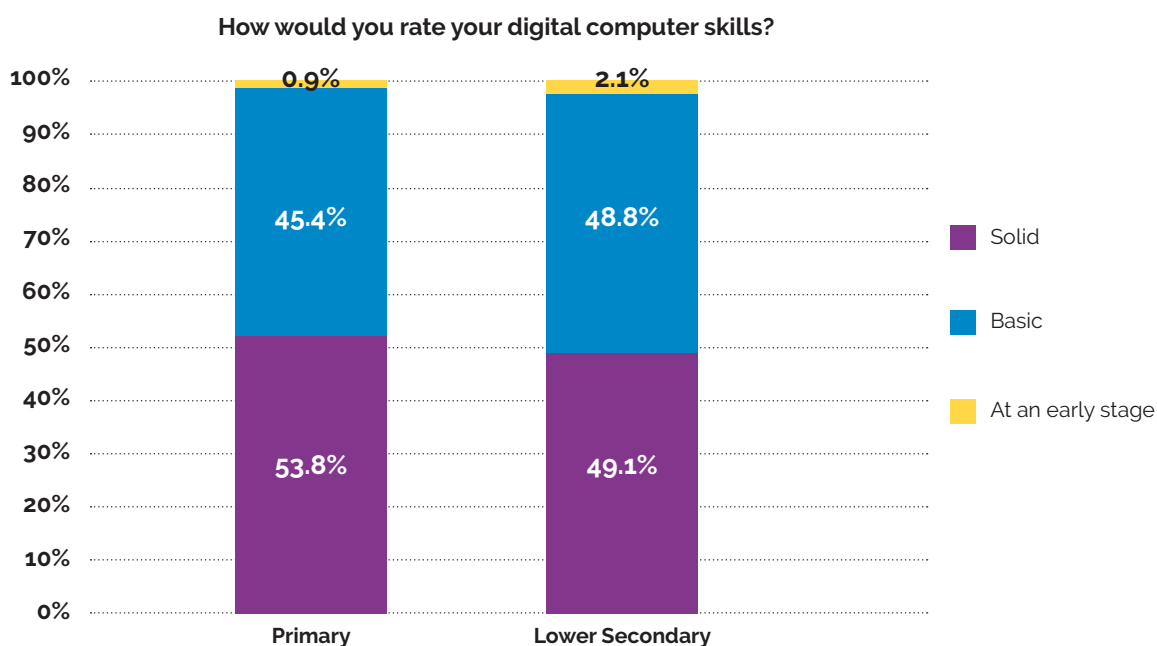
Despite the wide range of teacher training offered by Ceibal and ANEP, many teachers are at an **early stage of digital competence** and some either do not use technology to plan their classes at all or use it sparingly.

I've been learning, pressing different buttons, some of the kids even tell me, and I go, I press and sometimes it works, sometimes it doesn't.

(Lower secondary school teacher)

According to the surveys conducted, half of the teachers at the two levels studied consider their digital skills to be "basic" or, in fewer cases, "in the early stages". One in three teachers and four in ten lecturers furthermore stated that they did not feel prepared to work virtually.

Figure 2. Percentage of primary and lower secondary school teachers according to their self-perception of their digital skills



Source: Prepared by the authors based on responses to surveys on teacher use of CREA.

The crossover between the two variables would indicate that the strength of digital competence contributed greatly to teachers' perceptions of their readiness to work virtually. Among those who self-defined their digital skills as being at an early stage, none felt prepared to work virtually, nor did 56 per cent of those who said they had basic digital skills. In contrast, of those who felt they had strong digital skills, 29 per cent said they did not feel prepared to work virtually.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2018) proposes three successive stages or levels of teacher development in terms of the pedagogical use of information and communication technologies (ICT): **knowledge acquisition, knowledge deepening**

and knowledge creation. The evidence explored in the Uruguayan context seems to indicate that, as in most countries, a significant proportion of teachers are at the knowledge acquisition stage. To create relevant and powerful technological-pedagogical proposals and enter the knowledge deepening stage, these teachers would need to continue developing their digital skills.

In addition, the fieldwork shows that many teachers **have a very superficial knowledge of Ceibal's resources** and how to use them in a technological-pedagogical sense to enhance face-to-face, virtual and hybrid education.

When asked how easy or difficult it was for them to use different CREA functionalities, it was striking to

note the high percentage of teachers – especially those in lower secondary schools – who stated that they did not know how to use them or had never tried to use several of them. Teachers also stated that the main uses of Ceibal's virtual classrooms (they indicated that they use them “almost always”) were: reading texts (55 per cent), searching for information on the Internet (45 per cent), downloading documents with tasks to do outside the platform (45 per cent), writing texts or papers (45 per cent), answering questionnaires with questions to write (38 per cent) and solving exercises (36 per cent). On the other hand, the least frequent uses (“almost never”) corresponded to activities such as playing games (61 per cent), making their own videos or audios (57 per cent) and creating presentations (49 per cent).

These elements show that linear proposals are often being planned on the platforms that correspond to a closed repository format, one that does not invite students to inhabit the digital learning environments but instead asks them to carry out limited actions, such as identifying documents, downloading and uploading files, etc. This lack of ownership of the tools could result in the design of impersonalized virtual environments in which tasks are proposed in an isolated manner, folders are not organized by focus areas or objectives, single documents are placed inside the folders without any order or organizational criteria, tasks are usually all mandatory and there is no room for challenge in the completion of activities nor interaction among peers, for example.

Barriers related to teachers' pedagogical competence

As mentioned above, the country has high rates of attendance in lower secondary school but low rates of completion for this subsystem due to high levels

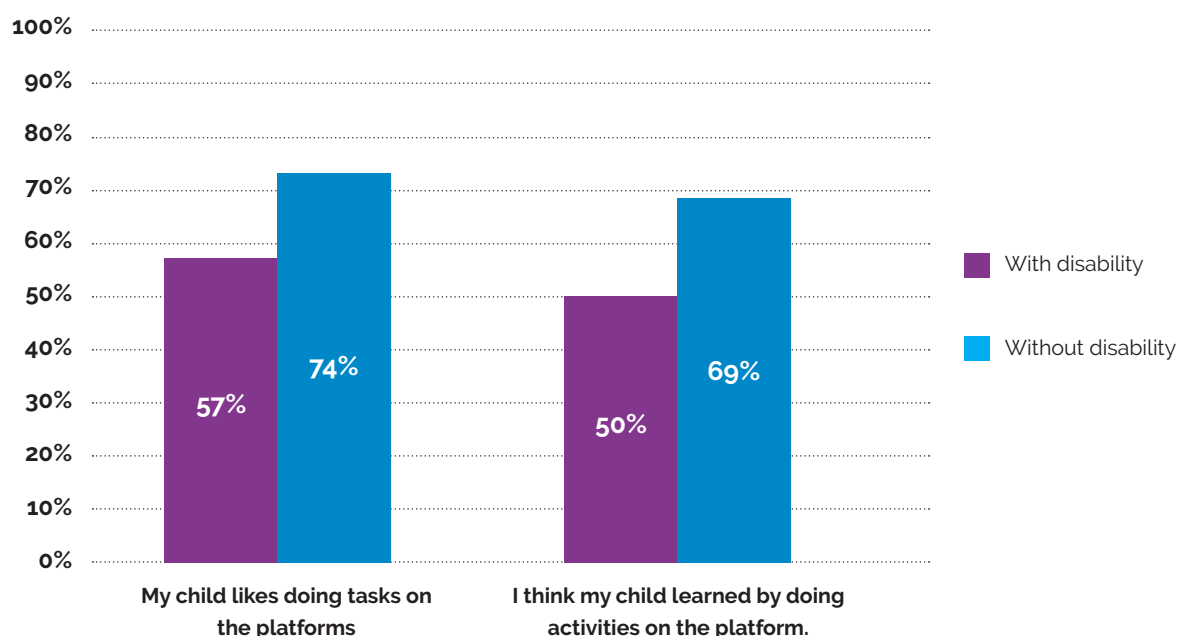
of grade repetition, over-age enrolment and school dropout rates. These results show, on the one hand, that the education system is not managing to offer all Uruguayan students an educational proposal that meets their needs and characteristics. On the other hand, the high levels of over-age enrolment and high dropout rates constitute a complex context for education, demonstrating the need for a strategic approach to teaching in diversity in terms of pedagogical competence.

The interviews provide evidence that teachers have some difficulties in designing and planning teaching proposals that involve strategies for working with students who differ from the “ideal student” and they are therefore failing to cater to a diverse range of students. According to teacher accounts, the strategies used during the suspension of face-to-face teaching were, in many cases, similar to those employed during face-to-face teaching. This barrier therefore preceded and survives the pandemic.

I adapted them as I do in the classroom: either there were fewer activities, or I lowered the level. Each teacher adapts according to the child, noting the difficulties and then taking the didactic tools that best suit the child so that they don't remain idle or get frustrated.
(Primary teacher)

The fieldwork also indicates that teachers seem unaware of how to **make their projects on the CREA platform accessible to students with disabilities**. According to the survey, more than 70 per cent of primary and lower secondary teachers said they did not know how to make their projects accessible to students with hearing, visual and motor disabilities, while 31 per cent of teachers and 41 per cent of lecturers did not know how to make them accessible to students with learning disabilities.

Figure 3. Adult caregivers of primary school students who stated that their children liked doing tasks on the platforms and who considered that they learned by doing the activities on the platforms, according to the child's disability



Note: The values in the graph should be considered indicative since the sampling error exceeds the thresholds defined for a reliable estimate ($p > 0.15$).

Source: Prepared by the authors based on responses to surveys on the use of CREA by family members of primary school students.

In turn, adult caregivers of students with disabilities showed a lower level of satisfaction with the projects on the CREA platform than adult caregivers of students without disabilities.

On the other hand, in the teachers' testimonies, a certain **failure to update the strategies for planning and designing a virtual classroom** could be seen. Thus, for example, there is little evidence of projects in which students are the protagonists of their own learning processes, where there are a number and range of tasks arranged in a challenging and interactive format, where the clarity of instructions

is guaranteed, and where multimodal resources are used to boost access and comprehension.

It was like a normal day of going to school, they would teach you things and we would put the dates, but the teacher would put it in a Drive document. It was a normal class but on the computer.
(Primary education student)

The results of surveys of middle-level students may shed light on these trends, even regardless of the incorporation of technology. When asked about

More than 70 per cent of primary and lower secondary teachers said they did not know how to make their projects accessible to students with hearing, visual and motor disabilities.

the classroom-based activities they carried out upon returning to the classroom, the most chosen options were those involving teaching projects centered on traditional paradigms; for example, a classroom dynamic in which the teacher writes on the blackboard and students copy into their notebooks (92 per cent) or in which the main activity is to solve problems (93 per cent) or do exercises (90 per cent), when these tasks do not necessarily involve processes of inquiry and deep understanding. Eighty-one per cent of secondary school students identified reading texts on the topic they were learning about in class as a central task and 75 per cent stated that the teacher talked about the topic while the students took notes.

Barriers related to teachers' technological-pedagogical competence

The following is a summary of the main difficulties related to each dimension that we were able to identify during the fieldwork.

The testimonies collected show that, during the suspension of face-to-face teaching, teachers used CREA on a widespread and regular basis as a channel for sending resources and study materials to students. Among the main difficulties detected in relation to how teachers took up this informative role via technology, it should be noted that students were often inundated with a somewhat disorganized mass of information, especially at the beginning of the pandemic. The way in which teachers configured and organized content and activities

also led to very disparate browsing experiences, as discussed above. In some cases, there was a certain disconnect between the activities proposed, which did not tie in with the teaching objectives proposed by the teacher from a didactic pedagogical point of view.

In relation to the individual or collective learning activities and experiences proposed by teachers, the testimonies collected seem to indicate that learning proposals that assigned a rather passive role to students were often predominant. These tend to achieve a lower level of student involvement than learning proposals that involve a more active role.

In addition, students hardly mentioned experiences of collaborative work. Forty-one percent of secondary school students and 43 per cent of primary school students stated that solving with a partner or in a group was rarely or never given as an option. Ninety-six per cent of students stated that they all completed the same activities and only 30 per cent said there were alternative activities and they could choose which ones to do. Such opportunities are offered by the CREA platform but they seem to be little known or used by teachers.

I worked totally on my own, I don't think they set us any group work during the whole virtual learning period. There was a feeling of isolation from your classmates because in face-to-face classes you are always doing group work, interacting, and this didn't happen during virtual learning. There was no work designed to be done in groups, it was all individual.
(Lower secondary school student).

In addition, several limitations are highlighted in relation to opportunities for communication and interaction between students and teachers. First, it can be seen that not all students were able to

participate in synchronous meetings with their teachers and classmates via video calls during the suspension of face-to-face classes. Eighty-three per cent of primary school students and 53 per cent of lower secondary school students said they had had video calls with their teachers. On the other hand, 55 per cent of secondary school teachers and 22 per cent of primary school teachers stated that few or none of the students had participated in video calls.

Testimonies from those who took advantage of this opportunity to meet reveal certain shortcomings. According to the survey of secondary school students, 73 per cent found it difficult to understand this type of class, 67 per cent could not connect to the teacher's audio and found it difficult to follow the class, 55 per cent said they had connected to the class but found it difficult to pay attention, and 51 per cent said they could not ask questions about things they did not understand. In primary school, these proportions were somewhat lower but still worrying. Despite these difficulties, video calls could have enabled students to better understand and be more involved with the activities on CREA. Students who had video calls during the suspension of face-to-face classes showed a higher level of liking for using CREA than those who did not have video calls.

Likewise, the interviews reveal a somewhat basic use of the discussion forums, thus failing to value genuine interaction among students. Nor were there many mentions of teachers' participating in the forums, opening discussion threads or connecting the different opinions of the students, nor of the creation of spaces for drawing conclusions within the forum in order to discuss collaborative ideas and the deep meaning they contribute.

Finally, CREA offers a wide variety of tools to facilitate student support, evaluation and feedback

from teachers. However, there is little knowledge and use of some of these tools on their part.

According to the data from the surveys conducted, 83 per cent of secondary school teachers stated that they were familiar with and used the CREA grading tool, while 85 per cent used the document return function with comments or marks. The testimonies gathered in the interviews flag up instances in which CREA's evaluation tools were used but not to provide effective feedback.

If you made a mistake, were you given another chance to do your work?] No, she would give you the grade she thought was right.
(Lower secondary school student)

Barriers related to teacher motivation

The interviews suggested that, in 2020, some teachers refused to teach in digital environments. In many cases, these were teachers who had very satisfactory performance levels in face-to-face teaching but, when faced with the need to plan and design learning scenarios using technology, they struggled or even refused. The interviewees emphasized that, in 2021, the situation was the opposite and practically all teachers offered technology-based proposals during the suspension of face-to-face teaching.

However, in many cases assessments still point to low motivation for teaching with technology. One in every three primary and lower secondary school teachers surveyed considered that pedagogical proposals involving technology are more difficult to design. Meanwhile, 39 per cent of teachers and 53 per cent of lecturers agree that creating their teaching projects via technology overburdens their role as a teacher.

Teachers were also asked whether, based on their experience so far, they would like to continue

holding virtual learning sessions combined with face-to-face lessons when the pandemic situation normalizes. The results revealed that 25 per cent of primary school teachers and 47 per cent of lower secondary school teachers have little interest in hybrid education.

According to Fraillon (2014), teachers' attitudes towards the use of ICT are associated with the extent to which they use them in their teaching; the motivational dimension therefore plays a central role in the transformations required in this regard.

Barriers to institutional support for the use of Ceibal resources

As part of this grouping, we explored three kinds of barrier: i) those involving the role of headteachers; ii) those involving support roles (support among teachers, support through technological-pedagogical roles such as primary school teacher facilitators, and support from inspectors); and iii) those involving the teacher training opportunities offered by Ceibal and ANEP. This executive summary presents three barriers related to institutional support, selected according to the relative intensity with which they appear to be occurring. The following issues will therefore be discussed: **the lack of leadership for digital transformation** on the part of headteachers, the **decline in cooperation among teachers since the return to face-to-face teaching** and the **shortage of technological-pedagogical equipment**.

Barriers involving leadership

Since the pandemic, the use of technology by leaders of educational establishments has increased dramatically. The greatest increase in the use of ICT by headteachers concerns communication with the

educational community and the use of educational platforms (IEA, 2021). Situations of a very low mastery of technology among headteachers do, however, persist. Fifty-nine percent of the primary school headteachers and 46 per cent of the lower secondary school headteachers surveyed self-rated their digital skills for computer use as basic. Seventeen percent of primary school and 20 percent of lower secondary school headteachers stated that, when the pandemic hit, they did not feel prepared to work virtually.

Well, being 100 per cent honest, it didn't seem useful to me... I later regretted this a lot, especially with the pandemic; basically, I had absolutely no idea what use it could be put to, for example, the portfolio.

(Lower secondary school headteacher)

The lack of knowledge and conviction of leaders in the potential of digital resources for teaching and learning greatly hinders the adoption of these resources by teachers, students and families. In the surveys, one in four headteachers indicated that it was "always" more difficult for them to support teachers in implementing didactic proposals if these were mediated by technology; and one in three considered that adding digital resources could "sometimes" hinder student learning.

Several interviewees pointed to the difficulty experienced by some headteachers in carrying out pedagogical monitoring of the teaching work, both before and after the pandemic and the suspension of face-to-face classes. This is related to the challenge of finding a balance between the three main functions of their role: pedagogical, administrative and community.

In the surveys, 69 per cent of primary school and 37 per cent of secondary school headteachers stated that they had provided individual feedback to each

teacher on their virtual teaching proposals during the pandemic. These percentages point to a large group of establishments in which teachers did not receive this type of pedagogical monitoring during the suspension of face-to-face learning.

Barriers to sharing and collaboration among teachers

Sharing and collaboration among teachers are effective ways of spreading motivation, replicating good practice and generating transformation within institutions that involve the entire teaching staff and enhance educational opportunities for students.

The teachers interviewed reported a very rich experience of sharing and collaboration with their peers during the suspension of face-to-face classes. Many institutions were able to hold coordination meetings and, in other cases, there were very fruitful informal contacts and cooperation.

The first guidance we received from the leadership was: no more working alone, so we set up teams. Within those work teams there were always one or two teachers who were a little better at technology than the others. We would have meetings among ourselves and we would get into a kind of rhythm.

(Primary teacher)

Interview testimonies suggest that, with the return to face-to-face teaching, many of these instances of exchange and coordination have taken a back seat. It is important to consider how to capitalize on and keep this collaboration alive in times of face-to-face classes.

Among the main barriers to sustaining coordination spaces among teachers is the lack of paid coordination time or teaching rooms in some

establishments. Schools without a coordination schedule are also those that least request on-demand training, according to the Ceibal pedagogical experts consulted.

Barriers related to technological-pedagogical support roles

In line with the findings of the literature on the subject, the fieldwork shows the importance of technological-pedagogical support roles in terms of providing training, support and accompaniment to help teachers and headteachers effectively incorporate digital resources into their teaching. Currently, this technological-pedagogical support role is played in primary education by Centres for Educational Technology and Ceibal (CTEC), which oversee a team of teacher facilitators. These centres operate in each of the departmental inspectorates and their role is to develop projects that focus on the educational management of ICT.

The study revealed some barriers that could be hindering the full development of the potential role of **teacher facilitators**.

First, not all primary schools have the support of a teacher facilitator. Second, according to the interviewees, the work of teacher facilitators is difficult in centres where it is not possible to bring the entire teaching staff together to hold group training sessions.

In addition, there is no such role in secondary schools, where instead there are guidance teachers for educational information technology (POITE). Unlike the teacher facilitators, they seem to have a more technical than technological-pedagogical profile. Not all schools have POITE and not all of them provide technical support to the institution's entire teaching staff.

Opportunities to improve the level of access to and participation in Ceibal's digital resources

This chapter identifies some opportunities to reduce the impact of the barriers analysed throughout the report. Many of the suggestions made were provided by the actors interviewed.

To facilitate communication, the opportunities will be presented in a table, alongside the barrier they are intended to address.

1. Opportunities for improvement in issues related to **barriers to the digital learning environment** offered by the CREA platform

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Browsing experiences varied greatly, as they depended on the way in which teachers organized their courses	• It would be advisable to incorporate a contents page into CREA with a learning road map to help students orient themselves. • Inform teachers about good practices that allow them to inhabit the digital environment and transform it into a virtual learning environment. • Offer optional templates, without limiting the potential for customization and innovation of teacher-created spaces. • Create a blended pedagogical model to standardize and ensure consistency in the teaching and learning process. This should be based on certain common frameworks for the use of digital resources among teachers across all disciplines. Implementation would depend on the subsystem, grade and subject. It would thus be possible to ensure consistency and, at the same time, freedom for teachers to create their own learning activities and sequences, while maintaining a pattern of common elements across subjects. • The model could be created at the national, departmental or school level. It could be created by a group of teachers, based on the Ceibal guidelines, and discussed and approved by the corresponding authorities.

(cont).

1. Opportunities for improvement in issues related to **barriers to the digital learning environment** offered by the CREA platform

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Barriers to accessibility for students with disabilities	• Suggestions for improving CREA accessibility for students with low vision or blindness: • Ensure high contrast on pages and resources, as well as hierarchical indexing of titles and image descriptions to facilitate text detection by screen reading programmes, as summarized in the WCAG 2.1. • Allow subtitles to be included in uploaded videos. If this is not technically possible, it is recommended that the transcript file be made available. • It may be relevant under WCAG 2.1 standards to provide audio description if simple transcription is insufficient for a person who is blind or has low vision so that they can perceive the content of images. • Create HTML content on the platform and use headings and paragraphs consistently to facilitate the use of a screen reader. The recent inclusion of Immersive Reader is a valid alternative for this audience, as it allows audio playback and configuration of HTML text. The inclusion of the image description is also important in this regard so that this information can be heard. • Suggestions for improving CREA accessibility for deaf students or those with a hearing impairment: • Ensure that captioning or transcription of video resources supports accessibility for deaf and hard-of-hearing users, according to WCAG 2.1 guidelines. • Providing a sign language description of the videos may also be relevant to support accessibility for deaf users, according to WCAG 2.1. • Create HTML content on the platform so that students can use the Immersive Reader tool to improve their understanding of the text.

2. Opportunities for improvement in issues concerning barriers related to **students' conditions** for accessing and using digital resources

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Broken devices, limited connectivity	A set of complementary solutions targeted on the most socioeconomically vulnerable areas could help improve these situations, as they mainly affect students of lower socioeconomic status.
Tablets are singled out as inefficient devices	Explore the assessment further by identifying whether the shortcomings correspond to any particular model. Evaluate changes in the models supplied.
Difficulties with reading comprehension, even in advanced grades	Develop reading skills through technology, with proposals that include a gradual and adapted approach to the instructions and texts for students, without taking certain skills for granted.
Students lack basic digital skills	Offer students more opportunities to use digital resources, following a gradual approach that is sequenced and supported by teachers.
Students with low motivation	- Liking for school: Ceibal projects can bring a fresh and renewed look to schoolwork and promote strategies that work on a sense of belonging through proposals such as Artists⁵, Scientists in the Classroom⁶ and Designing Change⁷. - Liking for using CREA: The data show that offering students more and better opportunities to use CREA could substantially improve their assessment of this platform. - Situations of educational exclusion: School dropout rates are high and the pandemic has worsened the situation. This could be an opportunity to design proposals that include technology and can specifically target students experiencing actual or potential educational exclusion.

5 <https://blogs.ceibal.edu.uy/formacion/artistas-en-el-aula/>

6 <https://www.ceibal.edu.uy/es/articulo/cientificos-en-el-aula-2022>

7 <https://www.ceibal.edu.uy/es/articulo/disenando-el-cambio-2022>

3. Opportunities for improvement in issues concerning barriers related to **teachers' conditions** for providing quality technological-pedagogical proposals

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Teachers with limited digital skills and superficial knowledge of Ceibal resources	• Identify teachers' level of development in the pedagogical use of ICT. • Favour formative processes and lines of action that help teachers to move past the knowledge acquisition level towards the knowledge deepening and knowledge creation levels. • Encourage collaboration between teachers with different digital capabilities. • Provide on-site educational technology support in educational establishments. • Disseminate lists of easily transferable examples.
Ineffective strategies for teaching in diversity	• Offer specific pedagogical training that empowers teachers to deliver teaching proposals for students that involve different learning styles, especially for those who are over-age, have low motivation or are experiencing various academic difficulties. • Support teachers to develop proposals that involve optional paths and generate scenarios to solve situations with different levels of difficulty so as to motivate students but, at the same time, challenge them intellectually. • Support the implementation of active methods that involve students in their own learning. These have proven to be especially effective with the most unmotivated students and therefore tend to reduce the inequalities that exist in the education system. • Some aspects of the platforms could also be redesigned: in the case of Matific, where a less complex alternative is offered to the students, this is perceived as being aimed at students in lower grades, which is very demotivating. Ways of resolving this situation could be explored while ensuring the adaptability of the proposal and students' self-esteem.

3. Opportunities for improvement in issues concerning barriers related to **teachers' conditions** for providing quality technological-pedagogical proposals

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Teachers are unaware of how to make their CREA projects accessible to students with disabilities	• Train teachers to create digital projects for students with disabilities, including training in the use of accessibility tools. Also provide guidance on possible educational proposals to be offered to these students. • Inform teachers about the possibilities offered by the use of the Immersive Reader tool, which has recently been incorporated into CREA.
Teachers with limited technological-pedagogical skills	• Disseminate knowledge among teachers of the various possibilities offered by CREA in terms of creating collaborative learning experiences for students (for example, promoting collaboration among peers to solve tasks that may or may not be differentiated, or adding a social dimension to outputs through collaborative walls that allow the students to develop self-assessment, peer assessment, and opportunities for metacognition, among others). • Encourage the use of learning objectives on the CREA platform and build the capacity of teachers to better use the tools provided by this platform, which they already know and use to some extent, for example, working on how to give good feedback. • Offer training sessions focused on strategies for customizing projects and developing resources for different levels of performance in virtual learning environments.
Headteachers with poor digital transformation leadership	• Ceibal has a training programme for headteachers. It would be an opportunity to investigate the levels of participation of headteachers in this proposal and assess its usefulness and impact on the integration of digital resources into the institutional projects and classroom proposals offered in the schools led by trained headteachers. • Disseminate good experiences (e.g. from the Global Learning Network) through workshops and meetings for headteachers. It is important not only to produce and disseminate materials or publications but also to create spaces for dialogue and meetings that allow headteachers to take increased ownership of the experiences shared by their peers and identify possible applications/transpositions into their own institutions. • Strengthen the technological-pedagogical support roles for headteachers.

(cont).

3. Opportunities for improvement in issues concerning barriers related to **teachers' conditions** for providing quality technological-pedagogical proposals

BARRIER	OPPORTUNITY FOR IMPROVEMENT
Few instances of coordination and collaboration among teachers since the return to face-to-face learning	• CREA offers a function that provides an interesting opportunity for interdisciplinary work: the "groups" function. Greater dissemination of the potential and possible uses of this working dynamic could increase its use by teachers. • Establish specific institutional bodies that propose collaboration among teachers. It is essential to create the need to work together, which should not be subject to the desire or availability of teachers. The role of headteachers is central to fostering collaboration among teachers, providing an overall view and a strategic vision based on interdisciplinarity. • Encourage experiences of collaboration among teachers from different schools, in which cooperation can be used to facilitate the workload of teachers by creating a reciprocal relationship in which they can rely on each other's strengths.
Insufficient technological-pedagogical support teams	• Increase the number of technological-pedagogical support staff as necessary. • Offer a technological-pedagogical support person for secondary school teachers and headteachers. • Enhance the digital skills and technological-pedagogical knowledge of inspectors. It is important that they learn about Ceibal's different strategies and resources so they can offer these to teachers and headteachers according to the needs of each school. • Evaluate the levels of participation of inspectors in the Ceibal proposals aimed at them, their assessment of their usefulness and the impact of participation in these instances on the work of inspectors and on the integration of digital resources into institutional projects and classroom proposals offered in the schools supported by inspectors who have gone through this process.
Questions as to the impact of training sessions on daily teaching practice	• Bring teacher training opportunities closer to the needs of teachers in the classroom. Teachers and leaders interviewed requested training opportunities contextualized to the different subjects, with concrete situations of use. • In some cases, teachers suggested the running of training courses at the school itself, especially aimed at the teaching staff of that institution and organized by area.

Closing remarks

The study has sought to present an extensive overview of various barriers – understood as situations that may be hindering access to and use of Ceibal's digital resources. The analysis has therefore focused on gaps or aspects that are not working well. This does not, however, imply a negative assessment of Ceibal's performance, which has achieved several outstanding results, making it an international leader in digital educational inclusion policies. Its policy of 1:1 delivery of devices and providing connectivity solutions in schools has reached near universal levels. To achieve this, Ceibal implemented an extraordinary deployment of equipment and support structures. The multiplicity of solutions implemented to deal with technical problems is an example of how it has made its institutional mark in continuous improvement.

Its achievements in terms of access to the CREA educational platform are also exceptional. The level of access to CREA was on an increasing trajectory prior to the pandemic. When the pandemic hit and face-to-face classes were subsequently suspended, the platform suddenly became almost universal. The sudden increase in users and traffic on the platform brought significant challenges, which Ceibal was able to successfully overcome. The widespread use of CREA had a positive impact on familiarity with the resource and contributed to reducing barriers to access. These elements created conditions by which to guarantee the continuity of learning that were far superior to those that other countries of the region were able to deploy. It is promising to note that, although the intensity decreased, in most cases, the use of Ceibal platforms was not discontinued when school attendance returned.

Ceibal has therefore overcome the first barrier to the use of platforms, and one that most countries still face: lack of access and users' lack of knowledge of how they work. In Uruguay, students and teachers are familiar with the platforms and know how to use

them. Once this first barrier has been overcome, **however, second-level challenges emerge: the initial challenge has shifted from “using” digital resources to “using them well”.**

The analysis offered some data that help us understand and contextualize this challenge:

- **Equipment and connection issues cannot be neglected:** Contrary to the view that equipment and connection are a first step to be overcome in order to then work on technological-pedagogical proposals, the evidence suggests that these are a persistent problem that requires ongoing support and dynamic responses. Universal strategies can be combined with others of a more focused nature to address the most resistant difficulties.
- **Those who most need to strengthen their educational opportunities appear to be those who have the least access to digital resources:** Students who are over-age, those who attend schools in more vulnerable socioeconomic contexts and those from families with lower educational levels and lower digital skills seem to be those who least accessed the platforms. And, for those who did access them, their frequency of use was lower than that of their peers. This results in a double exclusion. In addition, these students and establishments are the ones that have least used the platforms since the return to face-to-face teaching. Given that low access and low frequency of use is in many cases related to teacher practices, teachers are key actors in involving and building their capacity.

- **There is a significant group of students for whom technology-mediated approaches seem unappealing:** The study offers some possible clues as to the reasons for this situation. These include the lack of suitable devices and the scarcity of opportunities for their use. The low quality of the technological-pedagogical proposals may also play a role. It is also important to consider the existence of worrying levels of dissatisfaction with school and a lack of enjoyment of reading.
- **The teachers' technological-pedagogical proposals show a low level of use of resources and didactic strategies:** The study detected some limitations in teachers' pedagogical and technological competence to design technological-pedagogical projects. In general, linear activities predominate, assigning students a passive role with little space for interaction, collaborative work, reflection or metacognition. There are few references aimed at problematizing real-life situations or involving the diversity of students' needs and interests.
- **The greatest inequality is found within the educational establishments themselves:** Disparities within establishments emerge as one of the variables most associated with differences in access to CREA. A percentage of students who did not use CREA in the first semester of 2021 can be detected in most schools. It seems that the segmentation of educational opportunities is manifested more intensely within schools (possibly associated with the segregation of certain students and groups) than between schools in different geographical or social contexts. This raises the question of the strategies aimed at catering for diversity that are mobilized in class. The analysis provides evidence of the

role of headteachers, teacher facilitators and inspectors, and instances of collaboration among teachers as key elements in working to overcome this barrier.

- **There was no evidence that the use of digital resources contributes to reversing the dynamics of exclusion in the Uruguayan education system:** Based on the assessment that more than half of the population drops out of the education system before completing secondary education, the data on platform access show wide inequalities in access; there is a very high association between exclusion or low use of CREA and the variables structurally associated with repetition and dropout. It should be noted that there are positive signs associated with the use of the platform in contexts of high non-attendance at the primary level. It is possible that this is related to the previously mentioned challenges regarding the technological-pedagogical criteria involved in designing the proposals.

The challenge of "making good use" of digital resources belongs in the technological-pedagogical sphere. This emerges from the intersection between the digital and pedagogical competences used by teachers when planning, designing and implementing a pedagogical proposal mediated by digital environments. It could be said that the technological-pedagogical challenge arises from the concurrence of an old and a new challenge: the old pedagogical challenge and the new technological challenge.

The high levels of dropout and over-age students in Uruguay reflect the difficulties faced by the education system in responding adequately to the pedagogical needs of all students. These difficulties predate the pandemic. The incorporation of

technology into teaching and learning adds a new challenge. In this context, Ceibal has an opportunity to contribute to renewed ways of thinking and doing so that the education system can begin to change some patterns of exclusion. It is, however, important not to lose sight of the fact that digital resources cannot, by themselves, transform teaching proposals, which is where the matrix of exclusion resides.

To meet this challenge, all teachers and students must be involved in a sustained and widespread transformation, committed to inclusion and learning for all. This means addressing various situations, such as teachers who are convinced of the benefits of incorporating technology into teaching and learning but do not know how to use digital resources appropriately, or teachers who are not motivated to incorporate digital resources. It also requires contemplating some student situations such as persistent difficulties in accessing digital resources, lack of fundamental skills, low motivation for school and disinterest in using CREA. It means, in turn, going beyond the focus on the use of digital resources as a tool in order to achieve a deeper reflection on the teaching task and the transformation of teaching practices.

Two key elements have been identified which Ceibal could build on to address these challenges. First, Ceibal has high-quality digital resources that are functional and adapted to the national curriculum. These are highly recognized and valued by teachers, students and families. The CREA platform has enormous pedagogical potential to be consolidated as a virtual learning environment, that is, as a populated environment, with differentiated spaces, in which sharing and interaction among participants occurs explicitly and contributes to the construction of learning (Dillenbourg et al., 2002).

Second, but no less important, Ceibal's strategies and actions have succeeded in installing, in addition to a practice, a set of shared meanings among actors in the education system. The quality and professionalism of Ceibal were recognized by all the actors consulted, and the teachers, headteachers and students all recognized the importance of incorporating digital resources into education. The context is therefore conducive to continuing to develop Ceibal's vision of **innovative and inclusive forward-looking education**.

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