



INTEGRATING EDTECH INTO TEACHING AND LEARNING

Lessons from EDUINO in North Macedonia



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INTRODUCTION

Even before the COVID-19 pandemic, North Macedonia's education system faced considerable challenges. In 2018, 65 per cent of 15-year-olds in the country did not reach basic proficiency levels in reading and mathematics (OECD, 2020). In an effort to alleviate this learning crisis, several innovations were introduced in North Macedonia, but prior to COVID-19 these were generally small-scale and uncoordinated.

EDUINO is a digital learning platform that started in 2019, with the support of the UK Government. It was initially designed to support early childhood education¹ and provide caregivers with tools to support young children's social and emotional learning. When COVID-19 closed schools across North Macedonia in March 2020, understanding the great need for a coordinated approach to remote learning, the Ministry of Education and Science (MoES), the Ministry of Labor and Social Policy (MoLSP), the Bureau for Development of Education (BDE), UNICEF and SmartUp – Social Innovation Lab² worked to expand EDUINO's scope to become a national digital learning platform for pre-primary to secondary levels.

EDUINO: A one-stop location for digital learning in North Macedonia

The EDUINO platform combines the largest educational library in the country with subject content that covers early childhood education through to secondary education. The platform is integrated with Microsoft Teams, which allows teachers and students to communicate remotely if they have access to the internet and online devices.

The EDUINO platform was remarkably successful at crowdsourcing a large amount of educational content, effectively covering curricula from pre-primary, primary and secondary education. During the spring semester in 2020 and throughout 2021, the platform became the main channel of educational content delivery, with more than 4 million video views or downloads (Lazovski, 2021). This is a significant usage rate for North Macedonia, which has a school-age population of around 257,000 (State Statistical Office, Republic of North Macedonia, 2022).

EDUINO is also a key tool for teachers as it centralizes resources for teacher training, including mandatory and supplementary trainings across education levels. As EDUINO grew (*see Annex: Figure 1*) it brought together teachers, students and parents, creating a community of practice that co-created content and helped the platform to thrive. As of 2022, the platform engages a community of around 24,000 subscribed users who receive weekly news about webinars and open resources (UNICEF, 2021a).

1. In North Macedonia, early childhood education (ECE) provision caters to children from birth until the age of 6 years (Eurydice, 2022).
2. SmartUp – Social Innovation Lab is a non-governmental organization based in Skopje, which works across disciplines to address social challenges through innovation and technology. It was a EDUINO implementing partner.

This research synthesizes lessons from the experience of implementing EDUINO in North Macedonia to inform governments that are developing digital learning systems. To achieve this goal, this research brief seeks to answer the following questions:

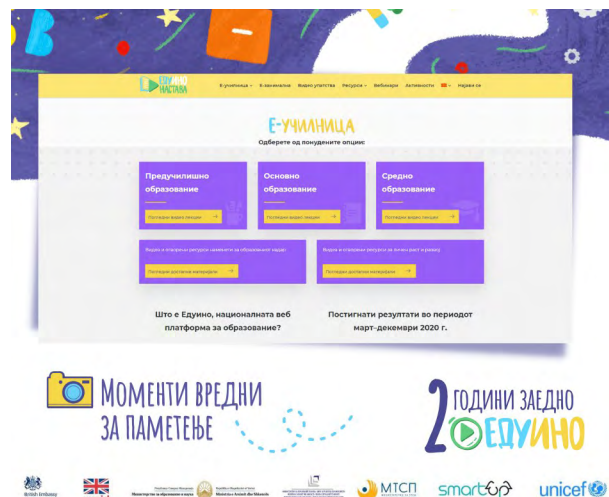
1. What were the key levers that enabled the rapid development and scale-up of the EDUINO platform?
2. What challenges did North Macedonia face in deploying the EDUINO model at a systems, school and classroom level?

Evidence for this brief was compiled by collecting and triangulating existing evidence from EDUINO's implementation. This evidence includes implementing partners' update reports, UNICEF implementation reports, user analytics from the

EDUINO platform, government publications on digital learning and existing literature on North Macedonia's digital learning ecosystem. Key informant interviews were conducted with the education team at UNICEF North Macedonia, which steered the scale-up of EDUINO.

Research findings are organized around the following key levers in EDUINO's implementation:

1. Developing and crowdsourcing curriculum-aligned learning content
2. Fostering user engagement through a community of practice
3. Furthering teacher capacity for digital learning
4. Reaching students with disabilities and other learning barriers





1 Developing and crowdsourcing curriculum-aligned learning content

1.1 Launching centralized calls for content, and making content creation part of teachers' official professional development, encouraged and rewarded teachers to produce content for the platform.

Between 2020 and 2021, EDUINO crowdsourced nearly 5,000 video lectures and 1,300 educational games and activities from almost 2,000 teachers around the country (UNICEF, 2021a). Today, EDUINO's educational content spans the whole curriculum and is available in all five languages of instruction in North Macedonia: Macedonian, Albanian, Serbian, Bosnian and Turkish (see Box 1).

When school closures began due to COVID-19, strong teacher motivation drove EDUINO's initial crowdsourcing content success. Within three days of schools closing, the MoES and UNICEF issued a call to teachers inviting them to record video lessons for the platform. In just two weeks, EDUINO received more than 500 videos from educators around the country, despite the lack of any formal compensation scheme for teachers producing this content (Kuzmanoska, 2020; Shashevski, 2020).

The speed of this response and the teachers' dedication was widely recognized in the country. But there was a need to structure content around learners' needs and gaps in the platform. To facilitate structured content development, calls for content were issued. To cover all the topics included in the education curriculum, the BDE issued four calls during 2020 and 2021, specifying the specific content needed by grade, subject and topic. All teachers submitting content were awarded six hours of professional development. This helped teachers advance in their careers while contributing to EDUINO.

BOX 1

EDUINO includes the following types of educational content:

Video lessons

Short, condensed classes prepared by teachers (10–15 minutes). Example: [Video lesson excerpt with English subtitles: 4th grade - Math - Division with remainders](#).

Video tutorials and courses

Short tutorials on tools and teacher methods (15–20 minutes). Example: Using the digital tool 'Kahoot'.

Teacher webinars

One-hour, semi-formal online events for teachers to build their capacities. Example: [EDUINO Webinar English excerpt: Good practices for your online classes](#).

Play-based educational activities

Short, experimental learning activities designed for children aged 3–10 years old. Example: [Every person needs](#).

Source: Lazovski, 2021.

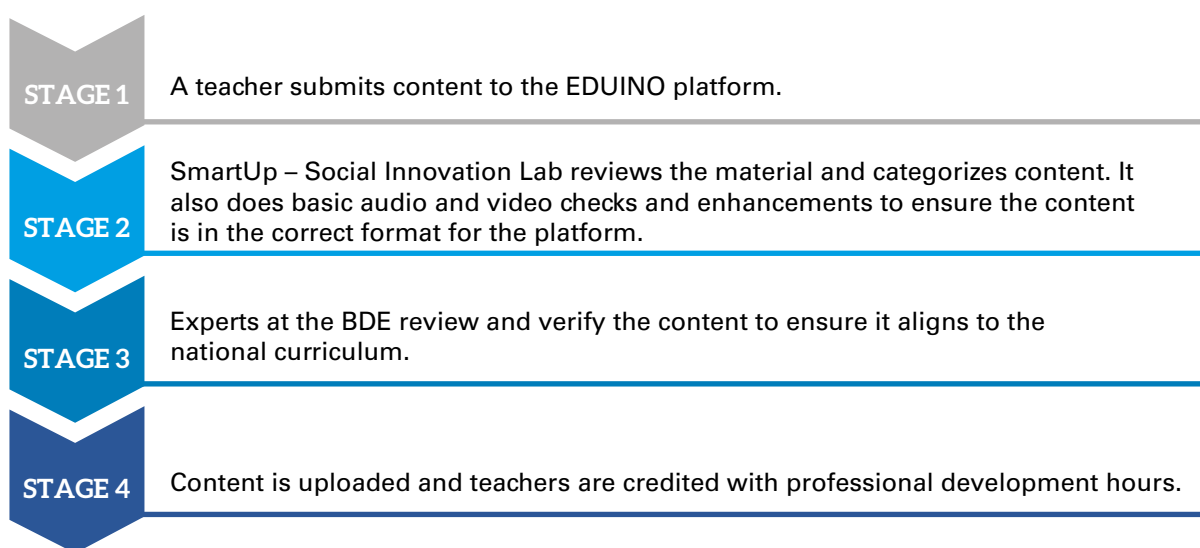


Key research finding

Making specific calls for content, and incentivizing teachers by offering them professional development credits to create content, was key to EDUINO's successful crowdsourcing strategy. These things were also essential for ensuring sustainable content creation beyond the initial COVID-19 response. Additional approaches for content development include encouraging content development during pre-service and in-service teacher training programmes and engaging students to create content, as they are often skilled in using content development tools.

1.2 Curriculum alignment was ensured through a four-step quality assurance system.

EDUINO ensures that all content uploaded to the platform is aligned with the national curriculum and meets minimum quality standards. This process follows these four steps:



While this four-step quality assurance process is useful for ensuring that all content is aligned with curriculum goals, it does not consider the entertainment value of lessons or review how accessible the content is for students with disabilities or learning difficulties. Going forward, it will be important to expand the scope of this quality-assurance process to ensure these factors are considered by assessing whether content is accessible and interactive and whether it encourages competency-based learning. This will ensure that EDUINO effectively engages students with different learning needs by creating world-class content.



Key research finding

Beyond reviewing content to ensure it aligns with the curriculum, it is important to review and assess whether digital learning content is sufficiently engaging and accessible for different types of learners. Developing features for EDUINO content, such as user ratings and feedback systems, can help to continuously monitor the quality and uptake of different content. This is useful for identifying which content is most popular among teachers and students and which content needs to be improved to increase engagement. A user-rating system can also help teachers and students quickly identify content that has been most useful to others.



2 Fostering user engagement through a community of practice

2.1 EDUINO implementing partners looked beyond technology to create a community of practice that nurtured the platform.

EDUINO implementing partners regularly engaged with educators, which helped create a community of practice. Now, teachers subscribing to EDUINO receive a weekly newsletter plus updates, invitations to webinars, links to open resources and opportunities for collaboration and exchange. This helps to maintain momentum for the platform and encourages collaborators to regularly return to EDUINO.

To help foster a community of practice, UNICEF North Macedonia introduced a peer-learning initiative called **EDUINO ambassadors**. Teachers who had contributed more than 15 videos or more than 10 play-based activities were recognized as EDUINO Ambassadors and **were celebrated** by prominent political figures. This raised the visibility of EDUINO and encouraged other teachers to contribute to the platform. EDUINO ambassadors were also invited to take part in the **EDUINO Talks campaign**. Here, they shared their expertise and passion for particular topics, such as social emotional learning and ICT tools in maths, and participated in different **events**, activities and **media** engagement, including appearing on **talk shows** and other **TV** programmes.

“EDUINO is a community of innovative educators ready for cooperation, connection, support and exchange of advice and good practices.” – Hilda Dimitrievska, EDUINO ambassador

Parents also have a great influence over children’s learning (Brossard et al., 2020). Understanding this, EDUINO introduced a way for caregivers to provide content to the platform through the EDUINO gameathons challenge. Here, parents, caregivers and kindergarten teachers were asked to use videos, photographs and instructions to share the play-based early childhood education games they had developed. Three gameathons have been held since 2020, which have engaged more than 2,500 parents, caregivers and kindergarten teachers. The sharing element of the gameathons encouraged parents, caregivers and educators to put innovations in early childhood education and socio-emotional learning into practice, while spending quality time with young children (EDUINO, 2021).



Key research finding

Making a core team of engaged teachers EDUINO ambassadors helped to motivate other teachers to contribute content and use the platform in their teaching. Supporting the user-generated, peer-led aspects of EDUINO is important to ensure its continued use. As part of this, building communities of practice for teachers in different subjects can encourage teachers to share best practices and useful resources for digital learning on specific, subject-related topics.



3 Furthering teacher capacity for digital learning

3.1 Supporting teachers' well-being during the shift to remote learning is crucial, as remote learning entails new ways of working and preparing for class.

Despite strong levels of teacher enthusiasm and motivation, teacher well-being was put to test during the transition to remote learning in 2020. In the second-half of 2020, Reactor – Research in Action conducted a large-scale study on the attitudes and experiences of teachers, students and school principals. Data were collected online using a quasi-random sample of predominantly urban respondents. Most teachers (88 per cent) reported that they constantly or often worked during their free time, while 66 per cent reported dedicating some of their time to their work-related responsibilities every weekend (Reactor – Research in Action, 2021). Similarly, 86 per cent of teachers reported worrying 'constantly or often' about their work, even when they were not working (Ibid.). This shows that, despite the rapid deployment of EDUINO in 2020, teachers had to shoulder a great deal of responsibility to integrate the platform into their practice and transition to a remote learning classroom. It is critical that additional resources, which prepare teachers to use technology for teaching remotely or in the classroom, are developed to ensure teacher preparedness and well-being.

When EDUINO first launched, many teachers struggled with how to organize and deliver their teaching in digital settings. In the first months of the COVID-19 pandemic, one in every three school principals in the Reactor study did not receive any guidelines for digital learning or received unclear guidelines (Reactor – Research in Action, 2021). During the first half of 2020, more than half of the schools in the sample (60 per cent) did not follow their regular schedule, and most teachers reported feeling stressed or confused with the organization of digital learning (Ibid.).

In the next school year (2020/2021), providing clear guidelines and protocols on schedule and class management was key to structuring the use of EDUINO. That year, all respondents agreed that the organization of remote learning had improved compared to the previous year (Reactor – Research in Action, 2021). Clear guidelines for organizing teaching in digital settings were key for ensuring schools could plan lessons around a timetable and deliver them through a video-conference-call platform (Ibid.). To provide further support with schedule coordination, EDUINO also introduced E-schedule, a tool for creating digital class schedules that can be shared with students (Cheslarov et al., 2020).



Key research finding

Supporting teachers to embed technology into their practice is critical, especially as using technology affects the way their lessons are planned and how students and teachers interact with each other. New digital learning solutions and innovative teaching methods will continue to emerge. As teachers shoulder increasing and often competing demands to make education more innovative, effective and inclusive, protecting their time and well-being and providing them with sufficient support remains important.

3.2 EDUINO is an effective platform for providing professional development to teachers.

To support teacher training, EDUINO includes multiple, built-in options for professional development. These include online webinars, video tutorials, educational resources and a list of accredited, in-person teacher training courses. Between 2020 and 2022, UNICEF North Macedonia, the BDE and SmartUp – Social Innovation Lab led 33 capacity-building webinars on EDUINO which focused on innovative teaching methods and digital learning. More than 23,000 participants attended the sessions, which were delivered through the EDUINO learning platform. This is a remarkable number, considering there are around 26,000 teachers in the country (UNICEF, 2021b). Teachers regularly co-create the focus of webinars. The content is usually a mix of key topics for teacher development selected by the BDE and topics suggested by teachers through surveys and polls.

Teacher professional development also comes through EDUINO's community of practice. Here, teachers learn from their peers by watching and using content submitted by other teachers.

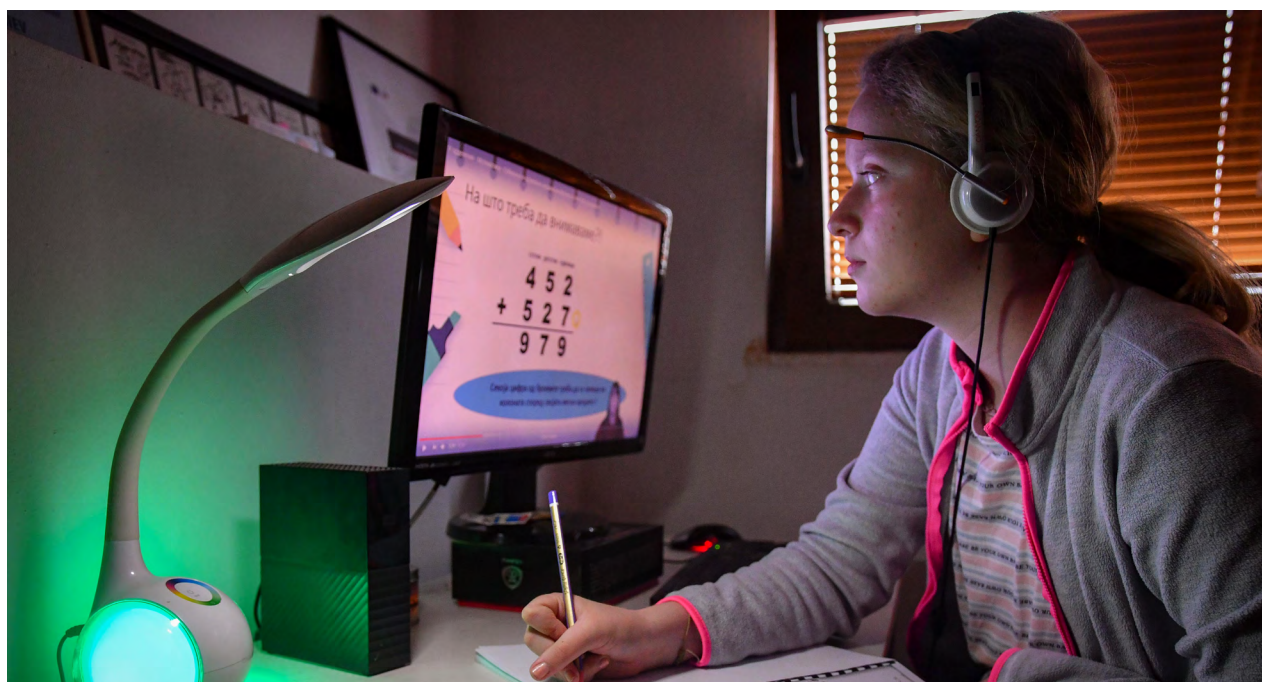
Teachers can also follow **online teacher tutorials** to build their capacity around digital teaching methods. These short tutorials focus on specific tools, like Kahoot or Zoom, or certain approaches, like the use of flipped classrooms.³ The MoES recognizes the tutorials as complementary teacher training courses.



Key research finding

Embedding professional development for teachers within EDUINO was key to building teacher skills, but it also encouraged teachers to visit the platform regularly, where many found useful content for their classes.

Likewise, designing trainings based on teacher training needs and organizing them around teacher training profiles facilitated continuous, structured learning for teachers, regardless of their initial skills.



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3. A flipped classroom, or flipped learning, is an approach in which teachers provide information to students before the class, so they acquire knowledge in advance, then use classroom time for active learning by practicing and applying concepts and ideas.



4 Addressing digital exclusion

4.1 Learners who face specific barriers need to be provided with holistic support to engage with digital learning solutions.

Learners' unequal access to the internet and to devices created considerable equity challenges during the transition to remote learning when schools closed. During 2020, one in every five households in the Reactor study had problems with the Internet, or had no Internet at all, almost one in every three shared a computer for the whole household and 6 per cent did not have a computer at all (Reactor – Research in Action, 2021).⁴ Socio-economic inequalities were closely linked with difficulties in access: only 49 per cent of poor households and only 37 per cent of Roma families reported having a computer at home (UNICEF, 2021c).

To bridge this digital divide, North Macedonia used multiple mediums for remote learning alongside EDUINO. More than 8,000 video lessons were broadcast on TV, covering educational content from different grades and following a regular schedule (Lazovski, 2021). The MoLSP provided USB sticks for mobile Internet access to about 30,000 students from households receiving social assistance, and schools contributed printed educational materials to students with no internet connection at home (Petreski et al., 2021). EDUINO also included downloadable content that could be used offline, such as digital interactive textbooks for Grade 4 students, which students could access at home if they had limited Internet access.

Despite these efforts, most teachers (77 per cent) reported facing difficulties in reaching students and parents during school closures, while 1 in every 3 teachers reported not being able to establish any contact at all with some students (Reactor – Research in Action, 2021). Teachers also frequently reported that the issue of siblings having to share one device created a barrier for students' access to learning (Ibid.).

Access to EDUINO was particularly challenging for children with disabilities who required access to assistive technology at home or who could not spend too much time in front of a screen (Petreski et al., 2021). Additionally, a lack of digital learning content with accessibility features prevented children with disabilities from effectively engaging with EDUINO content. As EDUINO is scaled up, emphasizing access to students who are disabled or face socio-economic barriers must remain a priority. Prioritizing content, and encouraging content to be developed, that is accessible for all students because it follows universal design learning principles⁵ (UDL) should be considered, as this ensures that children with or without disabilities can engage with the same content (Carnelli et al., 2022).

4. These figures may hide even greater challenges in rural areas of North Macedonia, as these areas were only partially represented in the Reactor study sample.

5. Universal design learning principles accommodate individual learning differences and styles by making use of flexible learning environments to facilitate the inclusion of children with and without disabilities in the classroom.



Key research finding

For vulnerable students to effectively engage with digital learning content, dedicated cross-sectoral support needs to be provided. This needs to go beyond the provision of digital devices or Internet connection, to include one-to-one teacher mentoring and support from social workers to ensure learners can follow digital learning. To do this, even stronger coordination and collaboration between the MoES and the MoLSP would be needed. Likewise, creating digital content that can be accessed through both smartphones and computers and ensuring that all students have access to IT labs at schools is important to prevent digital exclusion among students. Focusing on students with disabilities, digital learning content should follow UDL principles to ensure it can be accessed effectively by all students.

Going forward

The scope of EDUINO is expanding to include more content for pre-primary education and for experiential learning. In 2021, EDUINO expanded its scope to include more content for children aged three to six, with a focus on socio-emotional skills and learning through play. In this way, EDUINO is supporting government efforts to expand the reach of pre-primary education in North Macedonia. In 2019, 61 per cent of children aged three to six were not enrolled in pre-primary education (UNICEF, 2019). To introduce more experiential learning, efforts are also underway to launch EDUINO Lab. This will serve as a virtual laboratory to stimulate self-paced experimentation with a focus on science and climate change (Lazovski, 2021).

As in-person education resumes, fostering the use of EDUINO as part of blended learning within classrooms will ensure that it remains useful for teachers' practice. Mila Carovska, the former Minister of Education and Science, made this point when she said of EDUINO: "This library is of lasting value for our educational system and the use of these resources can continue in the context of regular education." (UNICEF, 2021a)

Going forward, it will be important to encourage the use of EDUINO as part of blended teaching. To do this, there is a growing need for co-creating and implementing policies, strategies and action plans for digital education that can support this process. Implementation research, built into the continued development of EDUINO, could also provide helpful guidance by generating evidence on which categories of teachers are using EDUINO for blended learning and which groups of students can benefit more from it. As EDUINO continues to develop it could become a solution that helps free up teachers' time so they can focus less on content development and more on building strong, student-centred teaching approaches for all students.






Lessons learned

Reflecting on the experience of EDUINO provides the following lessons learned, which education policymakers and development partners should consider when scaling-up digital learning solutions:

- 1. Crowdsourcing digital content from teachers, students and parents can help to fill in content gaps in digital learning platforms.** Quality digital content is crucial for digital platforms to support quality learning, yet quality, curriculum-aligned digital content is seldom readily available. Education policymakers can experiment with different strategies to encourage teachers, students and parents to co-create content. Such strategies include embedding content development within pre-service or in-service teacher training schemes, within flipped classroom approaches or by running social media challenges. Recognizing teachers' efforts in this process is important to crowdsource content successfully, for instance, by awarding teachers who develop quality digital learning content with professional development hours.
- 2. Developing a streamlined approach to digital content curation, validation and approval requires a clear and coordinated approach.** Quality assurance mechanisms with multiple stakeholder groups in North Macedonia were critical to ensure content met technical specifications and aligned with the curriculum. Additional measures to encourage the development of interactive and accessible digital content need to be considered.
- 3. Embedding professional development resources for teachers within digital learning platforms encourages teachers to get familiar with new tools for digital learning.** Delivering teacher professional development through national digital learning platforms motivates teachers to visit digital learning platforms and hones their digital skills in the process. This helps prepare teachers to incorporate digital learning platforms in their own teaching.
- 4. Look beyond technology and create a community of practice that nurtures digital learning platforms, with teachers at the centre.** Technology alone is not sufficient for digital learning to work. To bring teachers, parents and students onboard with digital learning, it is important to create and nurture communities of practice that will help take digital learning into every classroom. Active communities of practice provide teachers, parents and students with opportunities to communicate, co-create and learn from their peers by sharing best practices and resources for digital learning. These communities of practice help build people's ownership of digital learning tools and encourage uptake across schools.

Annex

Figure 1. EDUINO platform: Key implementation items



03/2020	COVID-19: School closures
03/2020	EDUINO goes live in just 5 days following school closures
04/2020	First 500 videos are uploaded to the platform, focus on primary education
05/2020	EDUINO expands to include content for high-school and pre-school
06/2020	First pack of video tutorials go live (for Kahoot and other tools)
07/2020	Community building effort to build momentum and collective support
09/2020	Video content with guidance for parents and children to restart school
10/2020	First EDUINO webinar and EDUINO Gameathon
11/2020	Improvements to video lessons categorization
01/2021	EDUINO ambassadors
02/2021	Video tutorials hit 100+ available resources, including tools such as Genially, PearDeck, Flipgrid, Whiteboard, BookCreator, OneNote and more
03/2021	Web page redesigned
04/2021	Focus on expansion of ECD content
10/2021	EDUINO Gameathon 2.0
12/2021	Launch of exclusive platform within EDUINO for ECD content
02/2021	EDUINO Gameathon 3.0

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