The Potential of Online Learning Environments:

Providing Wider Access to Learning and Assessment Opportunities

A review paper carried out by
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Introduction

This research paper into the potential of online learning environments was commissioned by the National Council for Curriculum and Assessment (NCCA), to inform the redevelopment of senior cycle.

The Irish education system has already started the journey of embracing online learning and online learning environments. In addition to the recent emergence from online learning during school closures in 2020 and 2021, the opportunity to reflect on the potential that online learning environments may offer is an important step, as we move towards a redeveloped senior cycle. The review has been informed by desk-based research into existing practices in the field of online and blended learning.

Section one of this paper provides a high-level review of current literature around the use of digital technologies and online learning environments in school settings. In addition, a review of the grey literature within the subject area, such as magazine and newspaper reports, internal evaluation reports published on organisational websites has been carried out. Furthermore, it should be noted that much of the published academic research on online learning environments is from the United States (US), supported by literature from Canada, Australia and New Zealand[1]. Where appropriate, this paper will primarily focus on examples from Ireland and include references to European research and projects that could help inform the use of online learning environments in a redeveloped senior cycle.

While engaging with the literature, a key objective of this paper is to ensure that clarity surrounding terminology used in relation to online learning environments and associated practices is developed. As with most literature, terms and definitions often lack universal agreement in relation to what they mean[2]. This paper includes a glossary of terms to offer clarity in terms of our understanding of the terminology used throughout the paper.

Section two explores the potential application of online blended learning approaches in a redeveloped senior cycle, through the lens of five areas of focus: non-school attendees, the traditional subject and module space, cultural education, transition year and initial vocational training. This section will present a selection of online learning approaches, that could be used to support a range of flexible learning pathways for students now and in the future. The review

[1] H2 Learning. (2018). *Irish-Medium e-Hub Pilot Project—International Review and Advisory Report*. Department of Education and Skills. https://assets.gov.ie/138796/04d00ca6-0873-43b0-b2d6-80b4719475c2.pdf
[2] Guri-Rosenblit, S., & Gros, B. (2011). E-Learning: Confusing Terminology, Research Gaps and Inherent Challenges. *International Journal of E-Learning & Distance Education / Revue Internationale Du e-Learning et La Formation à Distance*, *25*(1), Article 1. https://www.ijede.ca/index.php/jde/article/view/729

has cited examples of how online learning experiences are already being utilised by schools, here in Ireland and in other European countries.

Section three considers what was presented in section one and section two and identifies a number of key considerations that have emerged from a critical analysis of the opportunities and challenges associated with practices in this area.

The final section of this paper presents a number of high-level conclusions that have emerged from the review of practice in the area.

Section 1: Literature Review

Framing the Review

Covid-19 is seen as a watershed moment in education, as it introduced the majority of teachers to the world of distance learning and to the use of online learning environments or platforms (i.e. Teams, Google Classroom and Moodle), to enable schooling to continue[3]. In framing this review however, we will develop a broader view on the use and development of digital technologies within online learning environments from pre to post pandemic practice.

An overview of approaches to online learning before Covid (BC) is outlined, followed by those that took place during Covid (DC). From here, the literature review reflects on the lessons learnt during these phases and how they might impact on online learning approaches in the future, titled after Covid (AC).

Before Covid, BC - The Evolution of Online Learning

Present day online learning has developed through the conjunction of two streams of educational development, going back over many decades. The first stream was the use of technologies to support learning including blackboards, books, radio, film, and television, the functions of all of these earlier technologies having now been integrated within digital technologies in their use in today's schools. The second stream was remote learning (traditionally more common in adult learning in the form of distance education[4], but with a long history also in schooling for remote communities and for isolated groups, such as children in hospital).

During the course of this development a wide range of terms to describe these new forms of education also developed. As outlined earlier, many of these terms lack universally agreed definitions and so to ensure clarity and a shared understanding of the terminology develops within this paper, definitions and examples are provided.

During the 1990s, a reasonable level of access to classroom digital technology existed in schools. Terms such as, ICT in education, computer assisted learning and computers in education were commonly used to describe teaching elements of computer programming,

[3] Dempsey, M. & Burke, J. (2021). Lessons Learned: The experience of teachers in Ireland during the 2020 pandemic. Maynooth: Maynooth University.
[4] *'Distance learning is characterised by the separation of place and or time between teacher and learners and learning resources' in* Lai, K. W., Pratt, K., & Grant, A. (2003). *State of the art and trends in distance, flexible, and open learning:* A review of the literature. Distance Learning Reference Group, University of Otago. *https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=bec7d24c07595fee499ade0d96f3c29bf33d0398*

supporting curriculum subject teaching through the use of educational games, SEN and the use of office software (i.e. word processing, spreadsheets and databases).

With the further development of the internet in the 21st century, educational institutions were increasingly connected to high-speed internet, and terms such as e-Learning, Virtual Education, Technology Enhanced Learning and Digital Education began to be used to describe the use of a range of digital technologies, such as computers, phones, cameras and digital learning resources, such as e-textbooks, videos and interactive resources. The internet had a significant impact on university education during this period, in particular, as more courses were offered online using Virtual Learning Environments (VLE) and Learning Management Systems (LMS). VLEs and LMS can be defined as systems for delivering learning materials to students via the web and they typically include assessment, student tracking, collaboration and communication tools[5]. Common systems to support such approaches include Moodle, Canvas, Google Classroom and Teams. In time, schools borrowed from the practices in university education and began integrating VLE and LMS systems to supplement onsite (in-person) classroom teaching. These technologies blurred the boundaries between onsite and online education, as many onsite courses also used VLEs to allow students to access materials and assessments, before and after their onsite classes. For example, students could access reading material or presentations through the VLE in advance of class or submit homework online after a face-to-face class session.

The term online learning environment came into use in relation to this use of VLEs, and during this period the use of online learning also began to spread to schools[6][7]. The distinction between synchronous and asynchronous activities came to the fore in discussions of online learning, with the term synchronous activities covering interactions where students are required to log in and participate in class at a specific time each week (often via a video conferencing feature (e.g., the use of Teams or Google Classroom), whereas asynchronous referred to interactions that did not take place at the same time, such as text message exchanges, bulletin board discussions and online exercises. This period also saw the beginning of the use of immersive learning[8] in education, including both virtual reality, and augmented reality (both used principally onsite), and virtual worlds[9] (principally used for online distance learning). Immersive learning

[5] https://global.oup.com/uk/orc/learnvle/
[6] Bacsich, P., Frank Bristow, S., Op de Beeck, I., Pepler, G., Philips, B., & Andries, P. (2012). *Virtual Schools and Colleges—Providing Alternatives for Successful Learning (Volume 2)*.
[7] Barbour, M. K. (2018). The Landscape of K-12 Online Learning: Examining What Is Known. In *Handbook of Distance Education* (4th ed.). Routledge
[8] Mystakidis, S., & Lympouridis, V. (2023). Immersive Learning. *Encyclopaedia*, *3*(2), 396–405. https://doi.org/10.3390/encyclopedia3020026
[9] Pellas, N., & Mystakidis, S. (2020). A Systematic Review of Research about Game-based Learning in Virtual Worlds. *Journal of Universal Computer Science*, 26, 1017-1042

environments can simulate a real-world environment, for instance, students might use virtual reality goggles to explore the ocean bed, where they can experience the underwater environment in a safe and engaging way. These developments have impacted on how schools have used these technologies to create new approaches to education. More recently, developments in Artificial Intelligence, specifically Generative AI, are also seen to have a potential role in supporting new models of education, including online education[10]. Generative AI, in particular, has the potential to save teachers and students time and in designing more personalised forms of learning in the future. We explore some of these developments below.

Countries that had a tradition of remote education, particularly correspondence type courses[11][12] (i.e. students who received their learning material and submitted written assignments by post), explored how digital technologies could support teaching, learning and assessment at a distance. For example, in the US they created fully online schools, which are typically referred to as virtual or cyber schools[13]. When considering virtual schools and education, there is a continuum in terms of their approaches and Charles Graham[14] captures this in Figure 1 below. At one end of the continuum, are traditional face-to-face schools, who do not use online technologies. Here, students are enrolled in a school with their classes taking place in a physical classroom. In the middle of the continuum, are blended learning and mostly online approaches, where schools reduce the amount of face-to-face contact and increase the variety of blended programmes on offer. At the far end of the continuum are completely online or full-time virtual schools, where students experience all instruction online.

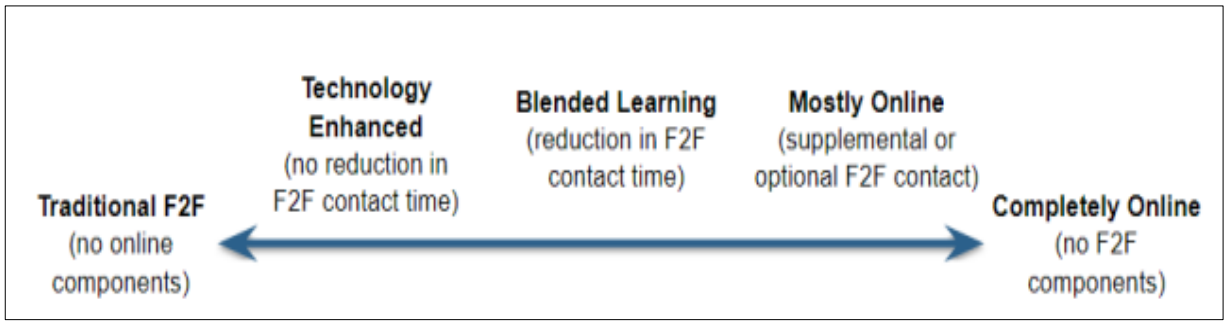

Figure 1: Continuum of Learning Models.

[10] https://www.unesco.org/en/articles/generative-artificial-intelligence-education-what-are-opportunities-and-challenges
[11] Barbour, M. K. (2018). The Landscape of K-12 Online Learning: Examining What Is Known. In *Handbook of Distance Education* (4th ed.). Routledge.
[12] Gershon, L. (2020, April 13). *Three Centuries of Distance Learning*. JSTOR Daily. https://daily.jstor.org/three-centuries-of-distance-learning/
[13] Barbour, M. K. (2018). The Landscape of K-12 Online Learning: Examining What Is Known. In *Handbook of Distance Education* (4th ed.). Routledge.
[14] Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education*, *18*, 4–14. https://doi.org/10.1016/j.iheduc.2012.09.003

In many instances of online learning students are located in a school building, as opposed to learning from home, to access supplemental classes online (i.e. some refer to such approaches as blended schools). Within these schools, there are an array of blended learning approaches and these often are informed by the subject area being taught, and the resources available to the teachers and students.

The EU Commission engaged in a detailed study on blended learning, where they reviewed a range of existing definitions and descriptions before putting forward their own definition, publishing a Council Recommendation on blended learning approaches for high-quality and inclusive primary and secondary education[15]. The Council Recommendation defines blended learning as follows:

> Blended learning in formal education and training involves a diversity of approaches and is to be understood as a school (in primary and secondary education, including vocational education and training), teacher and trainer or learner taking more than one approach to the learning process:
>
> – blending school site and other physical environments away from the school site (either with the presence of a teacher/trainer, or separated by space and/or time in distance learning);
> – blending different learning tools that can be digital (including online learning) and non-digital.

While this definition is quite broad, it covers a range of blended learning contexts, including blended schools, and therefore it can be very useful for schools. Blended schools have played an important role in education systems globally, including here in Ireland.

Online Learning Environment Models in Ireland

Evidence supports the use of blended schools, both in Ireland[16] and New Zealand[17], to reach students who typically are unable to access a full curriculum in their school. Blended schools offer supplemental education to students, where particular subjects are not available in their local school. The Gaeltacht e-Hub project, established in 2018, enables students to remain in their local post-primary-school and to enrol in online classes for either physics or chemistry if they are not available through the medium of Irish in their school. In addition, Post Primary Languages Ireland (PPLI)[18], have a Blended Learning Project, where they use blended learning

[15] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H1214%2801%29
[16] Ibid
[17] Lai, K.-W. (2017). Pedagogical practices of NetNZ teachers for supporting online distance learners. *Distance Education*, *38*(3), 321–335. https://doi.org/10.1080/01587919.2017.1371830
[18] https://ppli.ie/

approaches for students to access Leaving Certificate Polish. The PPLI project uses a combination of both face-to-face (classroom based) and online (both synchronous and asynchronous) approaches with students. The Blended Learning Project, similar to the e-Hub Project, has a key goal of providing equitable provision to all students who wish to study LC Polish. Equity of provision is at the core of these examples, thus ensuring an inclusive approach for the participating students, that does not penalise them because of where they live and/or attend school.

Elsewhere, a small number of Irish post-primary schools have experimented using online blended learning approaches to offer Leaving Certificate subjects that were unavailable to the students in their school. In 2009 two schools used internet technology to connect and teach chemistry across two classrooms in different schools[19]. Students from one classroom were connected live to another classroom, where they participated in live online chemistry lessons. This configuration would be described as a hyflex model, where "teachers teach students at the same time face-to-face (f2f) and synchronously online through video-conferencing software"[20]. A similar model was later used as part of The Digital Hub Schools Broadband Exemplar Project[21], circa 2013 where two schools, participated in the Connected Classroom Project to offering Leaving Certificate Mathematics to all students[22].

While both projects enabled students to study subjects, previously unavailable to them, the models were unsustainable in the longer term, as they proved challenging for the schools, specifically for the teachers and students. The model of connecting two classrooms using video-conferencing technology proved challenging for the teacher in trying to engage both cohorts of students, those in the physical class and those remotely connected by the technology. The Digital Hub's internal research[23] found that while the model worked, it was primarily down to the dedication of the class teacher and the schools involved, who worked tirelessly to overcome a myriad of issues. It should also be noted that the hyflex model was subsequently taken on board by many Irish post-primary schools in the later stages of Covid-19, when some students were in school and other joined for overflow classrooms or from home, but the emerging

[19] Beam me up, children: Ms Smith is on screen number one. . . (2009, December 2). *Irish Independent*. https://www.independent.ie/life/family/learning/beam-me-up-children-ms-smith-is-on-screen-number-one/26587651.html
[20] O'Ceallaigh, T.J., Connolly, C.; O Brien, E. (2023). *Hyflex Pedagogies: Nurturing teacher presence in multi-modal learning spaces post pandemic*. https://routledgeopenresearch.org/articles/2-2
[21] *The Digital Hub Schools Broadband Exemplar Project. https://www.youtube.com/watch?v=GK_cWzEJrR0*
[22] H2 Learning. (2018). *Irish-Medium e-Hub Pilot Project—International Review and Advisory Report*. Department of Education and Skills. https://assets.gov.ie/138796/04d00ca6-0873-43b0-b2d6-80b4719475c2.pdf
[23] *Casey, L. (2013). Review of the Connected Classroom Project. Digital Hub Development Agency.*

research, in this case for higher education, suggests that online students found it challenging to engage with their teacher and fellow learners[24].

In addition, online schools have also played a role in enabling at risk or vulnerable students to partake in, or in many cases reconnect with, education. NotSchool in the UK[25] was formed in 1998 and is an example of an online school, designed to reconnect young people with their education[26]. Such schools were created to address the issue of school refusal, which is an issue in many countries, including Ireland. The Irish Presentation Sisters identified the issue of school refusal as a key priority in the mid-2000s and established iScoil[27] in 2009, having trialled the NotSchool model with a group of young Irish students. iScoil targets young people between the ages of 13 and 16, who are legally required to attend school. It is part funded by the Department of Education under The Home Tuition Scheme[28] and has proved extremely successful[29] since its inception, and it continues to innovate and provide personalised learning experiences for their learners. The evidence is that such approaches work for students who, for a myriad of reasons, have become disconnected from attending their school.

This section, before covid (BC), has outlined a tradition of online learning, that has existed in different formats for more than 25 years in Ireland.

During Covid, DC – An Emergency Response

The Covid-19 pandemic had a major impact on schooling around the world. Overnight schools had to close and 1.6 billion young people in 195 countries worldwide, were unable to access their classrooms[30]. The closing of schools did not entirely stop education, although it certainly changed it, and many countries switched to forms of remote education, where students initially learned from home with the support of digital technology. This form of education was typically referred to as Emergency Remote Teaching (ERT) or Learning (ERL), where learners and their teachers used digital technologies to connect, so that schooling could continue. Schools used a range of present-day digital technologies in an attempt to recreate the in-person schooling

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[24] Eduljee, N. B., Murphy, L., Emigh-Guy, M., & Croteau, K. (2023). Student Perceptions about HyFlex/Hybrid Delivery of Courses during the COVID-19 Pandemic. *College Teaching*, *0*(0), 1–12. https://doi.org/10.1080/87567555.2023.2208815

[25] *http://www.notschool.net/origins.html*

[26] VISCED. (2013). *England—Researching Virtual Initiatives in Education*. http://www.virtualeducation.wiki/index.php/England#Virtual_initiatives_in_schools

[27] *https://iscoil.ie/*

[28] *The scheme is designed to address the needs of a small pool of learners who need home based support for relatively short periods of time (Department of Education and Skills [DES], 0044/2020).*

[29] Eivers, E. (2021). *The efficacy of iScoil's home-based provision*. Department of Education. https://iscoil.ie/wordpress/wp-content/uploads/2022/03/The-Efficacy-of-iScoils-Home-Based-Provision-Eivers-2021.pdf

[30] *https://en.unesco.org/covid19/educationresponse*

experience online. Such approaches proved challenging, and some students struggled to manage their learning in this new environment, as they missed the routine and structures of their in-person school experiences[31]. However, schools adapted their responses over time, which resulted in an evolution of practice.

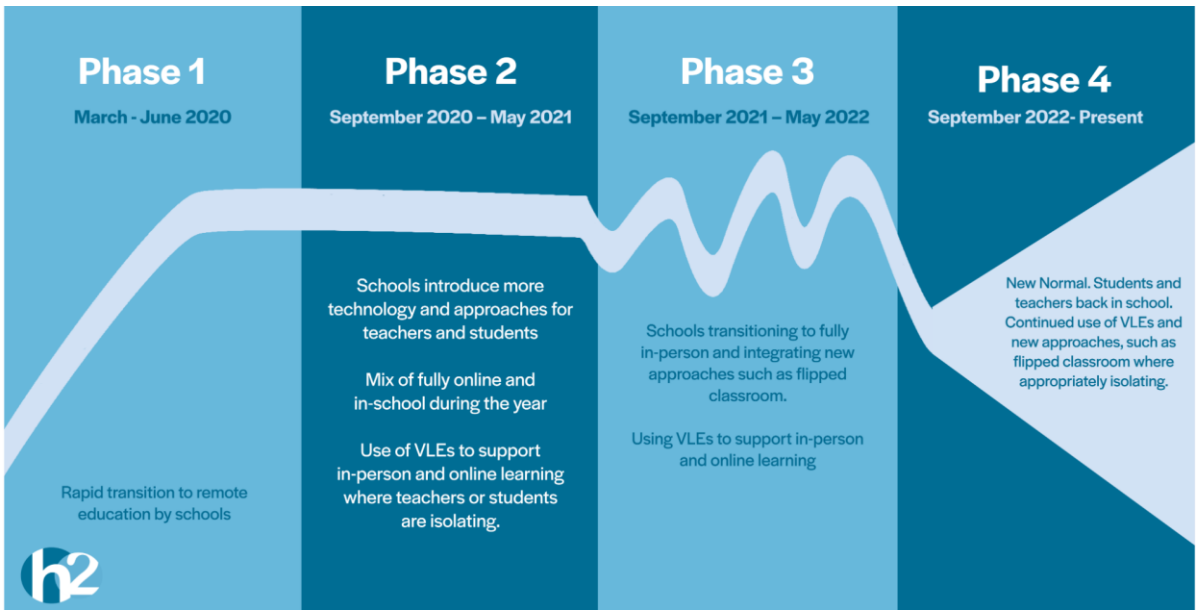

Figure 2: The phases of Covid-19 in Schools.[32]

H2 Learning has developed Figure 2 above to capture a number of distinct phases in relation to remote and online education in Irish post-primary schools between March 2020 and the present day, and this diagram has been informed by research on the impact of Covid-19 in Canadian schools. Initially, Phase one covered the period March to June 2020, when schools moved online overnight and used a myriad of technologies and approaches to connect with their students[33]. Phase two, September 2020 to May 2021, was characterised with interruptions to teachers and students being in school and typically saw schools using more digital technologies and new approaches with students. Phase three, September 2021 to May 2022, was characterised by a gradual return to pre-Covid-19 activities in schools and a return, predominantly to in-person teaching. Some schools introduced approaches such as the flipped classroom and continued to use VLEs to support in-person teaching, learning and assessment. Finally Phase four, September 2022 to the present day, witnessed a full return to in-person

[31] ESRI, Mohan, G., McCoy, S., ESRI, Carroll, E., ESRI, Mihut, G., ESRI, Lyons, S., ESRI, Mac Domhnaill, C., & ESRI. (2020). Learning for all? Second-level education in Ireland during COVID-19. ESRI. https://doi.org/10.26504/sustat92.pdf

[32] *This graphic has been adapted and informed by a graphic that was presented on page 3 of the following report, https://www.researchgate.net/publication/347535715_Understanding_Pandemic_Pedagogy_Differences_Between_Emergency_Remote_Remote_and_Online_Teaching*

[33] Dempsey, M. & Burke, J. (2021). Lessons Learned: The experience of teachers in Ireland during the 2020 pandemic. Maynooth: Maynooth University

teaching and schools selectively using online approaches and VLE platforms with their students, where appropriate. We will briefly review each phase below in a little more detail.

In the early stages of lockdown, Phase one, schools and their teachers and students, did their best to respond to this crisis situation, when they often did not have the requisite digital technologies and the associated competences to use them to support teaching, learning and assessment practices at a distance. Despite these challenges, schools improvised and embraced the challenge, thus ensuring that learning could continue, albeit in a different format from in-person or face-to-face classroom learning[34].

Schools quickly discovered during Phase one that teaching online is very different from in-person or face-to-face teaching and that it takes time to develop one's competences in this area[35]. Teachers need time to become familiar with effective tools and teaching strategies, as was evidenced in the Gaeltacht e-Hub Project[36]. Schools, teachers and students adapted as best they could, despite the many challenges they faced at this time. Nevertheless, many lessons were learned during this period of delivering online learning during the pandemic, which resulted in a voluminous literature report on what was learned[37][38], which informed how schools adapted their ERT practices over time.

A number of lessons were learned during Phase one, including the need for teachers and students to have the necessary digital equipment and competences and to have the necessary time and resources to plan effective online learning. Schools organised professional development activities to upskill teachers on how to use a range of digital technologies, such as VLE platforms and other technologies during Phase one and two. Phase two, September 2020 to May 2021, was characterised by periods of ERT, yet schools felt that the use of technology was more embedded in practice with many teachers using it on a daily basis in their classes[39]. Furthermore, there is evidence that where staff engaged in a coordinated approach (i.e. a school wide approach), there was greater collaboration, and it enabled staff to support one another. Interestingly, Irish teachers requested more pedagogical supports, around using digital

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[34] Devitt, A., Bray, A., Banks, J., & Ní Chorcora, E. (2020). Teaching and Learning During School Closures: Lessons Learned. Irish Second-level Teacher Perspectives. Trinity College Dublin. https://www.tcd.ie/media/tcd/education/research/research-projects/Teacher-Survey-Report-ExecutiveSummary.pdf

[35] Barbour, M. K. (2018). The Landscape of K-12 Online Learning: Examining What Is Known. *In Handbook of Distance Education (4th ed.)*. Routledge.

[36] Education and Training Inspectorate. (2021). *Independent evaluation of the Gaeltacht e-Hub Pilot Project*. https://assets.gov.ie/126987/1a193fc1-ff42-41c4-9cba-a4bf1b4a64d2.pdf

[37] Eurydice (2022). *Teaching and learning in schools in Europe during the COVID-19 pandemic: 2020/2021*. Publications Office of the European Union. https://data.europa.eu/doi/10.2797/1056

[38] https://www.worldbank.org/en/topic/education/publication/the-rapid-framework-and-a-guide-for-learning-recovery-and-acceleration

[39] Dempsey, M. & Burke, J. (2021). Lessons Learned: The experience of teachers in Ireland during the 2020 pandemic. Maynooth: Maynooth University

technologies to support online teaching and learning practices, over the course of the pandemic[40].

During these early phases of Covid-19, many in education looked for support in relation to ERT practices, and they turned to the online education and schooling research for guidance (i.e. the earlier work of Berge and Clark)[41], on how to plan and design effective online education. During the course of Covid-19, greater attention was paid to how the technologies were being used to support teaching, learning and assessment practices. Specifically, schools focused on how best to use digital technologies to connect with and build relationships with learners at a distance. Schools experimented with new approaches, where they–combined face-to-face and online learning environments, which were typically referred to as hybrid online learning models. Such approaches typically appeared during Phase two and three, as schools could readmit some students and staff to the school premises. The hybrid model timetabled students to learn in the school building on certain days of the week and have online live sessions with their teacher, from home, on other days. In such models, students were in school for part of the day and then online for other parts of the day. Such models provided greater flexibility to students, particularly those students who had developed good self-regulated learning skills and often these were older students (i.e., senior cycle students)[42] [43].

In Phase three, when schools returned to having all teachers and students back in the physical school building, additional new models developed. Some schools, and clusters of schools[44], were keen to harness the positive elements of ERT with a return to face-to-face teaching and thus approaches such as the Flipped Classroom, a form of blended learning, came to the fore. The flipped classroom model had its roots in higher education[45] and was designed to flip the classroom experience so that students were not sitting passively during lectures or classroom presentations, but were instead engaged in more active practices such as group discussions, presentations and problem solving, during the lesson. The idea was that the lecture content, or key questions, were shared in advance with students and the face-to-face class session was less focused on content transmission but more on deliberation, discussion and teaching for

[40] https://www.tcd.ie/education/research/research-projects/teaching-and-learning-practices-during-covid/
[41] Berge, Z., & Clark, T. (Eds.). (2005). *Virtual Schools: Planning for Success*. Teachers College Press, Columbia Univ.
[42] Michigan Voices: *An In-Depth Look at the Experiences of Educators, Students, & Parents During Emergency Remote* Learning | Michigan Virtual. (2020, August 7). https://michiganvirtual.org/research/michigan-voices/
[43] Devitt, A., Bray, A., Banks, J., & Ní Chorcora, E. (2020). Teaching and Learning During School Closures: Lessons Learned. Irish Second-level Teacher Perspectives. Trinity College Dublin.
[44] *For instance, the ACCS organised professional development workshops for their staff on the flipped classroom approach during the 2022-23 school year.*
[45] Seery, M. (2015). *The Flipped Classroom: Rationale and Approaches for Higher Education*. AHEAD. https://ahead.ie/journal/The-Flipped-Classroom-Rationale-and-Approaches-for-Higher-Education

understanding. The model, which is also known as the 3 Event Model[46], is captured in Figure 3 below and it shows that the typical in-class lesson, is now reimagined as three connected learning events, where the teacher decides if and when to use digital technologies. H2 Learning led a number of online professional learning events with post-primary teachers and the feedback from teachers attending these sessions was that such approaches worked well in preparing students for new content and in using class time to deal with any misunderstandings or questions that students might have. Teachers also noted that such approaches need to be carefully selected by the teacher for appropriate topics and that they would not work for all content, all of the time.

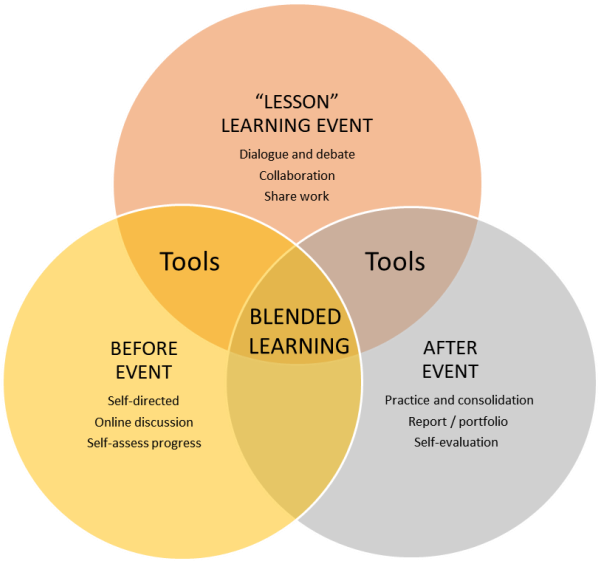

Figure 3: The Flipped Classroom or 3 Event Model.

Schools were innovative in how they addressed the challenges presented during phases one to three of Covid-19 (DC) and appear keen to utilise these new competences and practices developed with their students now that they are fully back in their classrooms (Phase four). Anecdotally, teachers noted that approaches such as the flipped classroom worked well with senior cycle courses, where there was a large amount of content to be covered[47]. The approach enabled students to interact with relevant course content in advance or after a lesson, via the school's learning management system (LMS), and they could also connect with their classmates and teacher online at designated times. Teachers noted that the approach freed up valuable class time for more active forms of learning. However, teachers also noted that such approaches needed time to design and implement and needed to be informed by research on effective

[46] European Commission. (2020). *Blended learning in school education – guidelines for the start of the academic year 2020/21.* https://www.schooleducationgateway.eu/downloads/Blended%20learning%20in%20school%20education_European%20Commission_June%202020.pdf

[47] *These sentiments were shared during three online courses with teachers who participated in a H2 Learning online course focused on the flipped classroom approach in post-primary schools.*

online teaching, learning and assessing practices. We will consider some of these lessons in the final part of this section, After Covid (AC).

After Covid, AC – Looking to the Future

As schools fully exited the pandemic restrictions in September 2022, many people suggested it was timely to reflect on what took place during Covid-19 and to consider what elements they might retain in the future (Phase four). The following quotation from Educause, though primarily written for higher education, captures this very well.

> At the same time, instructors (teachers) and students have changed during the pandemic and are coming back to the classroom with new skills and different perspectives. As a result, rather than resuming business as usual, instructors (teachers) should take inventory of what went well during emergency remote teaching, as well as what they missed most about in-person teaching when they were apart from their students and begin to blend the two to design the new normal.[48]

As noted earlier, there is extensive research on what took place in schools during Covid-19 and we are only reviewing a selection of that research here. There are some key lessons that can were learned from this extended period of ERT, and we capture of a number of these below.

For example, The World Economic Forum reported that:

- the majority of teachers agreed that remote learning (ERT) was a poor substitute for the classroom;
- the majority of teachers felt their students learning had suffered;
- there was a concern among educators that the stress and isolation from online learning contributed to mental health issues among young people[49];
- there were concerns that the digital divide would widen[50].

Research in Ireland[51] supported these findings, and in addition found that:

- the mode of delivery was associated with student engagement and more interactive and collaborative approaches impacted more positively on student engagement;
- teacher self-efficacy (their level of belief in their own capacity to implement online learning approaches) impacted on the level of student engagement;

[48] *https://er.educause.edu/articles/2022/1/designing-the-new-normal-enable-engage-elevate-and-extend-student-learning*
[49] *https://www.weforum.org/agenda/2021/03/teacher-survey-education-learning-loss*
[50] *https://www.weforum.org/agenda/2020/03/3-ways-coronavirus-is-reshaping-education-and-what-changes-might-be-here-to-stay*
[51] Devitt, A., Bray, A., Banks, J., & Ní Chorcora, E. (2020). Teaching and Learning During School Closures: Lessons Learned. Irish Second-level Teacher Perspectives. Trinity College Dublin.

- digital poverty was an issue where students and teachers lacked access to appropriate technologies and to the digital competences needed to use these technologies effectively[52].

While the above observations are selective, they capture a number of the main challenges that were identified in relation to ERT approaches and experiences during Covid-19. However, it should also be noted that some students had very positive and inclusive experiences during this period.

Research conducted by the European Commission[53] identified a number of practices (i.e. Phases one and two in Figure 2) developed during Covid-19, as having the potential to be utilised in the future, AC. These included:

- More personalised/inclusive learning opportunities for some students.
- More flexible learning pathways and experiences where students are able to manage their own learning.
- More autonomy and self-regulated learning for some students.
- More varied forms of formative assessment.

The Educause quotation, cited above, suggested that merging some of these emerging positive practices, with what was already known about effective face-to-face schooling, had the potential to create a 'new normal' in schools and other settings. Thus, in Phase four, we expect to see schools begin to embed online learning approaches more, where appropriate.

To conclude the literature review section of this paper, it is worth remembering the history of remote and online education practices in Irish post-primary education, and that these practices have typically been adopted when there was a clear rationale for using such approaches. The earlier examples from the Gaeltacht e-Hub project, from iScoil and from the PPLI blended learning project were all initiated to address a specific problem, to–provide inclusive access to education. Therefore, it is important, as a first step, to consider why a teacher or a school would use online learning approaches with their students. Considering this question will invariably require reflection and an identification of the opportunities and challenges associated with such approaches. Such professional decisions, whether by a teacher, a school, or an educational organisation, will require those involved to carefully consider their options before making a

[52] Dempsey, M. & Burke, J. (2021). Lessons Learned: The experience of teachers in Ireland during the 2020 pandemic. Maynooth: Maynooth University.
[53] European Commission. Directorate General for Education, Youth, Sport and Culture., ECORYS, & EIESP. (2021). Enhancing learning through digital tools and practices: *How digital technology in compulsory education can help promote inclusion: final report*: October 2021. Publications Office. https://data.europa.eu/doi/10.2766/365846

decision. Decision makers need to have the necessary digital competences[54] before they engage in reflective conversations, to ensure they can make critically informed decisions that fit with their context and that of their students.

[54] *Digital Competence Framework for Educators,* https://joint-research-centre.ec.europa.eu/digcompedu_en

Section 2: Online Learning Environments in a Redeveloped Senior Cycle

Existing practice, from Ireland and other contexts, is outlined in this section, identifying the opportunities that blended online learning approaches can provide. An overview of online learning approaches in use across five areas in senior cycle, will inform potential practices in a redeveloped senior cycle. The five areas in focus include:

- Non-school attendees
- Traditional subject and module space
- Cultural education
- Transition Year, and
- Initial vocational training

1. Non-school Attendees

> Exploring the online teaching, learning and assessment space that caters for students who do not attend school on a regular basis is an important area to explore, to ensure all students in senior cycle have access to teaching, learning and assessment opportunities, regardless of their ability to be physically present in a school building.

As noted earlier in the paper, students, who are not attending school are reconnecting with formal education through online learning environments. In Ireland iScoil caters for young people who are:

- Aged between 13 – 16 years;
- Absent from mainstream education for at least 6 months;
- Where significant interventions and supports have not worked;
- Where the Junior Cycle is not completed.

On successfully completing the programme, students achieve a QQI (Quality and Qualification Ireland) Level three qualification[55]. There are two options, to participate in iScoil, through a home-based model, or through one of their blended learning centres[56].

Students are supported by a mentor, their tutor and the iScoil team. The mentor, similar to those in the Gaeltacht e-Hub and other online school projects, support the learner by co-creating a

[55] https://iscoil.ie/wordpress/wp-content/uploads/2022/03/The-Efficacy-of-iScoils-Home-Based-Provision-Eivers-2021.pdf
[56] https://iscoil.ie/our-blended-centres/

personalised learning plan. The mentor works with the learner to support them and affirm their progress, as they move through their learning plan. Learners access materials on the iScoil VLE, which have been developed by a tutor, who is a subject specialist. Tutors are almost always qualified teachers, registered with the Teaching Council, whose subject qualifications broadly align with the subject they are developing materials for. Tutors also assess and review student activities on the VLE and collate a digital portfolio of student work that is submitted for external review and accreditation. Tutors communicate with students using messaging within the VLE in the format of text or audio, supplemented with video or voice calls occasionally. The iScoil central team are a key part of the infrastructure as they design and co-ordinate the delivery of the entire iScoil programme and are the central contact points for all external agencies, students and their families.

While the iScoil model currently supports students between the ages of 13 and 16 (as 16 is the legal age one can leave post-primary education), it is possible to envisage elements of this programme being extended to older learners, who could complete elements of their senior cycle programme from home or from a designated location in a post-primary school. The iScoil model works well for young people who are disconnected from school, by allowing them to re-engage with the formal education system and to acquire equivalent qualifications to those in schools, using a more flexible approach. The iScoil website reports that 80% of iScoil students achieve QQI accreditation and 83% of iScoil students progress to further education, training or employment.

2. Traditional Subject and Module Space

> The opportunities within the traditional subject and module space may afford students time to engage in deeper learning experiences within a subject or module and opportunities to stretch classroom learning.

Schools, in certain parts of the world, have typically developed supplemental online learning programmes for students, when their local school has been unable to offer a particular subject or subjects[57]. Such models have existed in countries such as Australia, Canada, New Zealand and the United States for many years[58]. Nearer to home, such approaches have also been

[57] *See examples cited in H2 Learning. (2018). Irish-Medium e-Hub Pilot Project—International Review and Advisory Report*. Department of Education and Skills. *https://assets.gov.ie/138796/04d00ca6-0873-43b0-b2d6-80b4719475c2.pdf*
[58] Ibid

developed for schools in Scotland[59] and Wales[60]. Both the Scottish and Welsh projects are supported by their respective Departments of Education and are designed to meet the unique needs of schools and learners in their countries.

In Ireland, we too have a number of existing projects that enable students in senior cycle to study subjects (such as physics, chemistry and modern foreign languages), at Leaving Certificate level, that are not on offer in the school they attend. The Gaeltacht e-Hub project was designed to address issues, such as the lack of a qualified teacher to teach a subject through the medium of Irish, and difficulty in providing a subject for small numbers of students. The Gaeltacht e-Hub project was established in September 2018 as one of a number of positive interventions and supports identified in the Gaeltacht Education Policy 2017-22[61], with the specific objective of strengthening the structure of educational provision in small Gaeltacht schools. The e-Hub project was launched in April 2019, initially as a pilot project for the 2019/20 school year and is now entering its sixth year in 2023/24. The e-Hub initially taught physics online and by June 2023, over 40 students had successfully participated in the project. Chemistry was introduced in September 2022, with nine students enrolled in the first cohort, attending online from five schools. The numbers opting for physics and / or chemistry fluctuates on an annual basis based on the requirements of the students attending the Gaeltacht post-primary schools.

The model allows students to enrol in either physics or chemistry from their own school and is offered as part of the school timetable. There are four e-teachers, two for physics and two for chemistry, who teach the four cohorts of online students, two 5th and two 6th year groups respectively. The schools are referred to as the provider or hub Schools, and the e-teachers have designated spaces from where they teach online within the schools, supported with a range of specialised equipment (i.e. a computer, a large screen monitor, a unidirectional microphone and document camera). In addition, they receive a range of ongoing professional development and technical support to assist them in running the project online.

The students are located in receiver schools, where the schools provide them with a dedicated space and the necessary equipment (device and headphones) to access the live online classes. The schools also provide students with an e-mentor, who is timetabled to support the students during the class. The e-mentor is a teacher, who is timetabled to support the students, however, it should be noted that in other jurisdictions, such as the US and New Zealand, the e-mentor can also be a support person in the school. The role of the e-mentor has proved extremely

[59] https://e-sgoil.com/
[60] https://e-sgol.cymru/
[61] Department of Education and Skills. (2016). *Policy on Gaeltacht Education 2017-2022*. Department of Education and Skills.

important in supporting students in receiver schools, ensuring they attend classes and that their pastoral needs are met.

All of the timetabled classes take place live, with the e-teachers, e-mentors and students all logging on online at the same time. During the live classes, students engage in a range of learning activities that include teacher directed sessions, collaborative learning and self-directed learning tasks. The e-teachers operate in the role of facilitators, and they activate a range of supportive pedagogies, including cooperative learning approaches[62]. In addition, the e-Hub students and their e-teachers meet in-person a number of times during the school year to participate in practical activities. These events take place in a suitable laboratory setting. In the case of physics, the practical days are held in the University of Galway and are led by the university staff, with support from the e-teachers, while the chemistry practical work is designed and led by the class teacher. While the e-Hub uses a predominantly online blended school approach, this is supplemented, where required, with a number of face-to-face sessions. In addition to enabling students to fulfil the curriculum specification, they also help to build strong relationships between students and their e-teachers.

The model has proved very successful and an external evaluation, undertaken by the Northern Ireland Education and Training Inspectorate in 2021[63], reported that:

> This is a successful project, which is well resourced and managed effectively by the Department of Education and its agencies, H2 Learning, the e-Teachers and the e-Mentors, and the two provider and eight receiver schools (p. 6).

In particular, students spoke "positively about their experiences of the online platforms to deliver their lessons; the feedback they receive to improve their work; and their opportunities to engage in real-time collaborative work" (ibid, p. 9), where they engaged in critical discussions, in creating diagrams and in analysing data with their peers and e-teacher. Similar approaches are deployed in Scotland where the e-Sgoil project provides a range of services to learners that are designed to complement and support the work already being done by schools, parents/carers and other agencies in meeting learner needs[64].

The e-Sgoil initiative is described in its promotional material as follows:

> The e-Sgoil initiative was launched by Comhairle nan Eilean Siar (CnES) in August 2016. Its main purpose was to enhance equity in terms of subject choice for all pupils, irrespective of geographic location or which school they attended in the Western

[62] *What is Cooperative Learning? Cooperative Learning Institute.* http://www.co-operation.org/what-is-cooperative-learning
[63] Education and Training Inspectorate. (2021). *Independent evaluation of the Gaeltacht e-Hub Pilot Project*. https://assets.gov.ie/126987/1a193fc1-ff42-41c4-9cba-a4bf1b4a64d2.pdf
[64] Graham, S. (2023). *Evidence of Impact Report 2023 Removing Barriers Foghlam a' Fàs*. e-sgoil. https://e-sgoil.com/downloads/e-sgoil_Impact_Report_2023.pdf

> Isles. It was also envisaged as a means of addressing recruitment issues in key subject areas[65].

e-Sgoil states that it responds creatively to demand and is keen to stress that it is not designed to replace classroom teachers, but rather to promote equity in terms of subject choice in schools. Currently they offer a range of supplemental subjects to students drawn from schools located in the Western Isles and these include Advanced Higher Maths, Physics, Gaelic, Higher Modern Studies and Fiddle and Chanter tuition. Similar to the e-Hub project, it uses a synchronous teaching model where the teachers connect live with their students online. The project uses a video-conferencing system Vscene[66], now known as Classview, alongside the Scottish digital learning platform for schools which is called Glow[67] and Office 365. Similar to the e-Hub project, the e-Sgoil project monitors the quality of teaching, learning and assessment practices, primarily using classroom observations conducted by the school's principal teacher. The project provides a range of services, including supplemental education across a range of subject areas and a recent impact report found that it is having a positive impact on the lives of learners, of all ages, across the Western Isles[68].

Thus, there is evidence[69] that where there is no suitably qualified teacher in a school, or where the number of students interested in taking a particular subject is not viable in a school, supplemental education models can address these issues well.

The models used to teach a subject can vary, however, there is a need to provide an adequate technological infrastructure and ensure teachers, students and mentors are constantly supported to teach, learn and mentor online. The human element is key in all of these models, and it is vital that teachers have opportunities to connect regularly with their students and that students connect regularly with each other, so as to build relationships.

3. Cultural Education

> Cultural education can help to broaden students learning experiences within art, music, history and more, while also using the online space to engage in intercultural learning.

There are many ways in which online learning environments and approaches can be used to broaden students learning experiences within art, music, history and other subject areas. For example, DCU's ADAPT Centre is part of a Horizon 2020 programme, which explores "whether

[65] https://education.gov.scot/improvement/Documents/sac83-e-Sgoil-faqs.pdf
[66] https://www.heanet.ie/services/video-services/video-conferencing
[67] https://glowconnect.org.uk/
[68] https://e-sgoil.com/downloads/e-sgoil_Impact_Report_2023.pdf
[69] Education and Training Inspectorate. (2021). *Independent evaluation of the Gaeltacht e-Hub Pilot Project*. https://assets.gov.ie/126987/1a193fc1-ff42-41c4-9cba-a4bf1b4a64d2.pdf

citizens' participation in informed discussions can improve both learning and decision-making processes"[70]. The project is part of an EU wide EUComMeet project[71], which is focused on "designing and testing an online platform that promotes the development of participatory spaces, which will allow citizens from different countries, who speak different languages, to interact using live translation software". While the project has been designed for TY students, the project organisers note that it can also be linked to the active citizenship strand of Leaving Certificate Politics and Society: "Rights and responsibilities in communication with others". Students participate in three live online discussions, where they "interact with students from other Irish cities and from a number of EU countries about the climate and sustainability". This is an example of how live synchronous technology can enable students and their teachers to connect with other schools, or to outside experts, in Ireland or around the world, where they can engage in real-time discussions on issues that are relevant to their learning. There is an endless list of potential uses for online discussion technologies in the redeveloped senior cycle.

There are multiple opportunities for using online learning environments and approaches in art, for example at one end of the scale students can develop their art skills by accessing self-study programmes to develop their drawing skills[72] and at the other end of the scale, using immersive technologies in the teaching of illustration[73]. In both cases students can use online technologies to develop a range of competencies, or to engage in experiences that may not have available in their own school. The immersive worlds, while very exciting, are still very new and there is ongoing research in relation to accessibility and usability issues with these technologies.

In Scotland, e-Sgoil has been using their approach to teach music since its inception. Students can connect with their tutor over the video-conferencing system and interact in real-time. In addition, their tutor visits their school once every three weeks. Thus, they use a blended approach that maintains continuity between the teacher and their student, despite being physically separated[74]. Furthermore, online learning technologies can be used to connect students with guest speakers. In the Western Isles, they have a tradition of pipe bands and the e-Sgoil connected students with an apprentice tutor who was working on the islands teaching drumming[75]. Students who joined the live webinar were able to hear and see how the tutor worked with the children in the schools and they were also able to ask questions and provide feedback, via an online voting tool, to the teacher.

[70] *https://www.adaptcentre.ie/news-and-events/ty-students-online-climate-discussions-across-europe/*
[71] *https://www.eucommeet.eu/*
[72] *https://www.skillshare.com/en/browse/art*
[73] *https://www.arts.ac.uk/research/current-research-and-projects/accelerate*
[74] *https://www.heraldscotland.com/news/18255248.race-save-music-schools-digital-lessons-western-isles/*
[75] *https://e-sgoil.com/dyw-live/dyw-live-events/scottish-apprenticeship-week-2022/instrumental-music-instructor/*

Similarly, these technologies and online learning approaches can support the teaching of subjects, such as History, where a guest speaker might join to share a perspective and engage in discussion with students. Teachers can design learning experiences, using these approaches, to engage their students and connect them with primary sources, such as online videos, or to immerse themselves in a virtual environment, so that they feel that they are present in the location. There is still limited research on the use of such immersive worlds in schools, but some believe it has potential to motivate and engage young people in historical discussion[76].

Finally, schools can connect with other schools by enrolling in eTwinning Projects[77] where they can engage in collaborative projects with the support of the project's TwinSpace environment. The project website states that "the eTwinning community is made up of thousands of teachers and educators, who share a vision of inclusive schools, using information and communication technology in a meaningful way, and making the most of 21st-century skills". Once again, the eTwinning platform enables schools to connect and engage in projects that are relevant to them and the sky is the limit in terms of what is possible. For example, schools might join a project around shared European Values[78]. In such a project they would have opportunities to connect with students in other European countries to engage in discussions on relevant issues, to address real-world issues and create digital materials, all the while developing their key competencies throughout the process. Thus, there are a myriad of ways in schools can connect to the wider world, through online learning environments, without ever leaving the classroom. It should be noted that schools have the freedom to join or initiate projects that fit with their own context.

4. Transition Year

> Learning and assessment opportunities available to students in Transition Year will be more open-ended in nature, in comparison to those within the traditional subject and module space of the Leaving Certificate, due to the flexibility of the programme.

Many organisations and sectors create modules and programmes that schools and students can participate in, as part of their TY programme. This can include modules schools create themselves, to modules created by professional bodies, non-government organisations, cultural organisations and/or private companies. Already, many of these modules are developed as online educational experiences, that include a mix of fully online self-study or asynchronous

[76] https://doi.org/10.3389/feduc.2022.1032108
[77] https://school-education.ec.europa.eu/en/etwinning
[78] https://englishpagesforyou.wordpress.com/etwinning-activities/

modules, live synchronous modules and face-to-face experiences in schools or other settings. There is a recognition that distance learning or remote online learning approaches can be used to support schools to design their own TY Programme.

Organisations, such as the Professional Development Service for Teachers (PDST), now known as OIDE, developed guidelines for schools and TY coordinators to use such approaches[79]. While these suggestions were developed to help TY coordinators during Covid (DC), they are still valid today and illustrate how online learning approaches might be used as part of a TY programme. They highlight that online learning approaches can be used for multiple purposes, such as being part of a work experience programme, or for students to sample subjects that they might consider taking in the future, or to engage in online accredited learning modules in which they attain a wide range of certified skills.

A high-level review of what is on offer for TY students unearthed a vast range of modules that are already using elements of online learning. For example, students can enrol in online courses where they can develop their ICT (Information Communication and Technology) skills, their career skills and their driving skills by engaging in a set of fully online modules[80]. Such approaches enable students to work through the module at their own pace and in their own time, while the system monitors their activity and automatically issues a certificate of completion once the student has successfully completed the course. Some universities[81] such as Dublin City University (DCU), have developed ICT modules that provide the teacher and the students with a set of self-study materials and a structure that they can follow. Such an approach enables the class teacher to lead the classroom activities with their students in their school, with the option of a representative from the university visiting the classroom once per term, and for the students to visit the university. This approach is an example of a blended approach where the university provides materials, via an online platform, and the class teacher mediates the content in their own classroom.

There are also examples of universities offering online STEM (Science, Technology, Engineering and Mathematics) programmes, where students can engage with the content in their own time and where they also have an option to attend a live online webinar once a week[82]. In this example from Trinity College, see Figure 5 below, students have a range of opportunities to engage with content (i.e., lectures in areas such as physics, engineering, design computer science, and astronomy), their teacher (i.e., the university lecturer) and their fellow students

[79] *https://www.pdst.ie/node/7648*
[80] *https://www.cliste.ie/library1/TY-Online-Programs-for-Irish-Schools-converted.pdf*
[81] *https://docs.google.com/document/d/13YOhC-G9OMcnXdDNvnRUBwMXm9tj9Tu0C12LQrCa_rg/edit#heading=h.8gctxi2rzqxa*
[82] *https://www.tcd.ie/study/other-courses/ty-programmes/*

during the course of the module. They also have opportunities to engage in active learning approaches to create a digital artefact and to reflect on their own learning. Furthermore, they receive feedback and critical insights over the course of the module.

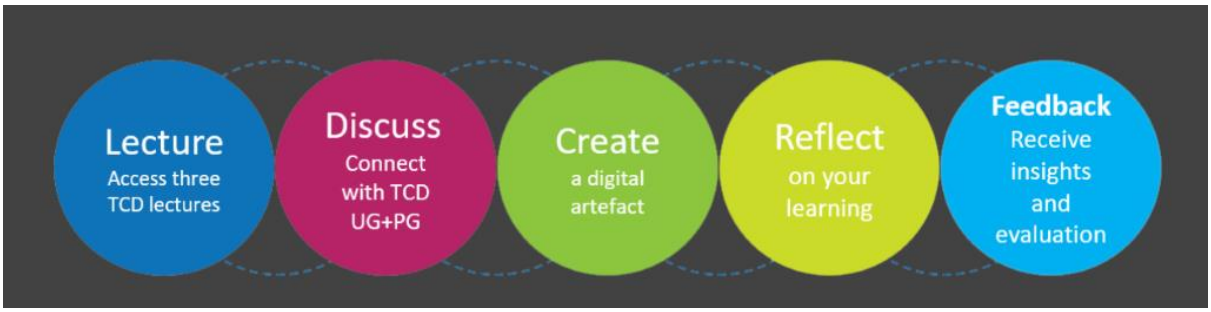

Figure 4: Opportunities for interaction during the online module.

In addition, a number of non-governmental organisations (NGOs), such as UNESCO, (United Nations Educational, Scientific and Cultural Organization) have developed online programmes that support a range of delivery modes, that includes in-person delivery, blended delivery and e-Learning delivery[83]. The supporting documentation provides guidance to teachers and to students on how they can access and interact with the course content via each of these three modes. UNESCO's design highlights the flexible nature of online learning approaches, which enables teachers and students to decide how they wish to engage with the course materials. UNESCO also provides an explanation for what they mean by each of these modes of delivery, and they note that the in-person module approach is only available in certain locations and that schools may incur additional costs for travel. Thus, the blended and e-Learning options provide flexibility and the opportunity for more students to engage in the programme.

Many TY online learning approaches provide students with opportunities to develop work skills across a range of work settings. These can range from how to become a barista[84] to gaining experience of what it is like to work in certain professional fields, such as accounting[85] or law[86]. In each case, the use of online learning is different. For example, the barista course consists of a two-hour online module which is preceded by a full-day in-person training session in the school, while the accounting example is all delivered online via an online learning platform. In contrast, the law example consists entirely of live synchronous sessions on Zoom. Thus, various organisations have designed programmes and approaches to suit their context and to enable the widest number of schools to participate. There is no-one-size-fits-all model, with the

[83] https://ecounesco.ie/wp-content/uploads/2022/12/TY-Programme-Brochure-2022.2023.pdf
[84] https://ty.ie/profile/ty-barista-programme/
[85] https://www.headstartaccounting.ie/ty
[86] https://www.lawsociety.ie/public/Public-Legal-Education/Solicitors-of-the-Future

majority of organisations designing online approaches that are flexible and inclusive, so that the largest number of students from all over the country can attend. The examples cited above are only a selection of the numerous TY modules and programmes that already utilise online learning approaches and some of the TY content and approaches have the potential to support students to access initial vocational training experiences, to support the traditional subject and module space and cultural education.

5. Initial Vocational Training

> Exploring the initial vocational training space can create new opportunities across senior cycle, for students to engage with aspects of initial vocational training and skill development.

As noted above, there are already examples of senior cycle students accessing initial vocational modules using elements of online learning. TY students can already participate in fully online skills modules, as in the case of the courses developed by the Irish Academy of Computer Training (IACT)[87]. Other organisations, such as Dulann[88] offer a range of online courses in areas such as health and safety, induction and customer care and successfully developed an offering for schools and transition year.

In Scotland the e-Sgoil has created a programme, Developing the Young Workforce (DYW) Live[89], which is a programme of live, interactive work-related learning sessions for learners, which is delivered by a network of more than 60 partner organisations and employers. The programme uses live webinars to connect schools with companies, entrepreneurs and people working in a range of careers. The programme is proving very successful and e-Sgoil plan to expand the project by developing a digital badging system to recognise student achievement on the programme. They also plan to provide additional certification for students, who successfully complete an entire programme, for example in maritime studies. The Comhairle nan Eilean Siar (CnES[90]), who established the e-Sgoil, have been working with employers for some time to address labour market priorities and staff have developed new industry-recognised national qualifications[91]. The online programme in Maritime Studies is an example of this.

Thus, online learning approaches and their associated environments have and continue to provide inclusive access to students to a range of accredited vocational programmes, where they can develop a range of necessary skills and attain online certification in the process. The

[87] https://gov.iact.ie/about-iact/
[88] https://ty.ie/profile/dulann-ty-online-course/
[89] https://e-sgoil.com/dyw-live/
[90] This is the Western Isles Council, which is the local authority managing education in this region of Scotland.
[91] https://education.gov.scot/media/hf3c1vei/ces-implementation-review0517.pdf

rationale behind these modules or approaches will undoubtedly vary, but it is possible to design new opportunities for students to engage in a range of vocational training and skill development. Furthermore, online virtual spaces will have an increasing role in vocational training as students, from their classroom or from home, can connect and collaborate with their classmates, experts and their teacher over the internet.

Section 3: Key Considerations when Considering the Use of Online Learning Environments

In this section of the paper a number of key considerations that should be take into account when using blended learning approaches. They should be viewed in the context of effective practices that have been identified over many years, and not just those informed by recent ERT experiences. The key considerations may not apply in all online blended learning scenarios, instead they are presented to help schools and teachers design meaningful learning approaches that can include elements of online learning and to support schools make informed decisions that align with the needs of their context. The key considerations are not presented in any particular order and could be used by teachers to reflect on how they might design and activate blended learning approaches in a redeveloped senior cycle.

Key Considerations for Online Teaching, Learning and Assessment Practices

1. Effective online teaching and learning needs to be designed[92]. The design process should take cognisance of a range of factors, such as the modality being used (i.e. fully online, blended or face to face (F2F)), how the learning activities will be paced and the pedagogical approaches that will be used[93]. Instructional design approaches, such as the backward design approach[94], which was alluded to earlier in relation to the examples of the flipped classroom (see Figure 3), have the potential to be utilised in designing online teaching, learning and assessment approaches. One of the key lessons learned during phase one of Covid-19 was that "there was a predominance of asynchronous (not occurring at the same time), transactional modes of communication with students"[95]; and

[92] Barbour, M., LaBonte, R., Kelly, K., Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. (2020). *Understanding Pandemic Pedagogy: Differences Between Emergency Remote, Remote, and Online Teaching*. https://doi.org/10.13140/RG.2.2.31848.70401
[93] Means, B., Bakia, M., & Murphy, R. (2014). *Learning online: What research tells us about whether, when and how*. Routledge.
[94] Wiggins, G., & McTighe, J. (1998). *What is backward design. In Understanding by design* (pp. 7–19). https://educationaltechnology.net/wp-content/uploads/2016/01/backward-design.pdf
[95] Devitt, A., Bray, A., Banks, J., & Ní Chorcora, E. (2020). Teaching and Learning During School Closures: Lessons Learned. Irish Second-level Teacher Perspectives. Trinity College Dublin. https://www.tcd.ie/media/tcd/education/research/research-projects/Teacher-Survey-Report-ExecutiveSummary.pdf

that such approaches did not always engage students with a need to use a range of approaches, including synchronous interaction, to engage students.

2. Online teaching and learning is **much more than students interacting with a wide range of digital content**. Education is widely regarded as both a cognitive and social process and any online design needs to bear this in mind. It is widely recognised that there are three typical ways in which students interact online[96].
    a. when they interact with educational content;
    b. when they interact with their fellow learners;
    c. when they interact with their teacher.

    None of these three forms of interaction is more important than the other and, while content is often a key priority, it is equally important to develop relationships with and between students and their teacher. Thus, it is important to develop an online community built on relationships and trust, as would be the case in a face-to-face classroom[97].
3. Successful face-to-face education practices that support effective student learning typically are accompanied by a **well-developed infrastructure** that, includes library resources, guidance and career counselling services, teaching support staff and quality resources[98]. Similarly, online education requires an effective infrastructure, and this requires an investment in an ecosystem of learner supports, which can take time to identify and build. This has been evidenced in the Gaeltacht e-Hub project, where teachers have access to a range of supports including, additional time to prepare for lessons, appropriate equipment, online resources, professional development supports and technical support. The project provides a range of in-time supports to both teachers and support staff, so they can design and implement appropriate online approaches for their students.
4. In keeping with the idea of developing appropriate infrastructure, it is important to acknowledge that there are a range of roles required in implementing effective online education. The class teacher, in the case in the Gaeltacht e-Hub is known as the e-teacher and performs the role of the instructional designer, as they prepare the lesson activities for their students. They then lead the teaching, learning and assessment practices in this online environment with their students. One of the most important roles in any online

[96] Moore, M. G. (1989) Editorial: Three types of interaction. *American Journal of Distance Education*, 3(2), 1-7. Retrieved from http://aris.teluq.uquebec.ca/portals/598/t3_moore1989.pdf
[97] Sudlow, D., Whalley, R., & King, A. (2022). *Towards Networked Learning: Stronger Together*. Virtual Learning Network Community. https://drive.google.com/open?id=1809KxgfrF0ifOxp4r7aA-LUfAlCmYvm8
[98] Barbour, M., LaBonte, R., Kelly, K., Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. (2020). *Understanding Pandemic Pedagogy: Differences Between Emergency Remote, Remote, and Online Teaching*. https://doi.org/10.13140/RG.2.2.31848.70401

learning infrastructure, is that of the mentor or facilitator[99], which in the Gaeltacht e-Hub is known as the e-mentor. The e-mentor is typically a teacher in the school where the student resides, where they assist students and monitor their attendance, providing pastoral care to the students[100]. Similarly, the iScoil model includes a key role for a mentor, who supports the class teacher in ensuring the well-being of the student is being addressed. Thus, it is essential to clarify what roles, the teacher and the mentor will play.

5. Online education can be challenging in that it requires teachers to develop new pedagogical approaches and to learn how to use a range of new technological platforms[101]. Thus, it is advantageous for teachers and students, to be open to change in terms of where, and how they teach, and learn, in these new online spaces, that are different from face-to-face practices. The online modality offers opportunities to reflect and to rethink how teaching, learning and assessment can be designed and activated but this requires a flexible approach on the part of the teacher[102]. Where possible, as captured in the previous section in relation to AC practices, online learning should promote active learning approaches, so that learners are motivated and engaged with the content, their fellow students and their teachers.
6. The research has also indicated that new ways of learning can be stressful and supportive pedagogies can assist teachers and students. Supportive pedagogies typically include clear instructions, guidance on managing time, empathetic approaches, well-managed discussions, multiple ways to check learning progression, multimedia resources, fun collaborative and engaging experiences, and providing structures that encourage motivation, while also giving learners greater flexibility. Teachers need to be supported in developing the necessary confidence and competences to effectively design and implement such practices in their context.
7. The role of the teacher in online learning is different than in the face-to-face classroom and, where possible, they should act more in the role of a facilitator of learning and design learning experiences that are learner centred, flexible, collaborative and based on the use of dynamic, socially based tools. In New Zealand they have described such an approach

[99] Barbour, M. K. (2018). The Landscape of K-12 Online Learning: Examining What Is Known. In *Handbook of Distance Education* (4th ed.). Routledge
[100] Yates, A., Starkey, L., Egerton, B., & Flueggen, F. (2021). High school students' experience of online learning during Covid-19: The influence of technology and pedagogy. *Technology, Pedagogy and Education*, *30*(1), 59–73. https://doi.org/10.1080/1475939X.2020.1854337
[101] Sudlow, D., Whalley, R., & King, A. (2022). *Towards Networked Learning: Stronger Together*. Virtual Learning Network Community. https://drive.google.com/open?id=1809KxgfrF0ifOxp4r7aA-LUfAlCmYvm8
[102] Barbour, M., LaBonte, R., Kelly, K., Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. (2020). *Understanding Pandemic Pedagogy: Differences Between Emergency Remote, Remote, and Online Teaching*. https://doi.org/10.13140/RG.2.2.31848.70401

as emergent design[103]. In such settings it is important that teachers establish a presence and build strong relationships with all students, while also ensuring that students develop peer relationships online. For example, in the case of the e-Hub the e-teacher takes the lead and builds such relationships with the students online and they are supported in this role by the e-mentor. As noted elsewhere, such approaches take time and teachers need to be supported by the wider education community to support their learners adapt to this new online environment, where they are expected to take greater responsibility for their own learning and become more self-directed learners[104].

8. The role of the student is also different in online education. Students are expected to take greater ownership of their learning and the research shows that older students, those at senior cycle, tended to perform better online than younger students during Covid-19 [105]. Online education should build student agency by enabling students to self-manage their own learning and in the process have greater agency over their learning. In this way, students can take greater ownership of their learning and make their own decisions around what they learn, when they learn and how they learn. For example, students might engage in an online quiz to identify prior content knowledge before embarking on an online module, or they might reach out to their classmates or teacher online for assistance with a particular task[106].
9. Ultimately, digital technologies now enable us to use new spaces and time in new and different ways[107]. We have new online or virtual spaces that allow us to reimagine where and how teaching, learning and assessment practices take place. These additional options enable us to consider how we can link our formal schooling learning spaces with a range of new offsite and virtual spaces (as referenced in the EU definition for blended learning). We now have new choices as to where, how and when we learn. Therefore, teachers and schools should have the confidence and competences[108] to make informed decisions around how they might use such technologies and spaces with their learners in ways that are motivating and engaging. Thus, teacher professional development is a key component

[103] Sudlow, D., Whalley, R., & King, A. (2022). *Towards Networked Learning: Stronger Together*. Virtual Learning Network Community. https://drive.google.com/open?id=1809KxgfrF0ifOxp4r7aA-LUfAlCmYvm8
[104] *Self-directed learning, autonomy and distance learning. My College.* https://my.chartered.college/research-hub/self-directed-learning-autonomy-and-distance-learning/
[105] *Michigan Voices: An In-Depth Look at the Experiences of Educators, Students, & Parents During Emergency Remote Learning | Michigan Virtual*. (2020, August 7). https://michiganvirtual.org/research/michigan-voices/
[106] Jin, S.-H., Im, K., Yoo, M., Roll, I., & Seo, K. (2023). Supporting students' self-regulated learning in online learning using artificial intelligence applications. *International Journal of Educational Technology in Higher Education*, 20(1), 37. https://doi.org/10.1186/s41239-023-00406-5
[107] Yates, A., Starkey, L., Egerton, B., & Flueggen, F. (2021). High school students' experience of online learning during Covid-19: The influence of technology and pedagogy. *Technology, Pedagogy and Education*, *30*(1), 59–73. https://doi.org/10.1080/1475939X.2020.1854337
[108] *Digital Competence Framework for Educators*, https://joint-research-centre.ec.europa.eu/digcompedu_en

to support teachers as they embrace such change in the creation and activation of such new modes of teaching, learning and assessment, as it teachers (as was noted earlier) who are key to the successful implementation of such approaches.

The above key considerations may not apply in all uses of online blended learning approaches, but they should be taken into account, if and when a teacher, or school is considering utilising such approaches. Digital technologies are not mentioned explicitly, as technologies in and of themselves will not ensure effective teaching, learning and assessment practices take place. "The effectiveness of distance education appears to have more to do with who is teaching, who is learning, and how that learning is accomplished, and less to do with the medium"[109].

[109] *Rice, K. L. (2006). A comprehensive look at distance education in the K-12 context. Journal of Research on Technology in Education, 38(4), 425-448.*

Conclusions

This paper has considered the literature in relation to online learning approaches, associated learning environments and the language that is typically associated with this field of study. The paper has confirmed that there are issues with language and terminology, as often terms are used interchangeably. Appendix 1 shares a glossary of terms, which have been gathered from a range of existing sources, particularly from the work of the EU Commission in relation to digital education, to support clarity and understanding. The Commission's definition for blended learning is particularly relevant and applicable in the context of a redeveloped senior cycle.

The paper has found that many Irish post-primary schools are already engaged in using online blended learning approaches through online learning environments with their students in senior cycle. These could range from using approaches, such as the flipped classroom, to engaging in online courses with TY students, or taking part in online collaborative projects as part of e-Twinning. Section two outlined a range of existing approaches that highlight the scope that online learning approaches can have in a redeveloped senior cycle. While there is a wide range of examples available for TY modules and programmes, the potential to integrate online learning environments and approaches into all senior cycle programmes exists.

Many of the examples cited, such as the Gaeltacht e-Hub, iScoil and PPLI, have been designed to address specific issues, which in the main relate to enabling students to access the fullest educational experiences possible. In the cases of the e-Hub and the PPLI, it is ensuring that students, irrespective of where they live or attend school, can access the broadest curriculum, while in the case of iScoil it is about providing flexible personalised learning pathways to students who are currently not attending school. Thus, online learning environments can expand access and support more inclusive forms of education.

The paper has endeavoured to showcase that online learning environments and approaches can be embedded into most areas of a redeveloped senior cycle. The key question for the education system is to consider why such an approach might be used, as the research suggests that when there is a strong rationale underpinning such approaches, they typically tend to have a positive impact as in the case of the e-Hub. While the technologies in this space (i.e., AI and immersive worlds) continue to evolve, they, in and of themselves, will not ensure that students are engaged in meaningful learning. There is a need to design such approaches for specific purposes and this needs to be articulated as a first step in the creation process.

When a decision is made to use online learning environments and approaches, it is most important that they are designed in line with the affordances of these settings. Online learning

environments are different from face-to-face learning settings and the activities that take place in these spaces need to be designed differently. Section three outlined a set of key considerations when using online blended learning approaches and learning environments, which could be used as a reference by the education system. Furthermore, these key considerations align quite closely with the guiding principles for senior cycle[110], specifically in relation to areas such as: inclusive education and diversity; learning to learn, learning for life; choice and flexibility; continuity and transitions; and learning environments and partnerships.

[110] *https://ncca.ie/en/resources/senior-cycle-review-advisory-report/*

Appendix 1 Glossary

The following glossary definitions have been developed from a review of relevant European Commission Staff Working Documents that were developed over the course of the creation and implementation of the Digital Education Action Plan[111]. Where Commission definitions or descriptions are not available, we have included definitions from other reputable or widely cited sources. In places we have included two definitions, to illustrate that terms can evolve or can have more than more meaning. The definitions give some indication of current thinking in the EC around these terms.

AI	"Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications)."[112]
Blended learning	Pedagogical approach mixing face-to-face and online learning, with some element of learner control over time, place, path, and pace. In the formal education sector, the term refers to when a school, educator or learner takes more than one approach to the learning process. Blended learning[113] in formal education and training involves a diversity of approaches and is to be understood as a school (in primary and secondary education, including vocational education and training), teacher and trainer or learner taking more than one approach to the learning process: – blending school site and other physical environments away from the school site (either with the presence of a teacher/ trainer, or separated by space and/or time in distance learning); – blending different learning tools that can be digital (including online learning) and non-digital.
Digital education	Digital education comprises of two different but complementary perspectives: 1) the pedagogical use of digital technologies to support and enhance teaching, learning and assessment and 2) the development of digital competences by learners and education and training staff
Digital learning tools (technologies)	Can include, for example: smart boards and projectors for collaboration in classrooms; mobile devices, tablets and laptops with applications for designing, exploring and sharing work; television and radio for following programmes; and augmented-reality and virtual-reality tools and applications for enhanced interactivity. Digital learning tools do not always need to be connected to the internet.

[111] https://education.ec.europa.eu/sites/default/files/2023-04/deap-swd-digital-skills-180423_en.pdf
[112] https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines
[113] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021H1214(01)

Generative AI	Generative artificial intelligence (AI) describes algorithms (such as ChatGPT) that can be used to create new content, including audio, code, images, text, simulations, and videos.[114]
Hybrid learning	Educational approach where students can choose how to attend a specific class or learning opportunity, either in-person or virtually. Educators teach remote and in-person students at the same time using tools like video conferencing hardware and software
Learning Management System (LMS)	A web-based software platform made for delivering, tracking and managing online and blended learning. Its main features allow handling all aspects of the learning process beyond content delivery (e.g., course management, learners' enrolment, online activity tracking).
Metaverse	A conceptual term that captures a mix of virtual reality and other technologies. It is a world of interconnected physical and virtual communities where users can develop professionally, socialise, entertain, commerce and trade with virtual properties
Online learning/education	Also known as ICT-based learning, virtual learning and e-learning, the term indicates a methodology involving the use of ICTs to support both teaching and learning. Defined as learning that takes place using digital technology to connect different devices and to facilitate interaction between the learner and teachers, trainers or other educational staff, or other learners, aimed at obtaining learning content or other information to achieve the objectives of learning programmes[115].
Reality: Augmented (AR) - Virtual (VR) - Mixed (MR) – Extended (XR)	AR is an interactive experience where real-world environments and objects are supplemented by computer-generated 3D models and animated sequences, which are displayed as if they are in a real-world environment. VR is a computer-generated scenario that simulates a real-world experience that can be experienced by using special electronic equipment, such as a VR headset or gloves fitted with sensors. MR features elements of both AR and VR. Its key characteristic is that the objects and content from both the virtual and real-world are able to react to each other in real time. XR is a catch-all term for Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR)
Remote or distance education	Method of delivery, which involves teaching and learning activities where educators and learners are not physically present in one location at the same time. Learning happens instead away from the physical site of an educational provider with educators and learners using different means to engage with a programme, course or educational activity. Remote education is used as a broad term which compromises, among others, the possibility to organise and deliver teaching and learning activities at distance (e.g., by using radio, TV or electronic resources) or online (e.g., requiring learners to use a connected device).

[114] *https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai*
[115] *https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-swd-sept2020_en.pdf*

	Distance education is defined as learning taking place with the teacher/trainer being separated from the learner by space and/or time, taking into account national circumstances[116]
Synchronous vs asynchronous digital teaching and learning	There are two kinds of digital teaching and learning: synchronous, (happening collaboratively and at the same time with a group of online learners and usually an educator) and asynchronous (happening at any time, individually or in group, with interaction and communication spanning across time). Synchronous vs asynchronous digital teaching and learning are differentiated in terms of the time of the online presence, but also available tools, instructional practices, number of people involved and social mode of communication
Virtual Learning Environment (VLE)	A learning situation that is supported by Internet-enabled technologies to provide virtual tools for students to learn specific content, communicate and submit work, while providing components for an instructor to manage the learning process, collect input, and provide feedback to students
Flipped classroom	Pupils acquire preliminary knowledge at home or remotely (via books, online research, and so on) and teachers use in school lesson time to facilitate the application of that in practice. This approach may be taken whenever appropriate in a course of study and relies on all pupils having adequate opportunity to develop knowledge and skills in both environments. The particular feature of "flipped" is that the distance learning happens before the on-site application.[117]
Emergency Remote Teaching (ERT)[118]	Well-planned online learning experiences are meaningfully different from courses offered online in response to a crisis or disaster. Colleges and universities working to maintain instruction during the COVID-19 pandemic should understand those differences when evaluating this emergency remote teaching.

[116] *https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-swd-sept2020_en.pdf*
[117] *https://www.schooleducationgateway.eu/downloads/Blended%20learning%20in%20school%20education_European%20Commission_June%202020.pdf*
[118] *https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning*