INCLUSIVE DIGITAL EDUCATION

Methodology Paper

European Agency for Special Needs and Inclusive Education

Co-funded by
the European Union

CONTENTS

INTRODUCTION

Education systems worldwide have adapted to unprecedented circumstances during the COVID-19 pandemic. There have been rapid and comprehensive steps towards a digitalisation of education. Nevertheless, the COVID-19 literature review[1] done by the European Agency for Special Needs and Inclusive Education (the Agency) has shown that access to learning, especially for vulnerable learners, remains a challenge.

Information and communication technology (ICT) for inclusion has been an overarching issue across Agency projects and collaborations with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the UNESCO Institute for Information Technologies in Education (IITE). These activities have focused on how ICT supports inclusive education systems and on the importance of accessibility.

This methodology paper is part of the outcomes of an activity entitled Inclusive Digital Education (IDE). IDE aims to thoroughly examine new priorities and demands in relation to inclusive digital education and blended learning during the period 2016–2021. This paper details the methodology chosen to analyse the topic. It is part of a package of materials from the IDE activity, consisting of the following:

- Main report, *Inclusive Digital Education*, providing a comprehensive overview of the study's results

- Project examples, collating a selection of Erasmus+ projects dealing with specific issues related to inclusive digital education (forthcoming);

- Policy brief, detailing issues not yet sufficiently addressed in the field of inclusive digital education (forthcoming).

The main report publication page will contain links to all the materials when they are available.

---

[1] European Agency for Special Needs and Inclusive Education, 2021. *The Impact of COVID-19 on Inclusive Education at the European Level: Literature Review*. (C. Popescu, ed.). Odense, Denmark

METHODOLOGY

This paper explains and details the methodology used to identify and further analyse international, European and national documents and other sources considered in the study on inclusive digital education. The main report, _Inclusive Digital Education_, sets out the study's results.

As the Agency had worked on several projects in the field of inclusive digital education in the past and thus had a good overview of the subject area, the IDE study was limited to the period 2016 to 2021.

The methodology underlying the implementation of the research was based on the following four assumptions:

Assumption 1. Relevant trends and developments in the field of inclusive digital education are reflected in the academic literature, where they are systematically analysed in terms of their implications.

Assumption 2. Scientific research is time-consuming, and the subsequent process of publishing research results in the academic literature also takes varying lengths of time. Accordingly, the published results always 'lag behind' actual practice.

Assumption 3. The topics relevant in research and those relevant in practice are not necessarily identical. For example, a specific question that is a central theme in research (and could therefore be found frequently in literature searches) is not necessarily relevant in current educational practice, and vice versa.

Assumption 4. Trends and developments do not only emerge within certain thematic fields (such as education), but also arise through external effects or originate from other domains (e.g. from industry).

Based on these assumptions, the research team made certain decisions about the methodology.

Corresponding to assumption 1, the study was mainly based on a search of current research literature to identify and structure the topic areas discussed there. However, the research period includes the outbreak of the COVID-19 pandemic, which has had a major impact on the education sector. The research began just over 1.5 years after the start of the pandemic.

In accordance with assumption 2, it was unclear the extent to which the published research literature sufficiently and comprehensively reflected the new questions and topics arising from the pandemic. Therefore, scientific conference series were also included in the study as another source of information that may react more quickly to such comprehensive changes. However, to also take into account the latest developments in the respective topic areas, the research results were validated through interviews with experts and supplemented if necessary.

Possible differences between highly relevant academic and practical issues (assumption 3) were identified by examining co-operative implementation projects in the education sector. Such project consortia usually consist of educational organisations that come together on topics that are of common practical interest. In the interviews with experts, these results were also reviewed and supplemented where necessary.

For the statement in assumption 4, there are no methodological instruments that could be used to predict external influences, or at least to identify them at an early stage. Although there are helpful methods in the field of future research/futurology (especially foresight methods), their use would go beyond the scope of this study. In addition, the reliability of the results is always limited, as they work with alternative scenarios and futures. Therefore, consideration of assumption 4 was limited to using the research team's knowledge of developments from other areas and indicating which of these developments might be relevant.

The 'Search criteria overview' section below outlines the search terms and databases used during the literature review. The 'Analysis and synthesis' section looks at the analysis and synthesis approach in more detail, covering the literature search, project and conference analysis and the expert interviews.

Search criteria overview

The literature search focused on documents directly or indirectly linked to inclusion in digital (based) education published from 2016 to 2021. To identify trends and developments, additional research fields that are not specific to inclusion or education were included. The research team checked the extent to which there are indications of developments that could also have an impact on the inclusive digital education field.

The following procedure was followed to find relevant literature:

- Key conferences in the thematic area were investigated via online searches to identify the topics being discussed in the scientific community.

- Subsequently, these topics were used for searches in relevant academic databases, especially Education Resources Information Center (ERIC), Fachportal Pädagogik (Education Research Portal), Scopus, OECD iLibrary, UNESDOC, ResearchGate, JSTOR, ScienceDirect and Google Scholar.

- In addition, selected academic journals published during the search period were screened for suitable articles. These included the following: *Journal of Intellectual Disabilities*; *Journal of Special Education*; *International Journal of Disability, Development and Education*; *International Journal of Inclusive Education*; *European Journal of Special Needs Education*; *Digital Education Review*; *International Journal of Innovation in the Digital Economy*; *International Journal of Artificial Intelligence in Education*; *Journal of Special Education Technology*; *British Journal of Educational Technology*; online *Zeitschrift für Inklusion* [online Journal on Inclusion].

- Finally, other sources arising from the research team members' experience in their respective disciplines were added.

To take the topic's complexity into account, the [ecosystem model](#) used in other Agency projects[2] was adapted to the study's objective. As Figure 1 shows, this adaptation consists of three essential levels in which inclusive digital education must be considered.

The **individual level** is divided into a learner and a teacher perspective, as the two may use different or the same ICT in the context of their learning and teaching, both independently and together.

The **educational institution level** links the individual level with the community and national/regional levels, hence dealing with inclusive leadership and stakeholder involvement.

The **national/regional level** touches upon the legislative aspects of inclusive education, including, for example, governance, funding, quality assurance and accountability, and the use of ICT to monitor effectiveness and efficiency at this respective level.

ICT, which can be used at each of these levels for a wide variety of purposes, may also be used as a level of consideration in the context of the study. However, it does not represent a separate level in the ecosystem model.

While it is possible to advance digitalisation independently at each level, in the context of the IDE study, only the co-ordinated and aligned process of simultaneous digitalisation and the provision of supportive framework conditions at all levels is understood as **digital transformation**.

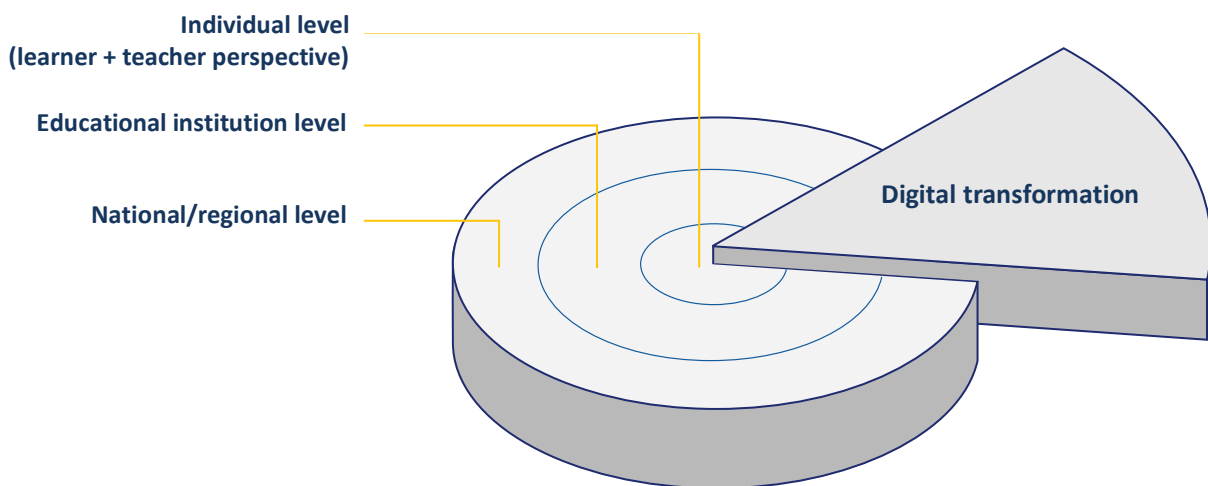**Figure 1. Simplified ecosystem model**

---

[2] European Agency for Special Needs and Inclusive Education, 2019. *Inclusive School Leadership: Exploring Policies across Europe*. (E. Óskarsdóttir, V. Donnelly and M. Turner-Cmuchal, eds.). Odense, Denmark

The research team used and combined appropriate search terms to look at these different levels in the education system, from the individual level up to the system level, and to find current co-operation projects and conferences.

Depending on the database or source used, certain basic keywords were used as the first filter stage, if the source (e.g. a relevant journal) did not already specify the focus. Those basic keywords were:

- Digital
- Digitisation OR digitization
- Digitalisation OR digitalization
- Inclusive OR inclusion
- Education OR inclusive education.

Subsequently, further search terms relevant to the respective system level were added.

- **Technical level**: design for all; universal design; inclusive design; assistive technology; assistive technologies; AT; assistive device; assistive devices; virtual reality; VR; augmented reality; AR; artificial intelligence; AI; robotics; educational robotics; telepresence; mobile learning; m-learning; gamification; learning analytics; chatbots; open educational resources; OER; massive open online course; massive open online courses; MOOC; MOOCs.

- **Individual (learner and teacher) level**: learner; learners; student; students; learning; teacher; teachers; teaching; inclusive education; disadvantaged; digital divide; computer literacy; digital media; vulnerable; vulnerability; exclusion; digital competences; digital skills; data literacy; media didactics; universal design for learning; UDL; inclusive pedagogy; distance education; blended learning.

- **Institutional, regional and national level**: readiness; organisational readiness; organizational readiness; digital resources; networking; parents; community; stakeholder; resilience; leadership; inclusive leadership; digital transformation; governance; monitoring; inclusion indicators; school administration; school administrators.

A similar approach was used to research the co-operation projects and the conferences, using the following search terms:

- **Co-operation projects**: inclusion; exclusion; special educational need; special educational needs; SEN; disability; disabled; handicap; handicapped; inclusive schools; inclusive primary education; inclusive primary education and training; inclusive secondary education; inclusive secondary education and training; inclusive vocational education; inclusive vocational education and training; inclusive higher education; inclusive higher education and training; inclusive VET; inclusive HE; inclusive teaching; inclusive learning; classroom management; school management; education management; educational management; leadership; administration; teacher training; digital; digitisation;

digitization; digitalisation; digitalization; digital transformation; information and communication technology; information and communication technologies; ICT; educational technology; educational technologies; e-learning; web-based learning; online learning; remote learning; blended learning; massive open online courses; MOOC; MOOCs; online course; online courses; virtual reality; VR; augmented reality; AR; artificial intelligence; AI

Conferences: artificial intelligence; AI; virtual reality; VR; augmented reality; AR; blended learning; e-learning; online learning; web-based learning; remote learning; MOOC; online course; online courses; leadership; administration; teacher training; digitisation; digitization; digitalisation; digitalization; transformation; digital transformation; ICT; educational technology.

The resulting documents, some of which were available in large numbers, were usually screened for relevance in terms of title and abstract. Documents that appeared unsuitable were deleted from the lists. Not all of the remaining documents were included, either because they proved unsuitable upon closer analysis or because they did not add anything new to the findings of other documents already used.

Analysis and synthesis

The research team took a qualitative approach in the literature review to examine and structure the identified literature and to describe it in terms of its key messages. However, since the literature research is limited to a short period of time, the results alone do not allow any statement about trends or developments.

A **gap analysis** and **supplementary expert interviews** allowed the research team to examine the extent to which the researched results in recent years differ from the results in the period before 2016. The gap analysis refers to Agency publications that are relevant to the study. It checks which new topics, developments, questions or solutions have been addressed in the meantime. Interviews with experts who have a broad and long-term overview of the topic area served to highlight recent developments, but also to point out topics that may only be relevant in the near future.

The **analysis of the co-operation projects** during the study period followed both a quantitative and a qualitative approach. First, a decision was needed on what the research's geographical focus should be in order to be considered within the time and resources available.

The European Union Erasmus+ programme database on on-going and completed projects was considered a suitable source to feed this indicator. The Horizon Europe programme also involves co-operation projects that, for example, develop and possibly also test the latest digital technologies. However, since these are mainly research projects, it has been assumed that their topics would be reflected in the literature already researched and that an analysis of these projects would not offer any new findings.

Furthermore, countless implementation projects in the field of digital education and inclusive digital education are taking place in countries, both within and outside Europe. However, the research of these projects exceeds the scope of this study.

For these reasons, the search was restricted to the Erasmus+ database and the transnational co-operation projects included there served as an approximation for this indicator. Accordingly, the study was limited to the Erasmus+ programme, with its database providing an overview of more than 178,000 projects and activities between 2007 and November 2021.

The vast majority of projects in the [Erasmus+ database](#) concern 'Learning mobility of individuals' and 'Cooperation for innovation and exchange of good practice'.[3] For projects in the first category, it could be assumed that the aim of such mobilities is to transfer established practice through learning on the spot and subsequent transfer and application in one's own country. For projects in the second category, it could be assumed that learning from each other takes place more at the organisational level and not only at the individual level, and that innovations are also developed and tested in some of the projects. Certainly, this indicator, which is fed by the number of projects, is unsuitable for reflecting the practical relevance of the topic areas in its dimensions. However, a purely quantitative evaluation could indicate which topics are of high practical interest, because enough consortia have obviously come together to address the respective topics in greater depth.

Within the quantitative analysis, an examination took place of which topics changed over time and to what extent, and which keywords were in frequent use. The qualitative analysis identified the respective objectives of the projects under consideration and structured them in such a way that their potential contribution to the thematic field of inclusive digital education becomes apparent.

The search for **relevant conferences** was performed via ACM Digital Library, Google Scholar and the World Academy of Science, Engineering and Technology (WASET) conference index. Only conferences where the proceedings – or at least the full programme with the titles of all presentations – were available online were included. Conferences that were thematically relevant and took place during this period but did not publish the proceedings/full programme online were not included (e.g. the conferences of the Association for the Advancement of Assistive Technology in Europe, AAATE 2017 and AAATE 2019).

The analysis focused on the last five years, i.e. 2017 to 2021. The 2016 proceedings were not available in full, so the analysis could not include that year.

Interested readers can use the links in [Table 1](#) to access the respective conference programmes or proceedings.

---

[3] Projects in the areas of 'Support for policy reform' or 'Jean Monnet Actions' may also be of interest for the study objective. However, due to time limitations, the quantitative and qualitative analyses were limited to the co-operation projects mentioned.

Table 1. List of 26 conference series included in the search with links to the programmes or proceedings available online (N=88) in the period 2017 to 2021, covering 6,005 conference presentations

Conferences and papers	2017	2018	2019	2020	2021
AIED – International Conference on Artificial Intelligence in Education	AIED 2017	AIED 2018	–	AIED 2020	AIED 2021
ASEDU – International Scientific Conference: Advances in Science, Engineering and Digital Education	–	–	–	ASEDU 2020	–
CIPAE – International Conference on Computers, Information Processing and Advanced Education	–	–	–	CIPAE 2020	CIPAE 2021
EMINENT – Expert Meeting in Education Networking	–	EMINENT 2018	EMINENT 2019	–	EMINENT 2021
FIE – Institute of Electrical and Electronics Engineers Frontiers in Education Conference	FIE 2017	FIE 2018	FIE 2019	FIE 2020	–
ICALT – International Conference on Advanced Learning Technologies	–	–	–	–	ICALT 2021
ICBDE – International Conference on Big Data and Education	–	ICBDE 2018	ICBDE 2019	ICBDE 2020	ICBDE 2021
ICCHP – International Conference on Computers Helping People with Special Needs	–	ICCHP 2018	–	–	ICCHP 2021, Part I; ICCHP 2021, Part II
ICDEL – International Conference on Distance Education and Learning	–	ICDEL 2018	ICDEL 2019	ICDEL 2020	ICDEL 2021
ICDTE – International Conference on Digital Technology in Education	ICDTE 2017	ICDTE 2018	ICDTE 2019	ICDTE 2020	–
ICEBT – International Conference on E-Education, E-Business and E-Technology	ICEBT 2017	ICEBT 2018	ICEBT 2019	ICEBT 2020	ICEBT 2021
ICEDS – International Conference on Education Development and Studies	–	–	–	ICEDS 2020	ICEDS 2021
ICEEL – International Conference on Education and E-Learning	ICEEL 2017	ICEEL 2018	ICEEL 2019	ICEEL 2020	–

Conferences and papers	2017	2018	2019	2020	2021
ICEMT – International Conference on Education and Multimedia Technology	ICEMT 2017	ICEMT 2018	ICEMT 2019	ICEMT 2020	ICEMT 2021
ICETC – International Conference on Education Technology and Computers	ICETC 2017	ICETC 2018	ICETC 2019	ICETC 2020	–
ICETM – International Conference on Education Technology Management	–	ICETM 2018	ICETM 2019	ICETM 2020	–
ICETT – International Conference on Education and Training Technologies	–	–	ICETT 2019	ICETT 2020	ICETT 2021
ICFET – International Conference on Frontiers of Educational Technologies	–	ICFET 2018	ICFET 2019	ICFET 2020	ICFET 2021
ICIEI – International Conference on Information and Education Innovations	–	ICIEI 2018	ICIEI 2019	ICIEI 2020	ICIEI 2021
ICISCAE – Institute of Electrical and Electronics Engineers International Conference on Information Systems and Computer Aided Education	–	–	–	–	ICISCAE 2021
ICMET – International Conference on Modern Educational Technology	–	–	ICMET 2019	ICMET 2020	ICMET 2021
ICSET – International Conference on E-Society, E-Education and E-Technology	ICSET 2017	ICSET 2018	ICSET 2019	ICSET 2020	–
IC4E – International Conference on E-Education, E-Business, E-Management, and E-Learning	IC4E 2017	IC4E 2018	IC4E 2019	IC4E 2020	IC4E 2021
Koli Calling – Koli Calling International Conference on Computing Education Research	Koli Calling 2017	Koli Calling 2018	Koli Calling 2019	Koli Calling 2020	Koli Calling 2021
WAIE – International Workshop on Artificial Intelligence and Education	–	–	WAIE 2019	WAIE 2020	–
WiPSCE – Workshop in Primary and Secondary Computing Education	WiPSCE 2017	WiPSCE 2018	WiPSCE 2019	WiPSCE 2020	WiPSCE 2021

The analysis used a quantitative approach to observe thematic changes over time. In a first round, the same search terms were used as for the literature search. These were complemented by additional search terms that were the result of a qualitative analysis of the 2021 conferences in an attempt to cover the most recent trends and developments. In a second round, the number of occurrences of these topics was calculated and added to the final results.

The synthesis of the information obtained from the literature review and the analysis of the implementation projects and the conferences underwent a final validation step with **experts reviewing the intermediate outcomes**.

This step made sense for a variety of reasons. Firstly, it allowed for the inclusion of the most recent developments that are not yet reflected in publications, presentations or projects. Secondly, the search had been based on 'hits' in various databases for the period from 2016 to 2021. Consequently, (quantitative and/or qualitative) comparison with the period *before* 2016 was not possible, nor was it possible to find out which topics were *not* covered and why this was so. Interviews with experts were considered suitable to close this gap.

Methodologically, several international experts in the system levels addressed in the study were identified, five of whom were invited for an interview. In preparation, the experts received a brief summary of the intermediate literature research results well in advance of the interview.

The interviews were conducted based on a few guiding questions in the form of an open interview. The experts could go into depth and elaborate on interesting points as they wished.

The following four guiding questions formed the basis of the interviews:

1. To what extent do these key findings **match** your knowledge and experience with regard to digital technologies and inclusion in education? If you see any **discrepancies** with your own knowledge and experiences, what could be causes or reasons for this from your perspective?

2. Are there **aspects missing** from the study that you would have expected, or are there **research gaps** from your point of view?

3. What are the **most relevant barriers** to implementing digital education for all learners, in your opinion?

4. What do you think are the **key issues** of potential relevance for inclusive digital education in the **near future**?