



# Teaching Digital Inclusion Early: Practical Approaches to Accessibility in Primary Education

Ann Marcus-Quinn<sup>1</sup>, Ian Clancy<sup>1</sup>, Ruth Bourke<sup>2</sup>

<sup>1</sup>University of Limerick, Ireland

<sup>2</sup>Mary Immaculate College, Limerick, Ireland

## Abstract

*Digital technologies increasingly shape how learners communicate, learn, and participate in civic life. However, when digital content is created without attention to accessibility, it can unintentionally exclude individuals with visual, cognitive, or physical disabilities. As schools prepare young people for a digitally connected future, accessibility must be understood as a foundational digital literacy rather than an optional or specialist skill [1]. This imperative is reinforced by the European Accessibility Act [2]. Education therefore has a critical role to play in embedding inclusive design principles early. This paper reports on work completed to date within SEED: Supporting Equity and Educational Design: Growing Awareness of Accessibility in Digital Classrooms in Ireland's Primary Schools, a Research Ireland-funded project examining current practices and awareness of accessibility in Irish primary education.*

**Keywords:** *Digital accessibility; inclusive design; primary education; digital literacy;*

## 1. Introduction

Digital technologies increasingly shape how learners communicate, learn, and participate in civic life. However, when digital content is created without attention to accessibility, it can inadvertently exclude individuals with visual, cognitive, or physical disabilities. As schools prepare young people for a digitally connected future, accessibility must be recognised as a foundational component of digital literacy rather than an optional or specialist skill. This imperative is further reinforced by policy developments such as the European Accessibility Act, which highlights the need for accessible digital environments across sectors, including education. Education therefore has a critical role in embedding inclusive design principles from an early stage. Recent discussions surrounding young people's engagement with digital technologies have frequently framed technology use primarily in terms of risk and overuse. However, emerging research argues that such perspectives often fail to distinguish between passive or recreational engagement and structured, educational, and purpose-driven uses of digital technologies. It is important to emphasise the importance of avoiding "one-size-fits-all" approaches to youth digital engagement and instead advocate for guided, literacy-based participation supported through education and policy initiatives. Within this context, accessibility education represents a meaningful form of digital engagement in which learners actively develop awareness of inclusion, usability, and equitable participation in digital environments [3]. When accessibility principles are applied, digital content becomes clearer, more flexible, and more usable for all learners [4]. Developing awareness of accessibility in primary school not only supports learners with diverse needs, but also fosters inclusive mindsets and practices among all pupils. Despite this, accessibility is not yet consistently integrated into everyday classroom activities, and there remains a limited availability of accessible, affordable classroom materials that explicitly support the teaching of inclusive design principles.

This paper reports on work undertaken to date within *SEED: Supporting Equity and Educational Design: Growing Awareness of Accessibility in Digital Classrooms in Ireland's Primary Schools*, a Research Ireland-funded project examining current practices and awareness of accessibility in Irish primary education. The project investigates how accessibility is currently addressed in classrooms and identifies gaps in teacher knowledge and available resources. In Ireland there are varying levels of digital engagement across primary classrooms and while there is some structured support for teaching accessibility concepts as part of routine digital learning there are few dedicated hardcopy classroom materials. The SEED project seeks to develop practical, curriculum-aligned resources to support teachers in introducing accessibility in meaningful and age-appropriate ways. The following sections outline the project context, methodology, preliminary findings, and the development and pilot implementation of a classroom-based accessibility toolkit.

## 2. Background and Context



Accessibility is increasingly recognised as a core dimension of digital literacy, encompassing the ability to create and engage with digital content that is usable by diverse audiences. Within educational contexts, this extends beyond technical compliance to include an understanding of inclusive design principles such as readability, colour contrast, and multimodal representation [4]. Approaches informed by Universal Design for Learning (UDL) emphasise proactive design that supports a wide range of learners, rather than retrofitting content to meet individual needs. Policy frameworks at both European and international levels further reinforce the importance of accessibility in education. The European Accessibility Act establishes requirements for accessible digital products and services, while the United Nations Sustainable Development Goals, particularly SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities), emphasise inclusive and equitable access to learning opportunities. Together, these frameworks position accessibility as a shared responsibility across sectors, including schools. Despite this policy and theoretical emphasis, the integration of accessibility into everyday classroom practice remains uneven. Research indicates that while digital technologies are widely used in primary education, explicit attention to accessibility is often limited with relatively few dedicated resources available to support its teaching.

### 3. Seed Project Toolkit Development

In response to the gaps identified in preliminary findings, the SEED project developed a practical, classroom-based toolkit designed to introduce accessibility concepts to primary school learners in an engaging and age-appropriate manner. The toolkit was created to support teachers in embedding accessibility within existing classroom activities, particularly in the context of digital content creation tasks commonly undertaken by pupils in the senior years of primary school.

#### 3.1 Posters

The toolkit comprises two large-format (A1) posters and a hardcopy learning resource in the form of a foldable cube. The posters were designed in accordance with established principles of document and communication design, drawing on seminal work such as Schriver's *Dynamics in Document Design*, which emphasises a reader-centred, evidence-based approach to the integration of text and visuals [5,6]. In addition, guidance from the National Disability Authority in Ireland informed the application of universal design and accessibility principles, ensuring that the materials are usable, understandable, and inclusive for a wide range of audiences [7]. The posters are printed on fabric to enhance durability and sustainability, and to enable their continued use within classroom settings as visual prompts for discussion. At the centre of the poster design is a thematic focus on hedgehogs, selected as an accessible and engaging narrative device and introduced in alignment with Ireland's Hedgehog Week. The poster design was also intentionally based on the native Irish hedgehog, as this species is incorporated within the Green-Schools biodiversity programme and highlighted as a "Habitat Hero", ensuring alignment with existing classroom resources, while the decision to print the poster on fabric further reinforces the sustainability principles underpinning the Green-Schools initiative [8].

Each classroom is provided with two contrasting posters: one intentionally designed to demonstrate poor accessibility practice, incorporating common design errors, and a second illustrating accessible and inclusive design principles. This contrast-based approach supports critical discussion and encourages learners to identify and reflect on design choices. While the posters were designed by a researcher with professional experience in accessible communication, care was taken to avoid an overly polished or complex aesthetic. Highly stylised or technically sophisticated designs, while visually appealing, may risk overwhelming learners in the senior years of primary school and can appear difficult to replicate. Instead, the posters deliberately model good accessibility practices in a way that remains achievable for pupils. By balancing adherence to core design principles with a level of visual simplicity, the materials aim to support not only understanding but also application, encouraging learners to view accessible design as something within their own capability rather than as a specialised or unattainable skill.

#### 3.2 Cube

Complementing the posters, each student is provided with a flat-pack cardboard cube that can be assembled into a three-dimensional object. Each face of the cube presents concise, child-friendly design guidance relating to digital content creation. These guidelines include principles such as clear text use,



colour contrast, effective use of images, and accessible audio and video practices. For example, the cube encourages pupils to “use short sentences and simple words” and to ensure that “text colour is easy to see on the background,” while also promoting inclusive practices such as adding subtitles to videos and describing images for clarity.

### **3.3 Teacher Supports**

To further support teachers in mediating classroom discussions, the toolkit also includes a compact, teacher-focused resource in the form of a keyring comprising eight concise reference cards. Each card highlights a specific design principle and provides a brief explanation of its importance in relation to accessibility and effective communication. For example, individual cards explain the rationale behind design decisions such as font choice, emphasising readability and clarity, or the use of appropriate colour contrast to ensure visibility for all learners. This resource is intended as a practical, easily accessible prompt to support teachers in reinforcing key concepts during classroom activities. Together, these elements extend the functionality of the toolkit beyond static visual materials, providing both learners and teachers with structured, accessible guidance. The combination of whole-class visual artefacts (posters), individual interactive materials (cube), and teacher supports (keyring cards) reflects a multi-layered pedagogical approach that accommodates different modes of engagement and reinforces accessibility principles through both exploration and guided instruction.

### **3.4 Emergent Elements in Toolkit Development**

An unanticipated development within the project was the creation of an Irish-language version of the student cube. While not originally planned within the initial funding proposal, informal engagement with participating teachers highlighted the value of providing resources that align with Irish-language teaching contexts. In response, the content of the cube was professionally translated into Irish, enabling its use in both English- and Irish-medium classrooms. This adaptation reflects the project’s responsiveness to practitioner input and supports broader inclusivity within the Irish primary education system.

A further factor shaping the development of the toolkit was an industry partnership that emerged during the early stages of the project. Following the award of funding, engagement with Brickfield Education Labs at a professional conference provided access to an existing presentation design resource used in adult training contexts. With permission from the organisation, the project team was able to adapt the cube template for use in primary education settings. This significantly accelerated the development process and enabled the production of high-quality classroom materials within the constraints of the project budget. It also ensured that the design guidance embedded within the cube was informed by established industry practice in accessible digital communication. The collaboration illustrates the value of cross-sector partnerships in supporting the translation of accessibility principles into practical, scalable educational resources.

The focus on presentation design reflects a growing classroom practice, where pupils are frequently required to create digital presentations as part of their learning. While instruction is often provided on content and structure (e.g., number of slides or topics to include), there is typically limited emphasis on visual design principles or accessibility considerations. The toolkit therefore seeks to address this gap by embedding foundational accessibility guidance into familiar learning tasks, enabling pupils to apply inclusive design principles in a practical and meaningful way.

## **4. Discussion**

At the time of writing, the classroom toolkit is in the early stages of implementation, and formal evaluation data has not yet been collected. Initial engagement has focused on consultation with participating school principals to introduce the project and its resources. These preliminary discussions were highly positive, with principals expressing strong support for the initiative and recognising the relevance of accessibility within contemporary digital learning contexts. Particular appreciation was noted for the quality and durability of the printed materials, as well as the provision of additional classroom resources to support teaching and learning. This initial response suggests that the toolkit aligns well with school priorities and is perceived as both practical and valuable for classroom use.

The toolkit is currently being implemented in participating classrooms, with data collection planned following a period of use within the upcoming school term. This will include teacher feedback on usability, clarity, and perceived impact, and will inform further refinement of the resources. As such, the present



paper reports on the design and early-stage deployment of the toolkit, with full evaluation findings to be reported in subsequent work.

## 5. Conclusion

This paper has highlighted the importance of positioning digital accessibility as a foundational element of digital literacy within primary education. Through the SEED project, it identifies a clear gap between high levels of digital engagement in classrooms and the limited availability of accessible, affordable classroom materials that explicitly support the teaching of inclusive design principles. In response, the development of a practical, classroom-based toolkit demonstrates how accessibility concepts can be embedded meaningfully within existing curricular activities. While formal evaluation is ongoing, early engagement with schools indicates strong interest in and relevance of the approach. The project contributes to ongoing efforts to support inclusive education by providing scalable, contextually relevant resources and by emphasising the role of early intervention in fostering accessible digital practices.

## Acknowledgements

The authors would like to thank Margaret Grene (University of Limerick) and Brickfield Education Labs for their valuable contribution to the design and development of the toolkit.

This work was supported by Taighde Éireann (Research Ireland) under the New Foundations programme.

## REFERENCES

- [1] Krejtz, K., Marcus-Quinn, A., Duarte, C. et al. Higher education accessibility information in practice. A report on the accessibility of European Universities. Universal Access Information Society 24, 2673–2685 (2025). <https://doi.org/10.1007/s10209-025-01224-4>
- [2] Marcus-Quinn A. The EU Accessibility Act and Web Accessibility Directive and the implications for Digital Teaching and Learning Materials. Routledge Open Res 2022,1:30 (<https://doi.org/10.12688/routledgeopenres.17581.1>)
- [3] McCoy, S. and Marcus-Quinn, A (2025) "Navigating Youth, Smartphones, and Policy: A Balanced Perspective on Digital Wellbeing" in *Pediatric Research*. <https://www.nature.com/articles/s41390-025-04288-3>
- [4] Ekin, M., Krejtz, K., Duarte, C., Pereira, L. S., Marcus-Quinn, A., & Krejtz, I. (2025). Impact of web accessibility on cognitive engagement in individuals without disabilities: Evidence from a psychophysiological study. *PloS one*, 20(7), e0328552.
- [5] Schriver, K. A. (1997). *Dynamics in document design: Creating texts for readers*. John Wiley & Sons.
- [6] Marcus-Quinn, A. & Geraghty, B. (2010). Design and Development of a Reusable Digital Learning Resource: A Case Study Teaching Japanese Script. In R. Donnelly, J. Harvey, & K. O'Rourke (Eds.), *Critical Design and Effective Tools for E-Learning in Higher Education: Theory into Practice* (pp. 294-309). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-61520-879-1.ch018>
- [7] National Disability Authority. (n.d.). Accessibility. <https://nda.ie/accessibility>
- [8] <https://greenschoolsireland.org/the-programme/projects/habitat-heroes/>