

**CHILDREN, EDUCATION AND SKILLS**

# Literature Review on the Impact of Digital Technology on Learning and Teaching

The Scottish Government has ambitions to raise educational attainment for all learners, and to narrow the gap in attainment between the most and least disadvantaged children in Scotland. Tackling youth unemployment is also a priority of the Scottish Government, and Curriculum for Excellence aims to support all children and young people to develop essential skills they will need to live and work in the twenty-first century.

The Scottish Government's vision for digital learning and teaching is that 'Scotland's educators, learners and parents take full advantage of the opportunities offered by digital technology in order to raise attainment, ambition and opportunities for all'.

This literature review was commissioned by the Scottish Government to explore how the use of digital technology for learning and teaching can support teachers, parents, children and young people in improving outcomes and achieving these ambitions.

## Approach

This study is designed to help inform the development of a strategy for digital learning and teaching by providing evidence of how and why digital learning and teaching can benefit learners, teachers and schools. It also aims to identify the conditions that lead to its successful implementation and any differences between primary and secondary settings. In particular it focuses on how digital technologies can support and contribute to five specific educational priorities:

1. Raising attainment
2. Tackling inequalities and promoting inclusion
3. Improving transitions into employment
4. Enhancing parental engagement
5. Improving the efficiency of the education system.

A literature search was undertaken, collecting nearly 1,000 items from academic, governmental and professional sources. These were reviewed to determine their

thematic relevance and the strength of the evidence they presented. The most useful were then collated and assessed to:

- Identify evidence of relationships between digital learning and teaching activities and the expected outputs, outcomes and impacts;
- Show the relationships that exist between the digital learning and teaching activities and the outputs, outcomes and impacts for different beneficiaries (learners, parents, teachers, and the school); and
- Identify which outcomes are immediate, medium-term and long-term.

## **Key findings**

The key findings of the research are presented below, separated into the key thematic areas which were examined during the review. In the cases where studies of similar digital equipment, tools and resources have been systematically reviewed or where there is a large body of evidence from different studies which have measured change (from quantitative studies using counterfactuals and testing learners before and after), it is possible to state there is conclusive evidence. In other cases where the evidence base is weaker (mainly qualitative studies drawing on relatively small samples of learners and schools), it is only possible to state that there is indicative evidence or (where few cases) promising evidence.

### **Raising children and young people's attainment**

There is conclusive evidence that digital equipment, tools and resources can, where effectively used, raise the speed and depth of learning in science and mathematics for primary and secondary age learners. There is indicative evidence that the same can be said for some aspects of literacy, especially writing and comprehension. Digital technologies appear to be appropriate means to improve basic literacy and numeracy skills, especially in primary settings.

The level of impact is generally similar to other changes to pedagogies which are effective in raising attainment although the use of digital learning has other benefits. Additionally, the extent of the effect may be influenced by the level of capability of teachers to use digital learning tools and resources effectively to achieve improved learning outcomes.

More effective use of digital teaching to raise attainment happens when teachers are able to identify how digital tools and resources can be used to achieve improved learning outcomes, as well as having knowledge and understanding of the technology. This applies in all schools.

Where learners use digital learning at home as well as school for formal and non-formal learning activities these have positive effects on their attainment. This is due to the extension of their learning time. This is particularly important for secondary age learners.

## **Reducing inequalities and promoting inclusion**

There is indicative evidence that the use of digital tools and resources can help to reduce gaps in subject attainment when they are effectively implemented. There is promising evidence that the use of digital equipment and resources can help learners with additional support needs to improve their skills and competences in literacy and numeracy.

Teachers' skills and competences in recognising how to use digital tools and resources and applying them effectively are critical to achieving positive results for learners with additional support needs or who are disadvantaged in other ways.

## **Improving transitions into employment**

There is promising evidence that digital tools can, where effectively used, build skills in interactivity and collaboration, critical thinking and leadership for secondary age learners. These are considered to be vital skills by employers. There is promising evidence too that for secondary age learners, digital resources coupled with digital tools can increase knowledge and understanding of career pathways, applying for work, and working environments. These resources can make it easier for employers to provide help and support to learners.

In addition to the skills that teachers require to harness digital tools and resources to build learners' employability skills, it is evident that they need to be prepared to develop learner-centred learning approaches. Support for learners to access digital equipment outside the classroom is also important.

## **Enhancing parental engagement**

There is promising evidence that using digital equipment and tools for direct communication with parents can improve learners' and parents' cooperation with requests from teachers about attendance, behaviour and support for learning.

Teachers are more likely to do this once they are more competent in using digital equipment and tools, and once schools use digital tools such as virtual learning environments to facilitate communication with parents.

## **Improving the efficiency of the education system**

There is promising evidence that teachers' efficiency can be increased by using digital equipment and resources to prepare for teaching. There is similarly some qualitative evidence that digital tools and resources enable teachers to do their job better in relation to teaching, assessment and their own on-the-job learning and development.

## **Primary and secondary settings**

While many studies clearly focus on specific learners in terms of age, settings (primary, secondary, special education) and domestic circumstances, none make any comparisons between the impact of digital technologies on educational priorities for different age groups. As a consequence, it has not been possible to identify any differences in the use and impact of digital technology in primary and

secondary school settings. However, it is generally the case that the impacts found apply relatively equally to primary and secondary school learners.

## Conclusions

Successful utilisation of digital technology depends not just upon sufficient access to equipment, tools and resources, but also on the availability of sufficient training, and knowledge and support networks for teachers. Providing teachers with this support will allow them to understand the benefits and applications of digital technologies and enable them to use digital technologies effectively.

If these needs are met, then the literature provides strong evidence that use of digital technologies can aid learning and teaching, as well as enhance the ability of some children to learn effectively. In particular, there is:

- Conclusive evidence that digital technologies can support educational attainment in general (and in maths and science particularly);
- Indicative evidence that it can support educational attainment in literacy and help close the gap in attainment between groups of learners; and
- Promising evidence that digital technologies can provide assistance to overcoming the challenges faced by some learners; improvements in employability skills and knowledge of career pathways; improved communications with parents; and time efficiencies for teachers.

The literature also identifies the factors that bring about more effective implementation of digital learning and teaching. These include:

- Training and support – not only to use equipment but to exploit digital tools and resources for teaching;
- Overcoming teachers' anxieties about digital teaching, not just about the use of the technology but also the use of different learner-centred pedagogies;
- Allowing teachers to experiment with technology;
- Networking with other teachers and schools;
- Maintaining and upgrading equipment and using tools that are compatible across many systems.

As a consequence, successful implementation of digital learning and teaching requires support to teachers in the form of opportunities to learn (both formally and informally), embedding digital learning in continuing professional development and initial teacher training, direction and leadership within a school, functioning digital equipment and tools, and an environment that gives teachers the flexibility to introduce and use digital learning.

### **How to access background or source data**

The data collected for this social research publication:

cannot be made available by Scottish Government for further analysis as Scottish Government is not the data controller.



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