



DEEPENING FORMATIVE ASSESSMENT PRACTICES WITH DIGITAL TOOLS



One of European Schoolnet's key aims is to broker educational research findings and other evidence to our key stakeholders: ministries of education, schools, teachers, and industry partners. The *European Schoolnet Perspectives* series is one way through which we achieve this.

Two issues are published annually. Each issue aims to:

- Summarize research evidence from key studies on innovation in education;
- Translate this evidence into concrete ideas for policy action;
- Conclude with the implications of the evidence for using technology in teaching and learning.

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European Schoolnet is the network of 34 European Ministries of Education, based in Brussels. As a not-for-profit organisation, we aim to bring innovation in teaching and learning to our key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners.



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Albeit not being widespread in schools in Europe yet, research provides first evidence that **digital formative assessment (DFA)** has great potential to support more powerful student learning. What do we mean by DFA and what do policy-makers need to know about it?

According to the [Assess@Learning Literature review \(Looney, 2019\)](#), **DFA** includes **all features of the digital learning environment** that:

1. **support assessment of student progress** and
2. which **provide information** to be used as **feedback**
 - **to modify the teaching and learning** activities in which students are engaged.

The definition highlights that **assessment only becomes formative** when **evidence** of learning **is actually used** by teachers and learners to **adapt next steps in the learning process**. This formative element of DFA can be either automated (e.g. made by programmes that suggest more difficult tasks based on previous answers) or carried out by teachers with the use of tools such as rubrics.

DFA encompasses a broad range of approaches, tools and learning strategies, such as personalised learning platforms, e-portfolios/digital diaries, social media (blogs, wikis, etc.), digital storytelling, e-textbooks, mobile learning, classroom polling, dashboards and monitoring tools and digital games. Teachers can use these digital tools to create possibilities for deepening formative assessment practices within and beyond the classroom.

Generally, assessments “serve an important function when they motivate students to learn, help teachers to refine their practice and develop their skills, and help education systems improve.

Assessments can also be used to certify student accomplishments, evaluate the output of educational programs, measure the progress of educational systems, and make comparisons across systems” (Griffin, McGaw & Care, 2012).



BACKGROUND INFORMATION

The nature of assessment defines what students learn and how they engage meaningfully in the learning process. Features of quality assessments that allow students to achieve are:

1. *considered during the design of the teaching and learning task,*
2. *integral to the teaching and learning cycle, and*
3. *allow for opportunities for students to show the extent of their learning.*

Assessment is in short designed with the learners, the learning goals, curriculum outcomes and the teaching in mind. ([Australian teachers guide to assessment, 2016](#)).

FINDINGS

What potential benefits does DFA provide?

Evidence from the analysis

Already in 2011, [Hattie](#) found in his widely cited [review of meta-reviews](#) in education research significant positive effect sizes for a range of formative assessment methods in ICT-based environments (e.g. formative evaluation). In the [Assess@Learning literature review](#) (2019), Janet Looney highlights different ways in which digital tools can enhance formative assessment practices. For instance, they allow for rapid (real-time) feedback and scaffolding of next steps for learning at an appropriate level of difficulty. The affordances offered by digital technology in terms of how and when feedback is shared in the classroom are starting to be considered by a growing number of educational professionals and researchers (O'Leary ET AL., 2018). For example, student response systems strengthen formative assessment practices

by providing anonymity and allowing teachers to organize discussions to respond to whole class needs (Beatty & Gerace, 2009).

Digital tools also provide opportunities to better understand students' learning and to predict and adapt learning processes. For example, Hooley and Thorpe (2017) described a way of assessing reading and comprehension skills of high school students when reading computer-based texts created by instructors. Students answered to questions at the end of each chapter and were on that basis pointed to relevant text paragraphs. Students in the test group showed significant gains in chapter content knowledge.

Further, digital tools provide immersive

learning environments to support situated learning. Panoutsopoulos and Sampson (2012) explored the use of a commercial, off-the shelf game (Sims 2-Open for Business). Students in the test group had better achievement of general education objectives related to student capacity for analysis than the control group. Games can facilitate deep learning and embody many of the best parts of learning environment design - at times, even better than real world learning environments and classrooms, according to Shute & Ventura (2013).

Finally, digital tools can also support for learners' choices and learning 'anytime, anywhere', provide students with opportunities for self-and peer assessment and help them to design their own learning goals and strategies (Assess@Learning, 2019).

BACKGROUND INFORMATION

The policy experimentation [Assess@Learning](#) is currently working on gathering more evidence on the conditions for the up-take of DFA across schools in Europe. Project partners are developing an online DFA toolkit with practical guidance for school leaders, teachers, students, parents and policy makers, which will be tested in five countries in randomised controlled trials. The project (2019-2022) is coordinated by [European Schoolnet](#), with partners from Estonia, Finland, Greece, Italy, Spain, Portugal and the United Kingdom.

Ideas for policy action

- **Provide further support and/or training opportunities for teachers** to extend their 'assessment literacy' to include digital tools, and to take full advantage of their capacities.
- **Support schools to redesign the learning environment**, in order to integrate DFA and opportunities for students' self-directed learning, assessment and collaborative learning. Both the digital and face-to-face interaction need to be considered as part of a blended approach.
- **Encourage students' participation and active involvement** not only in the assessment of their own learning, but also in the research on the development of DFA strategies, in line with an inclusive strategy of children's participation in education and assessment since in order to '...encourage opportunities for marginalized children to be involved... it needs to provide equality of opportunity for all, without discrimination on any grounds' (UN Committee 2009, 30, cited in Elwood and Lundy, 2010).

How can teachers effectively implement DFA in the classroom?

Evidence from the analysis

As identified in the previous section, DFA may have a significant impact on student motivation and learning. However, its effectiveness also depends on how it is used, and how it is integrated with teaching and learning aims. This includes how teachers design lessons to support learning aims, elicit evidence of student understanding, respond to identified learning needs and support student reflection in order to develop their own

learning aims and gradually become more autonomous (Assess@Learning literature review Looney, 2019).

A range of surveys and evaluations have found that a majority of teachers tend to use new technologies to reinforce traditional approaches to learning and assessment. For example, teachers may develop superficial questions that fail to elicit student understanding or possible misconceptions

(Langworthy et al, 2010; Selwyn, 2010; Voogt, 2009). Yarnall et al. (2006) found that teachers who had 'thinking-focused' goals (e.g. assessing students' approaches to problem solving) were more likely to use the new technologies to deepen their assessment practices, to focus student reflection on critical elements of learning science and to foster student skills for self-assessment.

For evidence of learning to be used effectively, both [teacher and student roles](#) need to change. To that end, teachers need to foster student agency, described as the ability for students to take more control over their learning (Deed, Cox, Dorman &

al., 2014). One crucial question is how much of the feedback teachers give is effectively received by students, according to [Hattie](#).

Finally, teachers also need to know what technology best supports their pedagogical

goals. To that end, they need to understand the affordances and limitations of the different platforms but they do not need to have an in-depth technical understanding of technologies, according to most studies in the field.

BACKGROUND INFORMATION

According to TALIS (2019), 79% of teachers (on average across the OECD) report that they frequently or always observe students and provide immediate feedback. However, the Talis report also shows that formative assessment practices involving students directly are not yet widespread yet, with less than half of teachers (41%) reporting that they let students evaluate their own progress.



Ideas for policy action

- **Foster teacher professional development:** teachers' skills to integrate effective formative assessment in their lessons plans, to respond to evidence of student learning and needs, and to provide opportunities for students to direct their own learning, are fundamental. Greater attention to teachers' assessment competences in both initial teacher education and continuing professional development is needed.
- **Teachers also need support to develop their technological literacy:** This includes understanding the potentials and limits of different digital tools. Where possible, cooperative work between subject teachers and teachers with specific programming skills open new doors to designing programmes to support specific pedagogical goals.

Bottlenecks around the implementation of DFA in classrooms



Evidence from the analysis

Using digital tools for assessment, both formative and summative, requires teachers, school heads and policy makers to consider how to ensure a secure and valid use of student data. According to a [Kennisnet](#) expert group on assessment, new questions evolve around trust and safety issues, interpretation and usability of data, exchange of data about learning and ownership of data, ethical issues and infrastructure in the school.

For teachers and students to effectively make use of evidence of learning, they need

to be able to use and interpret the data. To that end, data from different educational sources needs to be sufficiently clear, and comparable and exchange of data becomes important. However, it can be difficult to aggregate results at the right level to create valuable information about learning that can be exchanged and is comparable.

Moreover, more data is used – with or without human intervention – to make decisions on the next steps of student learning. While this opens exciting new possibilities, it also raises ethical questions such as 'Is every possible

scenario desirable?', 'Do teachers and parents need to be able to see everything a student has done online and when (e.g. when a student completes homework)?', and 'What rules should govern the use of Artificial Intelligence in schools?'

Finally, schools need to provide safe online environments with a stable internet connection that protects students from any possible harm that could come from security threats, outdated devices, or a lack of agreement within the school on how to ensure students' data privacy.

BACKGROUND INFORMATION

Digital technologies may potentially support integration of formative and summative assessments. In other words, data from large-scale external assessments, which are used for monitoring of students across the education system, may also be used to shape teaching and learning in classrooms. In turn, classroom-based assessments will be able to provide valuable data for decision makers at school and in some circumstances system levels.



Ideas for policy action

- **Provide schools with support on transversal issues** such as how to ensure interoperability between different systems, tools or platforms, data privacy and ethics.
- **Support the research and discussions related to the broader implications** of digital learning and assessment – including risks of social exclusion (e.g. through interactions in social media that reinforce social divisions, or through uneven student participation in online platforms).
- **Provide responses and adequate legal frameworks** for the cases in which educational data mining may lead to a loss of student privacy and raise ethical concerns.
- **Encourage investments** in digital educational technologies to create a more seamless integration of formative and summative assessment.

IMPLICATIONS FOR TECHNOLOGY USE IN TEACHING AND LEARNING

DFA has great potential to enhance student learning, as it can provide for more opportunities for self-directed learning, interaction with peers, and new ways for students to engage with complex problems in authentic learning environments. New assessment technologies may, over the long term, also support a more seamless integration of formative and summative assessment. To realise the potential for DFA, further thought at the policy level will need to be given to:

- **Ensuring coherence of DFA with other educational priorities** - New priorities for teaching and learning are frequently introduced in a piecemeal fashion, with little attention to how different priorities relate to one another. Efforts to introduce DFA are likely to fare better if it is clear how they may reinforce new curricular priorities (e.g. competence-based curricula, personalised learning). Guidelines on how to integrate formative assessment will support teachers to address everyday challenges of introducing new practices.
- **Accessibility of digital tools and programmes and implications for equity**, also seen that many DFA practices seem to require ideally a 1:1 or at least 2:1 student-device ratio. While access to digital devices at school and at home has grown significantly in recent years, it is not universal. Differences between regions, schools and urban and rural areas persist. Moreover, some learning programmes and tools require increasingly sophisticated hardware and connectivity, requiring regular upgrades. Policies to support digital learning will need to address issues related to access.
- **Encouraging investments in research and development** - Digital tools to support assessment and learning are still in the early stages of development. Greater cooperation between educators, policy makers and programmers may lead to the development of more effective tools for learning. Investments in adaptive learning analytics may help to further develop tools to track meaningful data and better meet individual learner needs.



What the research shows

More generally, research since the early days of technology in schools shows that ICT can:

- Support innovation and new ways of organising learning in time and space;
- Support effective pedagogies, notably active learning, collaboration, project-based learning, independent learning and personalisation;
- Motivate and engage students and help them understand complex concepts, providing them with richer and more compelling learning environments, and improving productivity;
- Support access and inclusion, in particular of students with disabilities, those with learning difficulties, and those from a different language background;
- Help students develop digital age competences, including higher order thinking skills, creativity and digital competence;
- Enable new forms of feedback and assessment, including learning analytics and adaptive learning, games and simulations;
- Make possible activities that would otherwise not be possible for example showing dangerous experiments, enabling collaboration over distance, and involving outside experts;
- Prepare students for life and work after school and to play their part in a society which has transformed the way young people communicate, seek help, access information and learn.

3 key factors for the successful use of ICT in education

1. The school needs to have a positive culture of innovation, reflection and improvement;
2. Technology has to be fit for purpose, accessible and perform reliably;
3. Teachers need appropriate competences and support.