



Information and Communications Technology in Initial Teacher Education



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.

Three 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.

All issues can be accessed online: www.eun.org/observatory/perspectives

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European Schoolnet is the network of 30 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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Initial teacher education (ITE) is an emerging focus of education policy and likely to be intensified following the publication in May 2017 of the European Commission's [School development and excellent teaching for a great start in life](#), which sets out a European strategy to support high quality, inclusive and future-oriented education. It stems from the identification of three key challenges in education: basic competence acquisition, equity and social mobility, and the need to prepare young people for a digital world. Actions proposed include new [eTwinning](#) opportunities for student teachers, online networks, exchange of ITE best practice and a Digital Competence Framework to support teachers' self-assessment and development.

Supporting this renewed policy interest, ITE is the focus of major 2017 Erasmus+ funded projects coordinated by European Schoolnet:

- **TeachUP:** a policy experimentation across ten countries to understand and measure what is the impact of providing online expert mentoring on retention and learning achievement. The courses designed within the project aim to develop teacher competence in formative assessment, personalization and differentiation, collaborative learning, and creativity;
- **eTwinning Teacher Training Institutes (TTI) Initiative:** this initiative aims to embed [eTwinning](#) as part of the curriculum for the initial training of student teachers, currently involving 28 countries and an online course for ITE teacher trainers;
- **ITELab:** a Knowledge Alliance project between higher education institutions and industry to foster innovation and knowledge exchange in ITE, establishing a new, online University-Industry Forum engaging wider stakeholders, and developing face-to-face modules for ITE providers and an online student teacher course.



BACKGROUND INFORMATION

Two issues are of particular relevance in these projects:

- How ITE curricula and programmes cover the pedagogical use of ICT;
- How student teachers are currently trained in using ICT.

ITELab sought to answer these questions, as well as to inform both the design thinking behind ITELab training materials and ITE Forum discussions, through a literature review ([presentation](#)), interviews with ITE providers and three case studies (Norway, Italy and Germany), summarised in the [ITELab Monitoring Report 2017](#), available in the ITELab research area: itelab.eun.org/research.

FINDINGS

Pedagogical ICT in ITE curricula

Evidence from the analysis

The ITELab literature review found that few studies cover ICT in the ITE curriculum and fewer still the pedagogical ICT competences needed by classroom teachers in the digital age: effective practices that make use of technology to support effective teaching and more efficient learning. Austria and France for example expect student teachers to reach a certain level of ICT competence (measured by the European Pedagogical ICT Licence and C2i - “*Certificat informatique et internet*”, respectively). Elsewhere, digital competence is encompassed within broader ambitions; in Finland for example, the aim is for all citizens

to be digitally competent, and for teachers to be researchers and innovators.

Interviews conducted with ITELab partners indicate that change is happening and governments are providing a lead in ICT in ITE in some countries. For example, Portugal has official government guidelines for ICT in ITE and Ireland’s Initial Teacher Education: Criteria and Guidelines for Programme Providers (2011) makes ICT in Teaching and Learning a mandatory element of all ITE programmes. Italian ITE providers are legally bound by the *Italian Digital School National Plan* (2015) to include digital competence in their courses. In Germany

the national framework M³K - *Modellierung und Messung medienpädagogischer Kompetenz* (2015) - applies to ITE providers. The Norwegian government has created new *National Regulations for the Framework Plan for Teacher Education at Master Level* (2016) which emphasise the need for digital skills within initial teacher pedagogy.

More typically however, ITE providers, usually universities, define their own curricula; if ICT is mentioned it tends to be vaguely worded and more aspirational than concrete.

BACKGROUND INFORMATION

“There is sometimes a mismatch between curricular reforms and what is going on in initial teacher education. Government requirements regarding curriculum reform implementation have not always been complemented by dialogue and collaboration with teacher education institutions (although, of course, there are exceptions, e.g. Finland).” [ICT and Initial Teacher Education: National Policies. OECD Education Working Papers, Number 61](#), OECD, 2011.

Ideas for policy action

The ITELab literature review and interviews indicate policy actions are needed to:

- Ensure all student teachers emerge from training with pedagogical ICT competence;
- Involve ITE providers in debates and initiatives for developing pedagogical ICT competences, and curriculum reforms more generally.

As European Schoolnet’s ITE projects are in their early stages, it is not yet possible to propose comprehensive policy recommendations. However, from what we already know, it is likely that policy action will also be needed on:

- Definitions and frameworks of teacher trainer and student teacher competences (in 2018, ITELab partner University of Agder will lead work on this issue);
- Improving and coordinating the accreditation of student teachers’ competences in new areas;
- Developing new teachers’ skills in areas such as the pedagogical use of ICT, personalising learning, and nurturing collaboration and creativity;
- Innovative and cost-effective ways of delivering ITE, including online solutions and new approaches to mentoring.

How are student teachers trained in the pedagogical use of ICT?

Evidence from the analysis

In the absence of formal, specific ICT teacher competency statements, both the teaching of ICT and trainee teachers’ use of it tends to be ad hoc. Evidence from the eTwinning TTI initiative shows that, as in schools, it is often dependent on a few innovative teacher trainers leading change, rather than their institution.

Studies suggest that, in general, student teachers receive mixed training in the use of technology for teaching

and learning. It is therefore something of a lottery whether a student teacher is exposed to systematic pedagogical ICT training. When there is training, it tends to focus on subject-specific applications (e.g. mathematics) and on technology (e.g. the interactive whiteboard) and treats technology in isolation rather than addressing how it can be integrated into teaching and learning.

Key determinants of student teachers’ use of ICT are their own competences and

beliefs. Agency, i.e. student teachers’ being responsible for their own professional development, can also be important. Learning persists when student teachers see ICT use modelled in classrooms and then learn by actively practising in context, rather than being taught the pedagogical use of ICT as a separate skill.

[ITELab’s Monitoring Report 2017](#) highlights innovative ways of training student teachers in ICT in six institutions, involving, for example, flipped learning (Germany),

learning by discovery (Italy), ICT modules offered to classroom teachers as well as student teachers (Norway), informal playful learning such as TeachMeets and

Twitter (Ireland), an ECTS-accredited Digital Educational Resources Course (Portugal), and a Video Enhanced Observation App used by ITE students and adopted by

many 'teaching schools' allowing teachers to see inside their own classrooms (United Kingdom).

BACKGROUND INFORMATION

It is often the case that ITE providers lack the up-to-date equipment and digital content found in schools and that tutors find it difficult to monitor emerging good practice in classrooms and to translate it into learning experiences for student teachers. Consequently, ITE tutors are rarely digital role models for student teachers.



Ideas for policy action

- There is a need to find effective mechanisms to ensure ITE tutors are kept up to date with educational technology and good classroom practices, as well as have the opportunity to develop their technological skills. One solution is to invite practising teachers with high levels of pedagogical competence to lead training sessions at the ITE institution, or, better, to observe them in 'teaching schools', as in Norway (a case study in the [ITELab Monitoring Report 2017](#));
- Ensuring adequate provision of up-to-date educational technology resources for ITE providers must also be considered;
- Finding ways for student teachers to experience and observe good ICT practice in classrooms is also advisable.

Pedagogical ICT competence frameworks



Evidence from the analysis

If developing student teachers' pedagogical ICT competence is challenging, then defining, categorising and assessing it is perhaps even more so. UNESCO was one of the first organisations to tackle this with its [ICT Competency Framework for Teachers](#).

[DigCompEdu](#), developed by the European Commission's Joint Research Centre, identifies six areas of competence and 23 competences that make up educators' digital competence, and provides an instrument for school-level assessment ([SELFIE](#)) with six levels of competence from 'newcomer' to 'pioneer'.

[TPACK](#) has attracted much academic study as a basis for a programme on ICT in

teaching. The TPACK framework focuses on teachers' Technological knowledge, Pedagogical knowledge, and Content knowledge, with pedagogical knowledge having the largest impact. Therefore, "*ICT courses should give priority to developing a strong pedagogical foundation before instruction in technological tools*" (Chai et al, 2010).

[ITELab's Monitoring Report 2017](#) reports on a new *Framework for Teachers' Digital Competence (2017)* developed by the Norwegian Centre for ICT in Education, in which competence areas align with general teacher competences in order to underline how digital competence is an integrated part of teachers' professional competences

and affects all parts of the profession.

In the MENTEP policy experimentation, the Technology-Enhanced Teaching Self-Assessment Tool (TET-SAT) developed in the project, is under-going school trials, with results due in September 2017. The domains covered are digital pedagogy, digital content use and production, digital communication and collaboration and digital citizenship. For each domain there are five levels, from starter to expert. Once the test questions are answered, users receive feedback and suggestions for activities to further develop competence in specific areas. They can also see how their own score compares to others nationally as well as to all users.

BACKGROUND INFORMATION

Although there are similarities across the different frameworks, and indeed each is based on extensive reviews and analyses of other frameworks, they can differ in purpose. The Norwegian framework is not designed to be used for assessment, for example, while TET-SAT is a self-assessment tool and DigCompEdu is closer to a taxonomy. What is yet to emerge is an agreement on common accreditation and credit transfer possibilities for teachers' pedagogical ICT competence.



Ideas for policy action

- Consider to what extent the DigCompEdu framework and the TET-SAT self-assessment can work in tandem and match national existing and planned competence frameworks for new entrants to the teaching profession;
- Allocate responsibility for monitoring and reporting regularly on developments in the rapidly changing area of teacher competence frameworks and implications for policy;
- Support the development of a survey of student teachers and ICT, to provide granular data at university, national and international level;
- Bring together ITE providers, policy-makers and practitioners to discuss how to specify, develop and accredit teachers' pedagogical digital competence.

IMPLICATIONS FOR TECHNOLOGY USE IN TEACHING AND LEARNING

Without pedagogical ICT training integrated into ITE, beginning teachers tend to teach as they were taught. On the other hand, well-prepared entrants to the teaching profession can act as a catalyst for change, as a European Commission publication on ITE policies notes:

“New teaching graduates can [...] be an asset to schools as they bring fresh knowledge, often including skills, such as integrating ICT and new media and different perspectives on existing routines and cultures”

[Shaping career-long perspectives on teaching: A guide on policies to improve Initial Teacher Education](#), European Commission, 2015.

It is vital that teachers are well-prepared to undertake this role, particularly as regards integrating ICT into teaching and learning. The review highlights the gaps to be addressed by policy-makers at all levels to make this happen, and improve low teacher retention rates in some countries: absence of a national strategy, lack of dialogue between stakeholders, autonomy of ITE providers, low levels of tutor competences, poorly-designed ICT training, other priorities and lack of time, and, until recently, a lack of clarity regarding the elements of pedagogical ICT competence.

The initiatives and projects described in this issue aim to address some of these challenges, notably:

- Increasing dialogue and sharing good practices;
- Developing ITE tutors' own competences;
- Assessing pedagogical ICT competence;
- Designing pedagogy-led training modules;
- Piloting innovative, flexible training models that integrate digital age competence development within existing provision.

“If we teach today's students as we taught yesterday's, we rob them of tomorrow.” John Dewey, 1915.



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.



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