ITELab Monitoring Report 2

Report #2 (D2.2.2)

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INTRODUCTION

The ITELab[1] Monitoring Reports form part of work package 2 (WP2) 'Case Studies and Monitoring of ICT within Initial Teacher Education (ITE)'.

The objective of WP2 is to 'stimulate the flow and exchange of knowledge between higher education and enterprises' as required by the Call for Proposals by:

- Improving the knowledge and research base on which this Knowledge Alliance project will carry out its work;
- Identifying evidence on the current integration of ICT within ITE and student teacher preparedness;
- Providing case studies on successful implementation of ICT within ITE curricula;
- Providing recommendation on the competences required of teacher educators involved in ITE based on experienced gained within the projects and recommendations on how ITE institutions can ensure these competences.

The first ITE Monitoring Report (D2.2.1) published in June 2017, is available on the itelab project website. It provides a full analysis, providing:

1. An analysis of the main institutional framework for the integration of ICT in teacher curricula;
2. The main areas of ICT in the curricula of the respective ITE providers;
3. Challenges for the integration of ICT in training programmes in ITE;
4. Details of CPD resources for qualified teachers that could be adapted for used in the project.

The aim of this second ITELab Monitoring Report 2 (D2.2.2), is to update information covering points 1, 2 and 3 above: EC and national strategies regarding integration of ICT in ITE courses; main areas of ICT in the curricula of respective ITE providers; challenges of integration of ICT in training programmes. It covers the period June 2017 to June 2018. Information sources include: ongoing literature monitoring by all partners; and, the results of an information gathering survey sent to partners and associate partners (universities, industry and education ministries).

[1] ITELab (Initial Teacher Education) Lab is a project coordinated by European Schoolnet and co-funded under the European Commission's (EC) Erasmus+ Programme from January 2017 to December 2019. It is a three year Knowledge Alliance project between higher education institutions and industry to foster innovation and knowledge exchange in initial teacher education. The ITELab Consortium includes 11 partners from eight countries (BE, FR, DE, IE, IT, NO, PT, UK) and is in line with the strategy of the European Commission which, for some time, has recognised the need for European cooperation related to ITE and that the modernisation of education requires close links between higher education, business, research and policy development.

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1 RECENT DEVELOPMENTS AND RESEARCH IN ICT IN INITIAL TEACHER EDUCATION

1.1 EUROPEAN POLICY ON ICT IN INITIAL TEACHER EDUCATION

1.1.1 Policy documents

The 2015 European Commission report '*Shaping career-long perspectives on teaching: A guide on policies to improve Initial Teacher Education' (December, 2015)* ***remains the key EU policy paper on ITE***. It reviews research, results from peer learning and sets out key challenges, suggesting policy actions illustrated with country examples.

A European Council meeting in Gothenburg in November 2017 included a debate on education and culture[2], drawing on 'Strengthening European Identity through Education and Culture'[3], drafted by the European Commission. This paper put forward a vision for a European Education Area and other proposals, notably *strengthening Erasmus+ and eTwinning, ensuring the quality of teachers and of teaching, including the establishment of an EU Teacher Academy and preparing a new Digital Education Plan to "promote innovative, personalised and digital teaching methods and technologies that will help improve learning outcomes,"* noting that "not enough teachers benefit from professional development programmes in these fields."

Following this, in January 2018, the Commission presented a first package of measures[4], addressing key competences for lifelong learning, digital skills, and common values and inclusive education. The *Digital Education Action Plan*[5] outlines how the EU can help people, educational institutions and education systems better adapt to life and work in an age of rapid digital change by making better use of digital technology for teaching and learning, developing the digital competences and skills needed for living and working in an age of digital transformation, and improving education through better data analysis and foresight. Initiatives include supporting schools with high-speed broadband connections, scaling up a new self-assessment tool for schools on the use of technology for teaching and learning (SELFIE) and a public awareness campaign on online safety, media literacy and cyber hygiene.

[2] http://www.consilium.europa.eu/en/meetings/european-council/2017/11/17/

[3] https://ec.europa.eu/commission/sites/beta-political/files/communication-strengthening-european-identity-education-culture_en.pdf

[4] http://europa.eu/rapid/press-release_IP-18-102_en.htm

[5] https://ec.europa.eu/education/sites/education/files/digital-education-action-plan.pdf

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In the same month, a Council Recommendation on *Key Competences for Lifelong Learning*[6] was published. Building on the Recommendation on Key Competences adopted in 2006, this proposal brings forward updates reflecting the rapid evolution of teaching and learning since then. The new Recommendation includes calls for promoting entrepreneurial education, notably by providing one entrepreneurial experience in primary or secondary school, boosting digital competences including programming and cybersecurity aspects, supporting the development of STEM competence and increasing language competences and number of languages learned.

In May 2018, the Commission announced a second package of initiatives. In its communication '*Building a stronger Europe: the role of youth, education and culture policies*'[7], the Commission sets out its vision of building a European Education Area including a strengthened Erasmus+ programme and a framework for European policy cooperation in education and training[8].

The May 2017 communication '*School development and excellent teaching for a great start in life*'[9] fosters this vision, ***highlighting the importance of "exchange of best practice among providers of Initial Teacher Education" and supporting student teachers to become "career-long learners"***. Of particular relevance to ITE are the following actions proposed by the Commission to develop better and more inclusive schools:

- "Increase cooperation between schools by making school partnerships and pupil mobility under Erasmus+ more accessible and enrich digital and intercultural learning by promoting participation in eTwinning;
- Develop a self-assessment tool on digital capacity so that schools in the EU can, on a voluntary basis, self-evaluate where they stand in relation to common criteria and are supported in developing and improving their effective use of technologies for digital age learning. Using the tool, schools can chose to report on their progress in the availability, use, competences and attitudes to Information and Communication Technologies, building a database across all participating Member States.
- Support improvements in school level education in science, technologies, engineering and maths (STEM) by promoting best practice in developing links and cooperation of higher education, research, businesses with schools at EU level and effectively addressing gender gaps and stereotypes in STEM, using Erasmus+

6 https://ec.europa.eu/education/sites/education/files/recommendation-key-competences-lifelong-learning.pdf

7 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1530529323717&uri=CELEX:52018DC0268

8 https://ec.europa.eu/education/policy/strategic-framework_en

9 http://ec.europa.eu/transparency/regdoc/rep/1/2017/EN/COM-2017-248-F1-EN-MAIN-PART-1.PDF

- Promote and support policy experimentation on developing multilingual pedagogies and teaching in diverse classrooms as part of the 2018 Erasmus+ work programme."

To support all learners and their competence development, the paper notes: "Digital technologies can enhance learning and support innovation in schools. Used properly, digital technologies can enrich learning experiences and support development beyond digital competence. Yet currently only a quarter of European school children are taught by digitally confident teachers. Digital technologies can support communication and cooperation in and between schools and enhance the participation of pupils and their families in school life."

In order to support teachers and school leaders for excellent teaching and learning, the Commission will:

- Simplify access and promote opportunities for future teachers to gain practical teaching experience abroad with the support of Erasmus+;
- *Develop online communities and resources for school professionals, including new eTwinning opportunities for student teachers, online networks for early career teachers and their mentors, online courses (including MOOCs), exchange of best practice among providers of Initial Teacher Education and a Digital Competence Framework to support teachers' self-assessment and development*;

The Communication observes: "The quality of teacher education requires more attention. Initial Teacher Education is most effective when pedagogical theory is combined with both subject knowledge and sufficient classroom practice. ***Student teachers need to be prepared for collaborative work and career-long professional development, for dealing with diversity in the classrooms and for using digital technologies with confidence***." Teachers should be encouraged to collaborate, for example in teaching as a team, and to participate in professional learning communities with external partners. Professional development models should change: "Collaborative environments and digital technologies can enhance teacher learning. Traditional workshops and training courses away from school still prevail. Educational innovations such as collaborative peer networks, massive open online courses (MOOCs), and the sharing of open educational resources can complement these methods and help overcome barriers to participation."

1.1.2 Policy analysis and commentary: some key recent publications

- **Teachers and school leaders in schools as learning organisations: Guiding Principles for policy development in school education.** Report from the ET2020 Working Group Schools 2016-18.[10]

  This report sets out guiding principles for policy development. Based on evidence from recent research in this area of school education the principles are the result of joint reflection and exchange by representatives of European education ministries and

[10] https://ec.europa.eu/education/sites/education/files/teachers-school-leaders-wg-0917_en.pdf

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stakeholder organisations in the ET2020 Working Group on Schools. The principles are further illustrated with examples from countries.

- **Effective Teacher Policies: Insights from PISA,** PISA, OECD Publishing, Paris, 2018[11].

  Improving the effectiveness, efficiency and equity of schooling depends, in large measure, on ensuring that competent people want to work as teachers, that their teaching is of high quality and that high-quality teaching is provided to all students. This report, building on data from the Indicators of Education Systems (INES) programme, the Teaching and Learning International Survey (TALIS) and the Programme for International Student Assessment (PISA), explores three teacher-policy questions: How do the best-performing countries select, develop, evaluate and compensate teachers? How does teacher sorting across schools affect the equity of education systems? And how can countries attract and retain talented men and women to teaching?

- **Teaching Careers in Europe: Access, Progression and Support, Eurydice**, 2018.[12]

  At a time when the importance of teachers is becoming increasingly apparent, what are the main challenges in the teaching profession related to supply and demand? How do education systems address these issues? How does one qualify to be a teacher? What support is available once qualified? What are the career opportunities in this profession? The comparative overview of national policies on teacher careers across Europe, which covers 43 European education systems, provides an analysis of different aspects of the teaching profession. The report focuses on primary and general secondary education. The main themes include: forward planning and main challenges in teacher supply and demand, entry to the teaching profession and teacher mobility, continuing professional development and support, career development, and teacher appraisal.

1.2 Competence Frameworks and Self-assessment Tools

Although there have been competence frameworks, and more recently digital competence frameworks, for a number of years, it is only recently that attention has turned to the specificities of professional digital competence and those of teachers to use ICT effectively in teaching and learning: pedagogical digital competence.

The UNESCO ICT competency framework for teachers[13] was one of the first attempts to classify this competence. It has three domains (technological literacy, knowledge deepening and knowledge creation) each with six sub-areas. In Europe what began

[11] http://dx.doi.org/10.1787/9789264301603-en

[12] https://eacea.ec.europa.eu/national-policies/eurydice/content/teaching-careers-europe-access-progression-and-support_en

[13] http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/unesco-ict-competency-framework-for-teachers/

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in 2016 as a generic digital competence framework for citizens (DIGCOMP[14]), gathered momentum in 2017 and 2018 with other frameworks, e.g. for consumers.

1.2.1 DigCompOrg

DIGCOMPORG[15] is a pan-European approach to *organisational digital capacity*. The DigCompOrg framework can be used by educational organisations (i.e. primary, secondary and VET schools, as well as higher education institutions) to guide a process of self-reflection on their progress towards comprehensive integration and effective deployment of digital learning technologies. DigCompOrg can also be used as a strategic planning tool for policymakers to promote comprehensive policies for the effective uptake of digital learning technologies by educational organisations at regional, national and European level. It can also be used as a means to create awareness about the systemic approach needed for effective use of digital learning technologies.

As can be seen in figure 2, the framework has seven elements and 15 sub-elements. For each of the elements and sub-elements of DigCompOrg, there are a number of descriptors (74 in total).

[14] https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework

[15] https://ec.europa.eu/jrc/en/digcomporg/framework and https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/promoting-effective-digital-age-learning-european-framework-digitally-competent-educational

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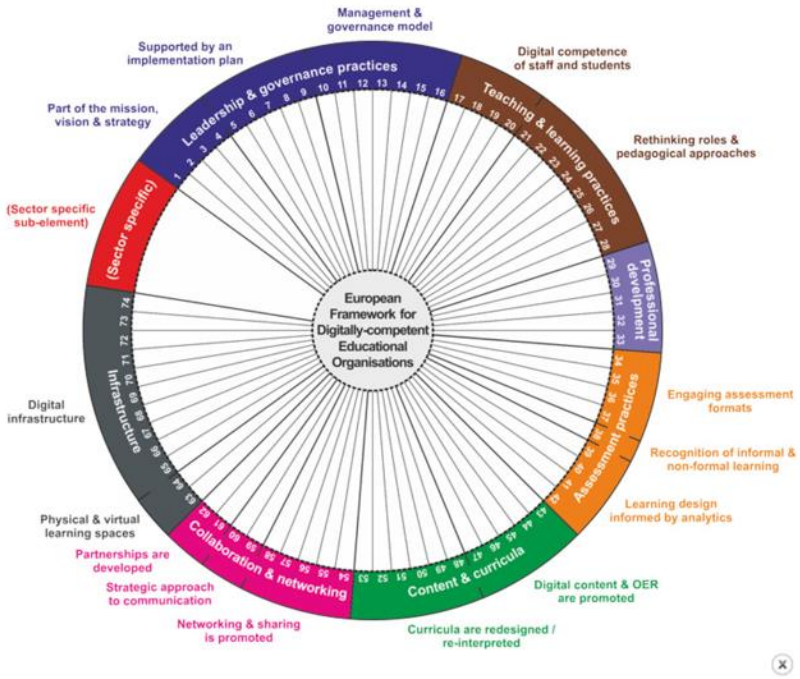

Figure 1: DIGCOMPORG framework

A framework in itself lacks a dynamic. That is why a tool has been developed for ***educational institutions to self-assess their organisational digital capability: SELFIE***[16]. SELFIE "asks questions to school leaders, teachers and students and based on this feedback it provides a snapshot of school's strengths and weaknesses in their use of digital technologies for learning. You can see where your school is, and, from there, decide what you want to improve, and build your own strategy." SELFIE focuses on learning rather than technology. As such, it considers all dimensions: school strategies, teaching, learning and assessment practices, infrastructure, curricula, student experience… It involves all key actors in the learning process: school leaders, teachers and students. Each school can select and even add its own questions to the tool to suit its own objectives. The system synthesises the input provided and generates the SELFIE School Report, a snapshot where strengths, weaknesses and areas for improvement are presented in a graphically.

SELFIE is undergoing trials in schools in 15 countries[17] but is not yet on general release.

[16] https://ec.europa.eu/jrc/en/digcomporg/selfie-tool

[17] https://ec.europa.eu/jrc/en/digcomporg/selfie-tool/selfie-map

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1.2.1 DigCompEdu

The Digital Competence Framework for Educators - DIGCOMPEDU[18] - was launched in late 2017. It is a common European Framework for the Digital Competence of Educators. Based on a scientifically sound background framework which helps to guide policy, it can be directly adapted to implement regional and national tools and training programmes. In addition, it provides a common language and approach that will help the dialogue and exchange of best practices across borders. The *DigCompEdu framework is for educators at all levels of education*, from early childhood to higher and adult education, including general and vocational training, special needs education, and non-formal learning contexts. It aims to provide a general reference frame for developers of Digital Competence models, i.e. Member States, regional governments, relevant national and regional agencies, educational organisations themselves, and public or private professional training providers.

The framework has six areas (fig. 2) and 22 competences. The focus is on how digital technologies can be used to enhance and innovate education and training, and not technology itself.

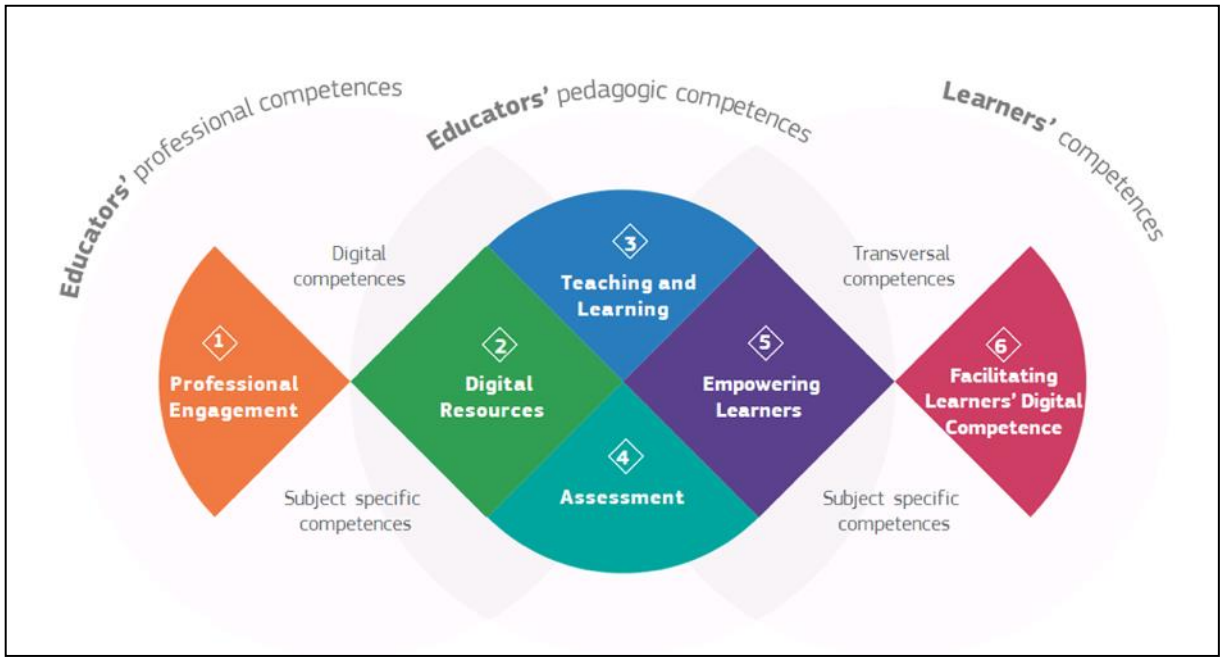

Figure 2: Overview of DigCompEdu

[18] https://ec.europa.eu/jrc/en/digcompedu

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1.2.2 TET-SAT

Not a framework as such, but a diagnostic tool developed in the MENTEP project[19], the ***Technology Enhanced Teacher Self-Assessment Tool – TET-SAT*** – has four dimensions, as seen in figure 3.

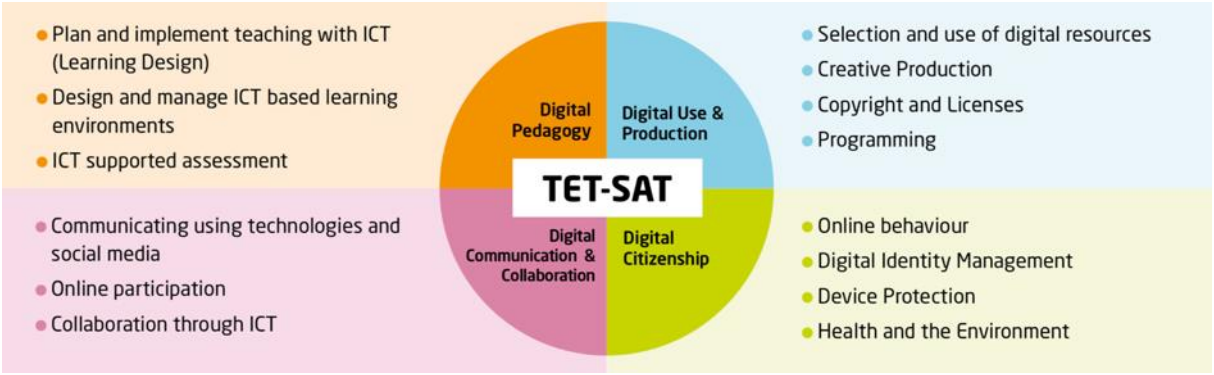

Figure 3: TET-SAT's four dimensions

Within each of the four areas a rich set of descriptive items is presented to users illustrating different TET-competencies in the relevant sub-areas. Each competence is proposed in the form of five different statements describing relevant practical pedagogical situations according to five competence levels. Teachers using the TET-SAT are asked to read the five 'statements', reflect on their actual teaching practice and select the one that most closely matches their own pedagogical behaviour. In order to associate a competence score to teachers, each of the five statements represents one competence level from level 1 starter to level 5 expert.

MENTEP (Mentoring Technology-Enhanced Pedagogy), Europe's largest education policy experimentation to date involving 6,000 teachers in 11 countries, ended in May 2018. The project addressed the two issues of encouraging teachers to innovate with digital technology how to assess their professional digital competence through a randomised controlled trial to assess the effect of using an online self-assessment tool (TET-SAT). TET-SAT gives teachers immediate personalised confidential feedback on their Technology-Enhanced Teaching Competence – their strengths, weaknesses and training needs. Furthermore, TET-SAT supports professional development as it directs teachers towards 16 national and European eco-systems of training resources tailored to their results. Data from TET-SAT is aggregated and anonymised and can be used to identify institution-wide or national trends and training needs – via a decision-makers' dashboard.

Survey results show that teachers who used TET-SAT clearly appreciated it and rated its features and content highly, particularly its ease of use, value in assessing their competences and helping them to re-think the use of ICT in teaching.

[19] http://mentep.eun.org

Data analysis revealed that TET-SAT impacted on teachers in the policy experimentation in two ways. First, it caused teachers to revise slightly downwards their beliefs about their own competency in using ICT for teaching: almost every third teacher discovered through using TET-SAT that their level of TET competencies was lower than they thought (figure 4).

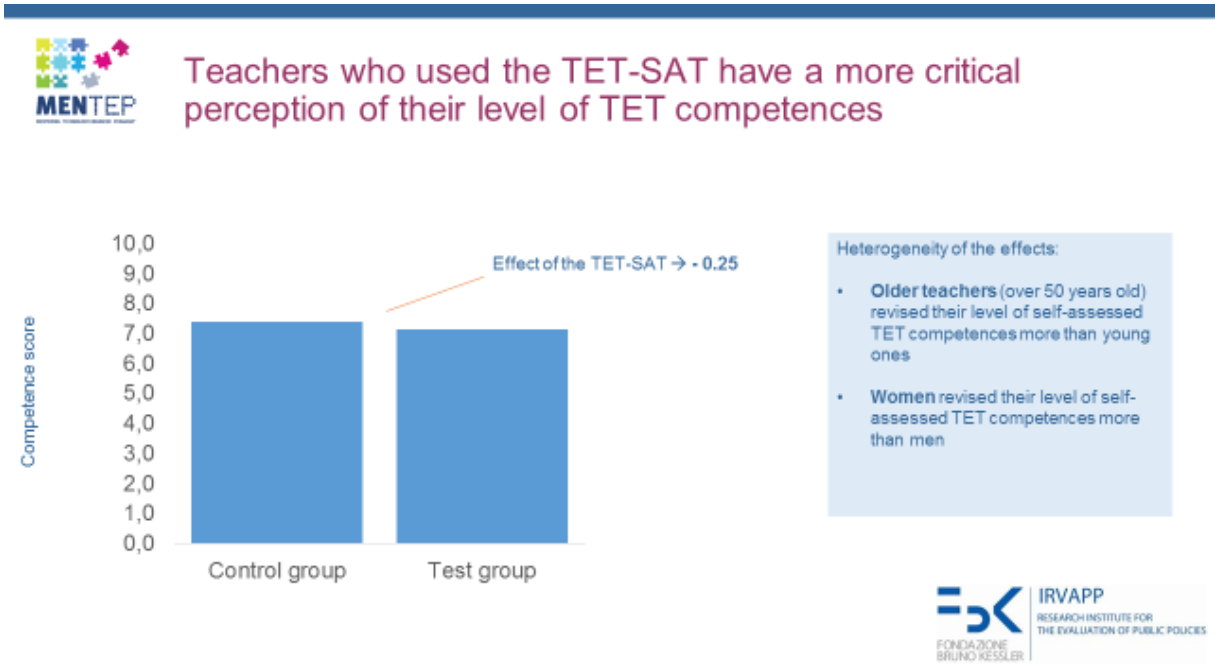

Figure 4: Impact of using TET-SAT

Second, using TET-SAT caused teachers to revise slightly downwards their views on whether ICT is useful in teaching and learning. Both findings may seem surprising at first but those teachers in the experimental group who chose to use TET-SAT already rated their competence as very high and had very positive views about ICT in teaching and learning before using the tool. The results therefore indicate that TET-SAT gives teachers a more informed and realistic view of what they are already able to do with technology in the classroom, the challenges to use technology in a meaningful way in teaching and learning, and the possibilities and limitations of using ICT in the classroom with the infrastructure and resources available at their own school.

It was found that a certain profile of teacher is more likely to use TET-SAT than others. Teacher A who is teaching a scientific subject, with a workload of 12 hours per week, with many ICT devices at home, positive views on ICT, who is highly collaborative, who followed training in ICT, and has a high level of self-assessed ICT ability has a probability of using TET-SAT of 50%. That is, one in two teachers like this can be expected to use the tool. Teacher B who is teaching a humanities subject, with a teaching workload of 18h/week, with no ICT devices at home, with negative views on ICT, who is less collaborative, who did no training on ICT for teaching, and who has a low level of self-

assessed ICT ability has a probability of using TET-SAT of 15%, meaning around one in seven teachers with similar characteristics is likely to use it. The research data also showed that self-assessment may not suit everyone and that other actions to reach out to specific subgroups of teachers to develop their digital competency need to be envisaged. These results confirm previous research results that the design of support measures for teachers needs to take into account the fact that one size may not fit all.

TET-SAT is freely available as an Open Educational Resource and can be adapted and installed locally in any of 16 languages. In ITELab the TET-SAT tool has been used for evaluation of the student teachers taking part in the MOOC and module, and will be used for an online survey in Autumn 2018 to gather information on teacher trainer competences.

1.2.3 The Digital Competence Wheel

The purpose of the Digital Competency Wheel[20] is to provide an overview of which digital competencies exist and should be improved, as well as concrete inspiration for how to improve the most relevant digital skills. The Digital Competency Wheel was developed by Center for Digital Dannelse (Digital Literacy), which has been engaged in digitalization and digital formation primarily in the public sector since 2009. The model is theoretically based on DIGCOMP.

[20] https://digital-competence.eu

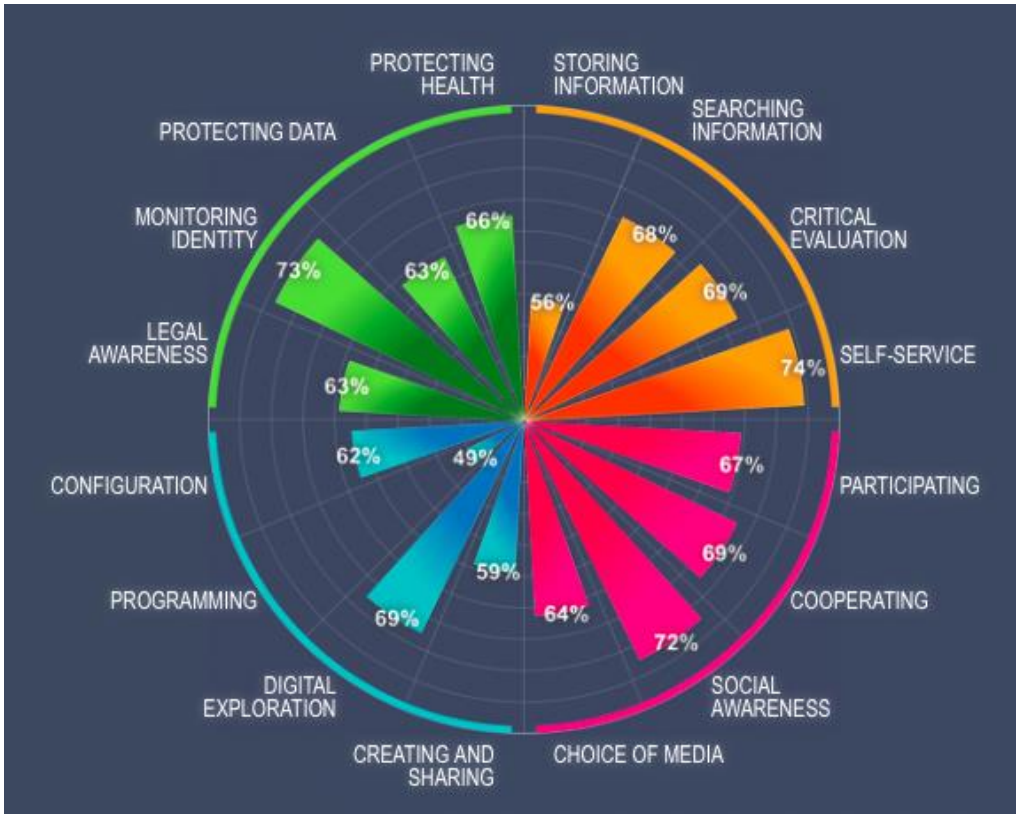

Figure 5: The digital competence wheel, showing the most recent 1,000 responses

The Digital Competency Wheel is a polar diagram that visually illustrates the strength of 16 different digital competencies. Each column represents a competency with a possible score between 0 and 100%. The higher the score the stronger is the competence. The centre of the wheel shows an individual's overall digital competence score.

1.2.4 Recent studies on digital competence

1.2.4.1 Teachers' professional digital competence

- **Gudmundsdottir, G.B., Hatlevik, O.E., Newly qualified teachers' professional digital competence:** implications for teacher education, European Journal of Teacher Education, vol. 41, 2018, issue 2, pages 214-231 2017

  https://doi.org/10.1080/02619768.2017.1416085

  This study explores how newly qualified teachers are prepared to use ICT in their initial teacher education. It presents findings of a nationwide survey in Norway on 356 newly qualified teachers. It explores how these teachers' ICT self-efficacy is related to how they perceive the quality of, and contributions from, their ITE related to ICT and the development of their professional digital competence (PDC). In general, newly qualified teachers report fairly poor quality and contribution of ICT training during their teacher education. The authors claim that continuous effort is needed to review the

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quality of ITE and contribute specifically to the development of PDC and developing student teachers' ICT self-efficacy in ITE.

- **Instefjord, E.J., Munthe, E., Educating digitally competent teachers: A study of integration of professional digital competence in teacher education, Teaching and Teacher Education**, vol. 67, 2017, pp 37-45. https://doi.org/10.1016/j.tate.2017.05.016

  The study focuses on the integration of professional digital competence in initial teacher education programmes. Data analysed are from three national questionnaire surveys conducted among teacher educators, mentor teachers and pre-service teachers in Norway. The study shows that there are weak positive correlations between positive management, management's development support, and teacher educators' digital competence, but stronger positive correlations between teacher educators' self-reported efficacy and digital competence. Results are discussed in relation to teacher education's role in qualifying for professional work in digital classrooms.

  Highlights:
  - Teacher educators' efficacy correlates positively with digital competence
  - 35% of teacher educators believe they are good role models for use of technology
  - Pre-service teachers are critical of the HEI's emphasis on digital competence
  - The influence of management on technology integration should be explored further.

- **Instefjord, E.J., How do Norwegian institutions with teacher training programmes integrate use of technology and develop the students' professional digital competence?** (Norwegian original PhD of the preceding). https://www.uis.no/forskning-og-ph-d/ph-d-utdanning/ph-d-program-i-utdanningsvitenskap/disputaser/larerstudenter-bor-lare-mer-om-bruk-av-teknologi-article126455-11161.html

- **O'Dowd (2017), Exploring the Impact of Telecollaboration in Initial Teacher Education: The EVALUATE project,** The Eurocall Review, vol. 25, no. 2, 2017. https://polipapers.upv.es/index.php/eurocall/article/view/7636/9681

  The guiding research question for the EVALUATE policy experimentation is: will participation in tele-collaborative exchange contribute to the development of competences which future teachers need to teach, collaborate and innovate effectively in a digitalised and networked world?

  The specific research questions are:
  - Will tele-collaboration have a positive impact on future teachers' digital-pedagogical competence?
  - Will tele-collaboration have a positive impact on future teachers' intercultural competence?
  - Will tele-collaboration have a positive impact on future teachers' foreign language competence?
  - How do socio-institutional factors in each of the participating countries shape and affect the impact of tele-collaboration in ITE?

The study is a randomized field trial involving student-teachers studying at ITE institutions in the participating regions of the EU. The treatment involves engaging classes of ITE students in a period of intensive tele-collaborative exchange with partner classes in ITE institutions in other countries based on specifically-designed tasks and content related to pedagogical-digital competences as well as intercultural competence, foreign language competence and other transversal competences.

- **Tondeur, R., Van Braak, Voogt, Presridge, Preparing beginning teachers for technology integration in education: ready for take-off?,** Technology, Pedagogy and Education, vol. 26, 2017, issue 2.
  https://www.tandfonline.com/doi/abs/10.1080/1475939X.2016.1193556

  The overall aims of this study are to explore (1) how beginning teachers integrate technology in their practice and (2) the connections between teachers' technology uses and their pre-service education programmes. Data of this follow-up study were collected through in-depth interviews with beginning teachers. The results reveal that all beginning teachers used a wide range of technological applications, mainly for structured learning approaches, while few created opportunities for student-centred technology use. Further, pre-service learning experiences that impact graduate teachers' technology use are identified. While teacher educators modelling technology use are an important motivator for beginning teachers to use technology in their own teaching, field experiences seem to be the most critical factor influencing their current practice. Based on the results of this study, recommendations about how to prepare and support pre-service and beginning teachers for technology integration are discussed.

- **Valtonen T. et al, Differences in pre-service teachers' knowledge and readiness to use ICT in education, Journal of Computer Assisted Learning, 2018**.
  https://onlinelibrary.wiley.com/doi/abs/10.1111/jcal.12225

  The aim of this paper is to provide insights into differences between pre-service teachers based on the areas of technological pedagogical content knowledge (TPACK) and the areas of theory of planned behaviour (TPB) in the context of using information and communication technology in education. The target group consisted of 267 first-year pre-service teachers at 3 Finnish universities. Differences between pre-service teachers were outlined using cluster analysis based on their knowledge of different TPACK areas (the respondents' weak and strong areas). To see how the TPB areas aligned with the 4 TPACK clusters, 1-way analysis of variance was used. Statistically significant differences between the 4 clusters were found in all the TPB areas except subjective norms. These results provide insights into the differences among pre-service teachers in the context of TPACK and the TPB. They also suggest that instead of considering pre-service teachers as one homogenous group, we need to understand the variations among their abilities and knowledge in order to be able to provide them with support they need within teacher education.

- **Voogt, J., McKenney, S., TPACK in teacher education: are we preparing teachers to use technology for early literacy?, Technology, Pedagogy and Education**, vol. 26, 2017, issue 1. https://www.tandfonline.com/doi/full/10.1080/1475939X.2016.1174730

  This study examines if and how five teacher education institutes in The Netherlands are helping students to develop the technological pedagogical content knowledge needed to effectively use technology for early literacy. Focus group discussions were

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held with teacher educators in which their responses to expert recommendations were probed. Findings indicate that, currently, very little attention is specifically given to the knowledge that teachers need to foster early literacy through the use of technology. This is due to multiple factors, including the conviction that many new technologies (e.g. tablets) are not used much in schools. Additionally, teacher educators themselves struggle with effective use of technology in their own courses. And although technological and early literacy specialists are available in teacher training colleges, pre-service educators note a distinct lack of integrated expertise in their institutions. Based on these findings, recommendations are given for research, policy and practice.

- **Witthaus, G., et al, Validation of Non-formal MOOC-based Learning: An Analysis of Assessment and Recognition Practices in Europe** (OpenCred), 2016. http://publications.jrc.ec.europa.eu/repository/bitstream/JRC96968/lfna27660enn.pdf

  This report presents the outcomes of research, conducted between May 2014 and November 2015, into emerging practices in assessment, credentialisation and recognition in Massive Open Online Courses (MOOCs). Following extensive research on MOOCs in European Member States, it provides a snapshot of how European Higher Education Institutions (HEIs) recognise (or not) non-formal learning (particularly MOOC-based), and how some employers recognise open badges and MOOC certificates for continuing professional development. We analyse the relationship between forms of assessment used and credentials awarded, from badges for self-assessment to ECTS credits for on-site examinations, and consider the implications for recognition. Case studies provide deeper insights into existing practices. The report introduces a model which guides MOOC conveners in positioning and shaping their offers, and also helps institutions and employers to make recognition decisions. It concludes with a set of recommendations to European HEIs and policy makers to enable wider recognition of open learning in higher education and at the workplace.

1.3 RECENT STUDIES AND REPORTS RELATED TO ITE

- **Albion, P.R., Tondeur, J. ICT and education: Meaningful change through teacher agency**, 2018. https://www.researchgate.net/publication/324039549_Information_and_Communication_Technology_and_Education_Meaningful_Change_through_Teacher_Agency

  The quality of teachers is a very strong influence on the quality of education. In an era when societies and technologies are changing rapidly, both the nature of the education that is appropriate and the means available for its delivery are also changing rapidly. Hence, if teachers are to contribute to the ongoing transformation of societies by transforming education through the use of technologies, they will need to engage in personal transformation through ongoing learning. The wide variety of contexts in which teachers work with differing resources, the variability in their prior learning and in the needs of learners, the rapid changes in technologies, and the shifting expectations of society make it impossible for central authorities to prescribe educational experiences that will be suitable for all circumstances. Teachers must be empowered to practice their profession by orchestrating resources and activities to match educational provision to learners' needs. Recognizing the agency of teachers as professionals is essential to enlisting them as contributors to the ongoing transformation of education through application of ICT. This chapter addresses the

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essential role of teacher agency in the transformation of teachers and the education systems in which they work.

- **Association for Teacher Education in Europe (https://atee.education), 42nd ATEE Annual Conference 2017 Conference proceedings**, editors: Marija Sablić, Alma Škugor, Ivana Đurđević Babić. https://atee.education/download/3824/
- **Association for Teacher Education in Europe (https://atee.education), ATEE Winter Conference proceedings 2018,** editors: Michiel Heijnen, Miranda de Hei en Stan van Ginkel. https://atee.education/download/3828/

  Papers include:
  - Attitudes of pre-service teachers towards the use of mobile devices in teaching-learning process in India. Susmita Mondal
  - Facilitating self-regulated learning in online courses: implications for training, Maureen Snow Andrade
  - Pre-service teachers' perceptions regarding the contribution of communal blog to their professional development. Liat Biberman-Shalev
  - The impact on teacher's self-efficacy of TPACK in the Professional Development School Scheme (PDSS), Ming Yan TSUI Ida Ah Chee MOK
  - Exploring lesson study as a transformative learning approach for teacher educators' professional development in technology, Maurice Schols
  - Migrant teachers' experiences with the use of digital technology and media during their placement period in Swedish schools, Annika Käck Sirkku Männikkö Uno Fors
  - Professional development: an ecological perspective on special education teacher learning in mathematics, Stella Long
  - Assessment of Innovation Dimension in a MOOC Course "New Media in Education" focused on PBL Plans, Orly Melamed Rivka Wadmany
  - Underequipped skilled educators: The case of Southern Italian high school teachers for 96 students with special educational needs, Anna Dipace Fedela Feldia Loperfido Jarmo Viteli Katia Caposeno Alessia Scarinci
  - How to Motivate New University Teachers for Student-centered Learning, Karolina Duschinská Radka High
- **Boyd, P., Szplit, A. (eds.), Teachers and Teacher Educators Learning Through Inquiry: International Perspectives, 2017.** https://www.researchgate.net/publication/318323530_Teachers_and_Teacher_Educators_Learning_through_Inquiry_International_Perspectives.

  This text contributes to a long-standing international debate around the knowledge and expertise of teachers. It focuses on inquiry, but relates this strongly to pursuit of the most effective approach, or pedagogy, for initial teacher education and for the continued professional learning of teachers. It will be helpful to begin with a somewhat simplified overview of this debate. On one hand some observers consider that education should be treated in a similar way to the field of medicine and require teachers to 'implement evidence-based practice'. Other observers consider that education should be

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compared to the more complex, real world field of healthcare and require teachers to 'develop research-informed practice' (Boyd, 2016). Whilst both these perspectives value the contribution to evidence of large-scale randomised control trial research and meta-reviews of such research, the evidence-based perspective tends to see this as sufficient, whilst the research-informed perspective sees the additional need for teachers to be more directly involved in knowledge creation through professional inquiry and practitioner research.

As in many other countries, in the Netherlands there is growing attention towards research conducted by teacher educators working at universities of applied sciences, previously known as university colleges, or teaching intensive institutes for higher vocational education. This attention places demands on teacher education departments in terms of their policies and their professional development support for teacher educators, for whom conducting research or supervising students' research have not been common practice. This chapter is about the lessons learned from several studies concerning designing and establishing professional development activities to support teacher educators in conducting research and supervising students' research.

- **Darling-Hammond, L., Hyler, M. E., Gardner, M. (2017). Effective Teacher Professional Development.** Palo Alto, CA: Learning Policy Institute. https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report

  This report reviews 35 methodologically rigorous studies that have demonstrated a positive link between teacher professional development (PD), teaching practices, and student outcomes. It identifies key features of effective efforts and offer rich descriptions of these models to inform education leaders and policymakers seeking to leverage professional development to improve student learning.

  Effective professional development incorporates most, if not all, of the following elements. It:
  - Is content focused
  - Incorporates active learning
  - Supports collaboration
  - Uses models of effective practice
  - Provides coaching and expert support
  - Offers feedback and reflection
  - Is of sustained duration

  The report also examines professional learning communities as an example of a PD model that incorporates several of these effective elements and supports student learning gains. This collaborative and job-embedded PD can be a source of efficacy and confidence for teachers, and can result in widespread improvement within and beyond the school level.

- **Lantz-Andersson, A., Lundin, M., Selwyn, N., Twenty years of online teacher communities: A systematic review of formally-organized and informally-developed**

professional learning groups, Teaching and Teacher Education, vol. 75, pp. 302-315, 2018. https://www.sciencedirect.com/science/article/pii/S0742051X18300908

This paper presents a systematic review of 52 empirical studies of formally-organized and informally developed online teacher communities from the early 2000s to the present time. Focusing on the social as well as technological aspects of online participation, the review explores how teacher communities are shaped by broader contexts of teaching. The review shows that while formally-organized and informally-developed communities address different needs amongst teachers and support different outcomes, they also share several common characteristics. Indeed, regardless of type, online communities can be a valuable means of developing supportive and collegial professional practices. That said, more evidence is required on the specific collaborative merits of teachers' online interactions.

- **Jakobsdóttir, S., Bjarnason, G., Gunnarsson, K. H., & Kristofersdottir, D. D.** (2016). **MOOCs as provisions in graduate education for future professional development.** In Commonwealth of Learning (Ed.), Conference proceedings for the 8th Pan-Commonwealth Forum on Open Learning (PCF8). Kuala Lumpur: Commonwealth of Learning & Open University Malaysia. https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/PDF_0.pdf
The role of MOOCs can be an important one regarding professional development, not the least in the area of ICT in education where the need has been great for teachers all over the world. In this paper, we will describe the experiences of embedding MOOCs in a graduate course (NOK042F) on distance education at the University of Iceland (UI) School of Education in 2014 and 2016. One purpose of this integration was to expose students to the opportunities involved before graduation so they could be more aware of what might be available for them in their future professional development.

- **Livingstone, S., The Class**, NYU Press, 2016. http://connectedyouth.nyupress.org/details/9781479824243/

Do today's youth have more opportunities than their parents? As they build their own social and digital networks, does that offer new routes to learning and friendship? How do they navigate the meaning of education in a digitally connected but fiercely competitive, highly individualized world? Based upon fieldwork at an ordinary London school, The Class examines young people's experiences of growing up and learning in a digital world. In this original and engaging study, Livingstone and Sefton-Green explore youth values, teenagers' perspectives on their futures, and their tactics for facing the opportunities and challenges that lie ahead. The authors follow the students as they move across their different social worlds; in school, at home, and with their friends, engaging in a range of activities from video games to drama clubs and music lessons. By portraying the texture of the students' everyday lives, The Class seeks to understand how the structures of social class and cultural capital shape the development of personal interests, relationships and autonomy. Providing insights into how young people's social, digital, and learning networks enable or disempower them, Livingstone and Sefton-Green reveal that the experience of disconnections and blocked pathways is often more common than that of connections and new opportunities.

- **Ministry for Education and Skills (Ireland), 2018 Digital Strategy Action Plan,** 2018. https://www.education.ie/en/Publications/Policy-Reports/digital-strategy-action-plan-2018.pdf

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The 2018 Digital Strategy Action Plan sets out a roadmap for the twelve months ahead, to bring the Irish education system further along the path to being the best in Europe at embedding digital technology in teaching, learning and assessment by 2026. It reiterates the goals and objectives set out in the Digital Strategy for Schools 2015-2020 and contains over 80 actions/sub-actions to be achieved by the end of 2018. It will be followed by annual action plans in 2019, 2020. Key elements of the 2018 Digital Strategy Action Plan include:

- Computer Science to be introduced as a Leaving Certificate subject from September 2018;
- The National Council for Curriculum and Assessment will work with a network of schools to explore how coding might be best integrated into the primary school curriculum;
- The Digital Learning Framework, which allows schools to assess their digital capability, will be assessed and improved;
- Clear statements on the use of digital technologies will continue to be included in all subject specifications developed in 2018;
- Clusters participating in School Excellence Fund – Digital will begin their projects and future rounds will be considered;
- The Department will actively contribute to the whole of Government approach to internet and cyber safe security for young people;
- A circular will be issued to schools on the usage of smartphone and tablet devices – this will require schools to engage with the school community including students and parents on their use.

- **OECD, The OECD Handbook for Innovative Learning Environments, 2017**. http://www.oecd-ilibrary.org/education/the-oecd-handbook-for-innovative-learning-environments_9789264277274-en;jsessionid=5bomsl8kq8lkd.x-oecd-live-02

  This handbook draws on extensive reports and materials compiled over a decade by the OECD in its Innovative Learning Environments project. Its four chapters – The learning principles; The innovative learning environment framework; Learning leadership and evaluative thinking; and Transformation and change - each contain a concise, non-technical overview introduction followed by a set of tools. The handbook makes good the ILE ambition not just to analyse change but to offer practical help to those around the world determined to innovate their schools and systems. "If there has been one lesson learnt about innovating education, it is that teachers, schools and local administrators should not just be involved in the implementation of educational change but they should have a central role in its design." Andreas Schleicher, OECD Director for Education and Skills.

- **Paniagua, A. and D. Istance (2018), Teachers as Designers of Learning Environments: The Importance of Innovative Pedagogies, Educational Research and Innovation**, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264085374-en

  Pedagogy is at the heart of teaching and learning. Preparing young people to become lifelong learners with a deep knowledge of subject matter and a broad set of social skills requires a better understanding of how pedagogy influences learning. Focusing on pedagogies shifts the perception of teachers from technicians who strive to attain the

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education goals set by the curriculum to experts in the art and science of teaching. Seen through this lens, innovation in teaching becomes a problem-solving process rooted in teachers' professionalism, rather than an add-on applied by only some teachers in some schools. Teachers as Designers of Learning Environments: The Importance of Innovative Pedagogies provides a snapshot of innovative pedagogies used in classrooms around the world. It sets the stage for educators and policy makers to innovate teaching by looking at what is currently taking place in schools as potential seeds for change. At the heart of all of these approaches is a sensitivity to the natural inclinations of learners towards play, creativity, collaboration and inquiry. To illustrate how teachers use these innovative practices, the publication presents examples from 27 national and international networks of schools. It is now generally acknowledged that the quality of an education system cannot exceed the quality of its teachers. This volume goes a step further to argue that a teacher cannot help students meet new educational challenges by continuing to draw on a limited and perhaps even inherited set of pedagogies. And here lies the genuine importance of innovative pedagogies.

- **Selwyn, N., Nemorin, S. & Johnson, N. (2017) High-tech, hardwork: an investigation of teachers' work in the digital age.** Learning, Media & Technology, Vol. 42 (4), pp. 390-405. https://www.tandfonline.com/doi/abs/10.1080/17439884.2016.1252770?journalCode=cjem20

  This paper explores the ways in which digital technologies are now implicated in the work – and specifically the labour – of school teachers. Drawing upon qualitative studies in two Australian high schools, the paper examines the variety of ways in which teachers' work is now enacted and experienced along digital lines. In particular, the paper highlights the association of digital technologies with the standardization, evidencing, intensification and altered affect of teachers' work. The paper questions the extent to which these trends might be seen as constituting 'new' forms of labour, with the research data pointing to continuities and disjunctures in terms of teachers' autonomy and professionalization. The paper also considers how these conditions are experienced in different ways across the teaching workforce. The paper concludes by reflecting on how fairer and/or empowering working conditions might be achievable through alternate uses of digital technology.

- **Staufenberg, J., School-led teacher training routes pull further ahead, Schools Week,** 3 August 2018. https://schoolsweek.co.uk/school-led-teacher-training-routes-pull-further-ahead/

  In England in 2016-17, 55 per cent of first-year teacher trainees took a school-led route such as School Direct or school-centred initial teacher training (SCITTs). 93 per cent of postgraduates in school-led routes achieved their qualified teacher status, compared with 90 per cent in higher education institutions.

1.4 Highlights from the ITELab Case Study interviews with partners on Institutional Frameworks

In the national education policies of the ITELab providers, approaches to defining the role of ICT in teacher training or the pedagogical digital competences of teachers range from a 'light touch' approach to national frameworks.

1.4.1 United Kingdom (England)

The Department of Education's 'Teacher Standards'[21] do not directly mention digital technology, but its use is implied. Recent policy shifts focus principally on the implementation of the new GCSE and A level curricula which are being introduced in secondary schools. The new curricula are more knowledge-heavy than previously, with a focus on reverting to more traditional teaching ways of subjects such as English and mathematics, for example whole-class teacher-led lessons. The impact of this on ITE is that the student teacher on placement in schools faces more constraints on what and how they teach, with less freedom to experiment, than in the past. For example, project-based learning has a more limited profile than previously. For student teachers, what is increasingly taking priority is their ability to manage behaviour, maintain discipline and use management information systems to track student progress.

1.4.2 Portugal

The educational system in Portugal is undergoing great change, with the introduction of a ***new student profile framework***. This profile intends to draw guidelines for students when they reach the end of upper secondary education. ***'National School of Promotion for School Success'*** was a challenge made the Ministry of Education, for schools and principals to implement innovative measures to increase student success. The Pedagogical Innovation Pilot-Project (PIPP) comprising about 6 schools (25% schools) and the Autonomy and Flexibility Curriculum Project that involved 270 schools (25%) were given the freedom to change pedagogical practices. The methodology of digital pedagogy and collaborative teaching in the classroom being integral to this change. Following a successful pilot, this freedom has now been given to all primary (first-cycle) schools.

1.4.3 Ireland

The Department for Education and Skills (DES) published the ***2018 Digital Strategy Action Plan (June 2018) for schools***. The Plan, which has over 80 actions, sets out a roadmap for the twelve months ahead, to bring the Irish education system further along the path to being the best in Europe at embedding digital technology in teaching, learning and assessment by 2026. The annual action plan is part of the DES's Digital Strategy for Schools 2015-2020, which sets out the government's medium-term plan to realise the potential of digital technologies to enhance teaching, learning and assessment.

Key elements of the 2018 Digital Strategy Action Plan for schools are that:

- Computer Science will be introduced as a Leaving Certificate subject from September 2018 (phased introduction).

[21] https://www.gov.uk/government/publications/teacher-standards

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- The National Council for Curriculum and Assessment (NCCA) will work with a network of schools to explore how coding might be best integrated into the primary school curriculum.
- The Digital Learning Framework, which allows schools to assess their digital capability, will be assessed and improved.
- Clear statements on the use of digital technologies will continue to be included in all subject specifications developed in 2018.

There is no direct link or reference to ITE in the Digital Strategy. The universities themselves remain largely independent to set their own teaching curriculum. However, the work of the ITE institutions with the placement schools for their student teachers, is one way in which the schools' Digital Strategy feeds back into the universities. For example, in 2017, University College Dublin (UCD) introduced a one-year joint 'Computational Thinking' course in partnership with Microsoft.

1.4.4 Norway

As reported in the first ITE Monitoring report, ***a new Framework for Teachers' Digital Competence*** was published by The Norwegian Centre for ICT in Education in May 2017. The main purpose of the Framework is to establish a common ground and a common vocabulary for describing teachers' professional digital competence. The aim is for the framework to be used by national, regional and local authorities, and by teacher education institutions and teacher educators as a reference when developing national guidelines for the different teacher education programmes, institutions' own study programmes and curricula, continuing professional development programmes and courses, and local competence development plans.

The Norwegian Directorate for Education and Training is now working on a new national curriculum for schools, "Fagfornyelsen" (subject renewal)[22]. The important issue is defining "Kjerneelementer" (core elements) in each subject to provide more focus on in-depth learning. The main aim of the renewal is "to make subjects more relevant for the future" and create better linkages and integration between different subjects. The core elements were established by the Norwegian Ministry of Education and Research in June 2018[23] and the work on the competence aims for each subject will be developed during the next year. The new curriculum will be implemented from the autumn 2020.

Core elements are as follows:

- Natural science will have a more explorative and practical focus with a clear technology component.
- Programming will be part of various subjects.

[22] https://www.udir.no/laring-og-trivsel/lareplanverket/fagfornyelsen/ available only in Norwegian

[23] https://www.regjeringen.no/no/aktuelt/fornyer-innholdet-i-skolen/id2606028/

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- Social science will have the main responsibility for digital competence
- Mathematics will include programming and algorithmic ways of thinking
- Natural science will include programming in the core element 'technology'
- Music will have more focus on digital practices in music, such as programming
- Arts will include programming related to visual modelling at lower secondary school
- Foreign languages will have a core element called Language and Technology.

For the universities training future teachers, the strategic move aligned with the above is closer collaboration with schools. This move is outlined in the Norwegian Ministry for Education and Research's strategy paper published in Autumn 2017, Strategy for Teacher Education 2025 - National Strategy for Quality and Cooperation in Teacher Education[24]. For the University of Agder (ITELab partner), a direct consequence of these strategies is hiring of teachers from schools, across different subjects, to work in collaboration with the university teams.

1.4.5 Italy

Italian ITE institutions are obliged by the ***Digital School National Plan*** (PNSD 2015) to provide digital competence in their ITE courses. The ITE curriculum is prescribed by law with special reference to enabling inclusion and accessibility to students with special educational needs. The implementation of this national plan continues; for example, action 28 of the plan requires every school to have a teacher nominated as a 'Digital Animator', with a strategic role to promote digital skills across the school.

For the University of Perugia (ITELab partner), this means that there are 86 digital animators training and working with the local regional office in Umbria. The university collaborates with the schools through activities ranging from their student placements to participation in digital school initiatives.

[24] https://www.regjeringen.no/contentassets/d0c1da83bce94e2da21d5f631bbae817/kd_teacher-education-2025_uu.pdf

2 ICT IN ITE INSTITUTIONS: 2018 SURVEY

2.1 INFORMATION GATHERING SURVEY 2018

This section presents the main findings from an online survey that took place in May-June 2018 with the 55 ITElab industry partners and associate partners (ministries of education, universities, industry) to better understand how ICT is being covered in ITE.

Given the small sample size, the results are indicative. However, as part of the overall monitoring of ITE activity, they add further insights at an institutional level. The results are based on 28 responses from 14 different countries (a 51% response rate); 17 responses were from 13 universities, 9 from education ministries, and 2 from industry.

The results are shared by sector.

2.1.1 Universities

All sectors of education except pre-school were represented in responses.

For the majority, digital pedagogical skills are integrated within existing teacher modules in general, and not taught separately. However, 54% report that their university has separate modules to develop specific skills e.g. coding.

The results show that the main driver to change the curriculum comes from government policy. In countries with less government direction pressure to change is at the institutional level. One comment referred to student-led pressure to change.

Respondents were asked to choose the top six challenges in integrating ICT and digital pedagogy in courses. The results (figure 6) indicate that ***the most frequently chosen challenges are a lack of suitable teaching placements to practise digital pedagogy skills and the wide variety of school environments*** makes it difficult to prioritise digital skills. These were followed by student teachers being more concerned about managing learning than with digital pedagogy skills, and teacher trainers' own ICT and digital pedagogy skills.

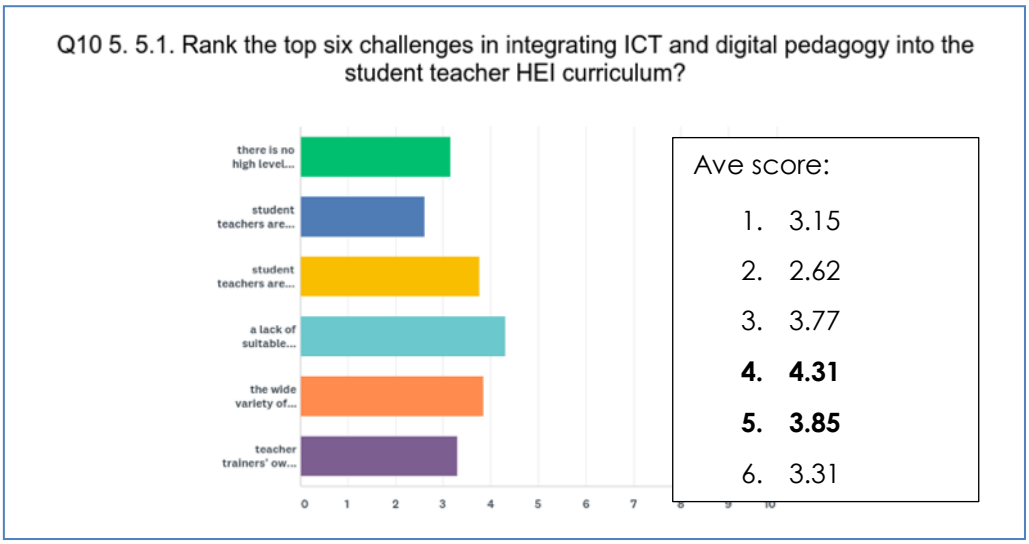

Figure 6: Top challenges in integrating ICT

Key:

1. There is no high-level pressure to change the existing curriculum.
2. Student teachers are more interested in learning theory.
3. Student teachers are more concerned about managing learning than with digital pedagogy skills.
4. **A lack of suitable teaching placements to practice digital pedagogy skills.**
5. **The wide variety of school environments makes it difficult to prioritise digital skills**
6. (limited by) Teachers trainers' own ICT and digital pedagogy skills

Respondents mentioned the pressure on time within the ITE curriculum to experiment and develop digital pedagogical skills. From the experience of partners in the ITELab project, this point relates particularly to the training of secondary student teachers on one-year post-graduate training in which many topics are covered in a short time.

Asked how their institution developed the skills of teacher educators themselves, for the majority (62%), it is up to the individual teacher trainer to develop their digital competence. For over half of the respondents there is also a coordinated approach. This may seem contradictory, but could be linked the fact that in some countries there is a strong top-down, policy-led digital strategy approach to school education.

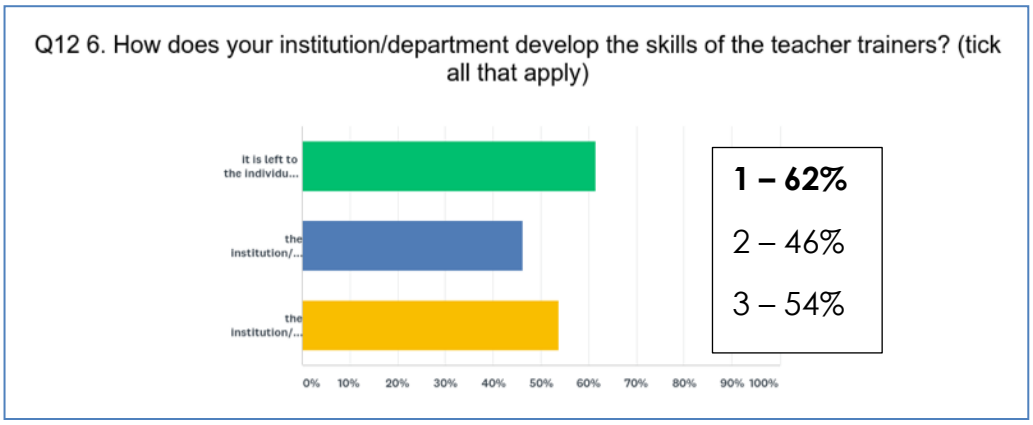

Figure 7: ICT skills training for teacher educators

Key:

1. **It is left to the individual teacher trainer.**
2. The institution/department offers one-off ICT skills training
3. **The institution/department has a coordinated approach and plan to develop the ICT and digital pedagogy skills of teacher educators.**

For most respondents (38%), if ICT skills training is available, it takes the form of some sort of blended learning or face-to-face (31%) training. Only one respondent mentioned training via a MOOC.

Respondents were asked about the role of the education ministry in working with universities to develop student teachers' digital pedagogy competences. For 46% of respondents (see figure 8) there is a top-down approach; for 23% there is a hands-off approach; for 23% there are frameworks and guidance to adhere to. 8% mentioned working collaboratively with the education ministry.

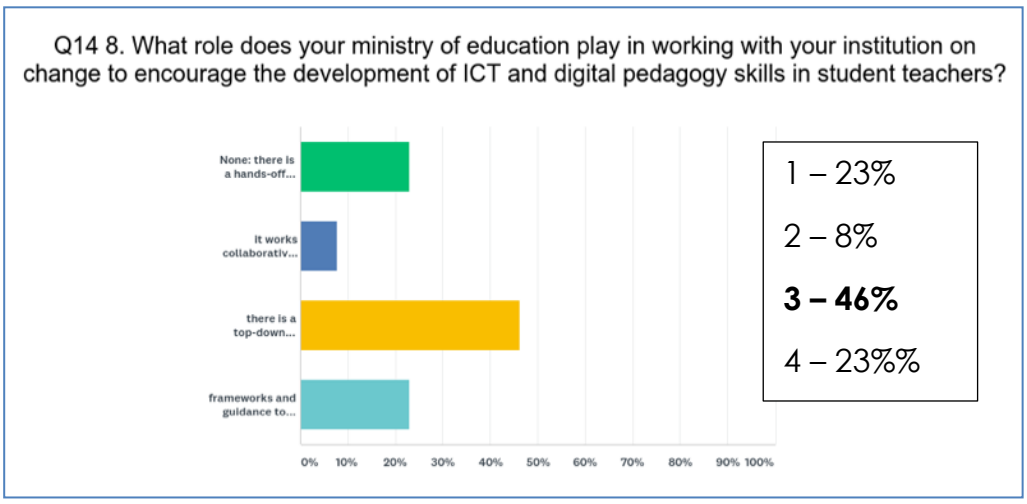

Figure 8: Role of education ministry

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Key:

1. None, there is a hands-off approach
2. It works collaboratively with universities
3. **There is a top-down approach with national policies**
4. There are frameworks and guidance to adhere to

Respondents were asked about the role of schools in developing student teachers' digital pedagogical competence. Responses are divided again (figure 9), probably reflecting a top-down, policy-level approach in the country: 38% state that schools do not play a role and for the remainder, institutions either work with the schools themselves or with teaching schools.

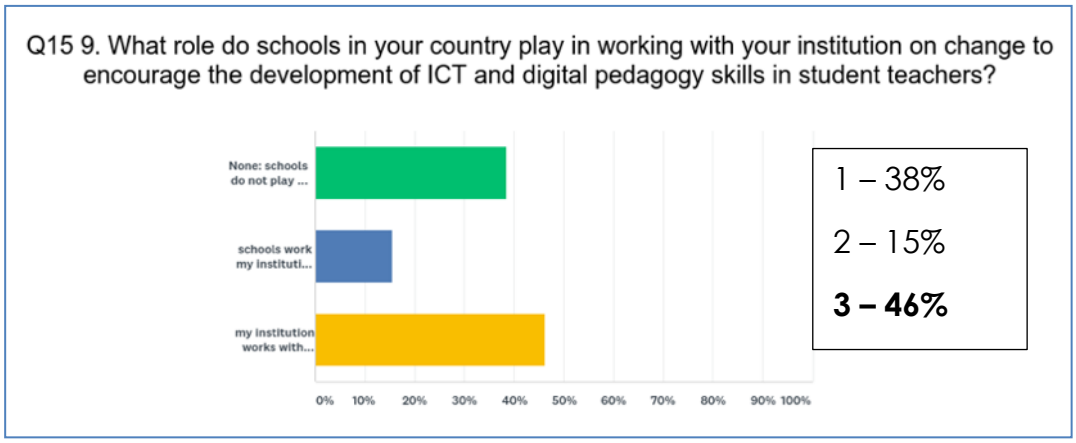

Figure 9: Role of schools

Key:

1. **None, schools do not play a role**
2. Schools work with my institution on this topic
3. **My institution works with teaching schools**

Asked about cooperation with the ICT industry and business in developing digital pedagogy skills of student teachers, most respondents (70%) said there was little or no cooperation. What is interesting, and is a pointer for the future, is that the remaining 30% either work with industry/business on specific initiatives (e.g. the future classroom, coding), or are under pressure to develop closer relationships with the ICT industry and businesses.

Finally, over 60% of respondents' institutions either conduct regular student surveys or work collaboratively with student teachers to obtain their views on developing their digital pedagogy competence. However, in 38% of cases students there is no or little consultation.

2.1.2 Industry

Two of the ICT industry partners in ITELab (Microsoft and Steelcase) responded to the survey. Their responses indicate that they work at all levels within the universities: senior management, department heads, course module leaders; as well as, with the education ministries. One of their main aims is to encourage and support the development of ICT and digital pedagogy skills in student teachers. For Microsoft Education, this includes joint content production and delivery of blended learning training (e.g. the MS Student Teacher Education Program). Their resources are a mix of Open Education Resources (OER) and protected. In terms of the challenges they perceive facing universities in integrating ICT and digital pedagogy into student teacher curriculum, the responses are similar to those of the universities themselves: no high-level pressure to change; lack of suitable teaching placements to practise digital skills, and teacher trainers' own ICT and digital pedagogy skills.

2.1.3 Education Ministries

Three respondents representing education ministries (national and regional) completed the survey. They represent countries/regions with more than 50 universities, where they only worked with a small number of them (less than 20%) and typically either at department head of student teacher level. Their main interaction with the universities was via surveys, and in two instances, collaborating on future classrooms. Again, for two of the institutions there is a top-down, national framework and guidance linked to the area of ICT and digital pedagogy skills. Each of these institutions delivered some form of blended learning and face to face training.

The challenges facing the integration of ICT and digital pedagogy skills into the student teacher curriculum are the same as for the other two groups: lack of top-down pressure to change; lack of suitable teaching placements to practise digital skills; teacher trainers' own digital skills; and, again interestingly, student teachers being more concerned with managing learners that with digital pedagogy skills.

There were also some examples provided of Spanish innovative resources, which are a mixture of creative commons and protected:

- Good practices: http://xtec.gencat.cat/ca/curriculum/orientacioeducativa/practiques-de-referencia/
- Teacher training and exchanges: http://xtec.gencat.cat/ca/recursos/lestrangeres/angles/-Edu365
- Primary: http://www.edu365.cat/primaria/muds/angles/index.htm-ARC
- Online resources combined with face to face training by the university of working teachers and initial teachers:
    - http://apliense.xtec.cat/arc/cercador/d-9039#_ga=2.209647570.1110140150.1528135388-
        - https://e-ikastola.eus/course/index.php?categoryid=2.

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2.1.4 Recommendations for change

Finally, 18 respondents offered recommendations they would make to bring about change in universities in the development of ICT and digital pedagogical skills in student teachers. Half of all the respondents (50%) recommended that strategic, long term action was required in this area, as well as short (22%) and medium-term actions (28%).

Recommendations range from policy to skills development, and include adopting a more collaborative approach across all the different institutions (ministries, schools and universities). The main strands of individual recommendations are listed below:

- ***Work on teacher educators' competences****, both on campus and in the schools.*
- ***Develop programmes that demonstrate through practice the impact of ICT and pedagogy skills through-out the full ITE programme****; i.e. a focus on digital skills, digital assessment, building digital content and engaging with peers and programme digitally.*
- ***Direct links with mentor teachers*** *who utilise ICT and pedagogy skills in their own work.*
- *A* ***more coherent institutional-level policy in support of opportunity for ITE students*** *to deliberate and practice imaginative ICT usages in real-class / school based settings as part of their programmes but without high-status marking / grading being attached.*
- ***Create think tanks with colleagues who are interested in the topic*** *- collaborations with industry to develop infrastructure - information exchange with ministries - involve stakeholders within your institution - involve professional school of education - create highlight examples to involve others - cooperation with international partners*
- ***Regarding ICT skills development there should be a continuum in terms of national policy from primary to secondary and then higher education,*** *taking into account new goals like STEM and computational thinking. Student teacher in most of the cases lack of basic ICT skills while entering the university which makes it really hard to cope with the advances of new technologies and their affordances.*
- ***A more collaborative approach between the institutions involved*** *(Ministry of Education, universities, schools, stakeholders). Try to Improve coordination among institutions (HEI & Education & Schools). Establish a certificate for initial teachers to enter schools*
- ***Lecturers should really notice the necessity of ICT skills in higher education****. There must be a pressure on the student teachers on getting the necessary ICT skills to survive in the classroom. It should not be optional.*
- *For our institution****: integrate ICT content into the syllabus****, continue to encourage MOOC attendance and other workshops and projects such as ITELAB.*

3 CONCLUSION: CHALLENGES FOR INTEGRATION OF ICT IN TRAINING PROGRAMMES IN ITE

In conclusion, this second monitoring report shows an increasing focus first, on initial teacher education in education policy and practice and second, on the importance of developing the student teachers' digital pedagogy skills.

At a policy level, the EC's May 2017 communication '*School development and excellent teaching for a great start in life'*[25] remains the seminal paper, ***highlighting the importance of "exchange of best practice among providers of Initial Teacher Education" and supporting student teachers to become "career-long learners"***. This priority has heavily influenced the direction of the new teaching modules and student teacher MOOC being developed within the ITELab project, both of which encourage collaboration and emphasise the importance of lifelong learning.

The ongoing development of the competence frameworks and tools support this career-long or lifelong learning, supporting analysis and self-reflection, at an institutional level (e.g. *SELFIE*[26]) and at an individual level (e.g. The Digital Competence Framework for Educators - DIGCOMPEDU[27] and the diagnostic tool TET-SAT[28]).

This **focus on digital competencies**, is echoed in the academic research which provides in-depth analysis and case studies (e.g. Gudmundsdottir, G.B., Hatlevik, O.E., Newly qualified teachers' professional digital competence: implications for teacher education, European Journal of Teacher Education, vol. 41, 2018, issue 2, pages 214-231 2017). A further study in Norway, on the integration of professional digital competence in initial teacher education programmes, analyses data from three national questionnaire surveys conducted among teacher educators, mentor teachers and pre-service teachers in Norway (Instefjord, E.J., Munthe, E., Educating digitally competent teachers: A study of integration of professional digital competence in teacher education, Teaching and Teacher Education, vol. 67, 2017, pp 37-45). Going forward, current research in the ITELab project led by the University of Agder is looking at teacher trainer competences with a view to comparing them across partner countries, institutions and with data collected on student teacher digital competencies from the evaluation work led by the University of Würzburg. This triangulation of data will be presented in the third, and final monitoring report to be published in 2019.

[25] http://ec.europa.eu/transparency/regdoc/rep/1/2017/EN/COM-2017-248-F1-EN-MAIN-PART-1.PDF

[26] https://ec.europa.eu/jrc/en/digcomporg/selfie-tool

[27] https://ec.europa.eu/jrc/en/digcompedu

[28] http://mentep.eun.org

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Other insights from recent research chime with work underway in the ITELab project. For example, trialling of 'Live to Air' sessions in the ITELab module pilots builds on O'Dowd (2017), Exploring the Impact of Telecollaboration in Initial Teacher Education: The EVALUATE project. In addition, one of the conclusions from the research strongly echoes the findings from the piloting underway in ITELab, which suggests that ***'instead of considering pre-service teachers as one homogenous group, we need to understand the variations among their abilities and knowledge in order to be able to provide them with support they need within teacher education'*** (Valtonen T. et al, Differences in pre-service teachers' knowledge and readiness to use ICT in education, Journal of Computer Assisted Learning, 2018).

The ITELab case studies show the national policy initiatives in schools that are feeding through and having an impact on initial teacher education. In Portugal, the 'National School of Promotion for School Success' challenge from the Ministry of Education strongly supports the methodology of digital pedagogy and collaborative teaching in the classroom which is reflected within initial teacher education. In Ireland and Italy, national digital strategy plans have been published and in Norway the recent publication of the new 'Framework for Teachers' Digital Competence' takes such plans even further.

Finally, the small survey of ITELab partners throws light on the some of the challenges of integration of ICT in training programmes in ITE, two in particular. First, the results highlight the critical role played by top-down, 'joined up' policy initiatives in sponsoring, validating and prioritising change. Second, one theme to emerge, not often explicitly recognised in discussions in this field, relates to school placements: '***the most frequently chosen challenges are a lack of suitable teaching placements to practise digital pedagogy skills and the wide variety of school environments makes it difficult to prioritise digital skills'.*** They are major factors in successfully developing and using digital pedagogy skills, from both the education ministry and the initial teacher education institution perspective. A further challenge is the pressure on student teachers themselves, who tend to be more concerned with managing learners than with their own digital pedagogy competencies.

It is clear therefore that much remains to be done at all levels from government, to institution, to individual, if the ambition of new entrants to the teaching profession having high levels of pedagogical digital competency is to be achieved.

ITELab will continue to monitor activities in this area, combining with the experience of the project's own activities. European Schoolnet's annual EMINENT conference will be used to host a workshop with policymakers and interested stakeholders, to exchange knowledge and shape a set of policy recommendations coming out of this project. These will be published in the third, and final ITE Monitoring Report (December 2019).

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ITELab - *Innovating ITE curricula*

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