Preparing student teachers for the future classroom

Case studies from Initial Teacher Education on innovative approaches to developing student teachers’ pedagogical digital competence

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1 INTRODUCTION

The ITELab (Initial Teacher Education Lab) Project is a Knowledge Alliance Project between higher education institutions and industry to promote innovation, knowledge exchange and practical course materials in pedagogical digital competence in initial teacher education. The project is coordinated by European Schoolnet and co-funded under the European Commission’s Erasmus+ Programme as a three-year Knowledge Alliance project from January 2017 to December 2019.

European Schoolnet (EUN) the ITELab coordinator is a network of 31 European Ministries of Education, based in Brussels which works to bring innovation in teaching and learning to key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. ITELab works to develop new approaches to incorporating training on the pedagogical use of ICT within initial teacher education and to mainstream the new and innovative pedagogic practice.

In order to highlight innovative and good practice in the integration of digital technologies in the curricula of ITE institutions, a series of case studies will be developed over the course of this three-year Knowledge Alliance Project.

This first set of three case studies examines how an ITE institution in Norway, Italy and Germany are currently successfully integrating ICT across their ITE courses and curricula. The case studies highlight a range of innovative approaches to incorporating ICT training, both technical and pedagogical in their ITE programmes. Examples of new models for ITE delivery are shown and some of the challenges to innovating ITE curricula are explored. The case studies were built by interviewing each of the partner ITE institutions in the project; a survey of their methods and approaches to preparing future teachers, and through discussion and workshops at EUN in Brussels in May 2017.
2 ACKNOWLEDGEMENTS

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3 CASE STUDY 1 PROVIDING STUDENT TEACHERS WITH THE COMPETENCES TO INTEGRATE ICT WITH CONFIDENCE IN NORWAY

This case study looks at how the University of Agder, Norway employs a new pedagogical model, putting technology at the service of pedagogy in all elements of the education system as a result of the close cooperation of all stakeholders.

3.1 BACKGROUND AND CONTEXT

The University of Agder is a public university situated on the southern tip of Norway in the Municipality of Kristiansand. The Teacher Education Unit coordinates the teacher education programmes with five university faculties responsible for the delivery of the courses and subjects which form part of the ITE programmes.

The Teacher Education Unit has close cooperation with 180 schools and preschools in the Agder region for student placement. Almost 1,600 students are enrolled in:
- Pre-school Teacher Education
- Primary and Lower Secondary Teacher Education: Primary 1st–7th grade and Lower Secondary 5th–10th grade
- Upper Secondary Teacher Education 8th–13th grade
- Postgraduate Certificate in Education
- Specialist education in music or drama (through Faculty of Fine Arts)

From the autumn of 2017 the initial teacher education programmes for all future primary and secondary school teachers will be five-year master’s programmes and the university has decided to emphasise professional digital competence in all aspects of the programmes.

As a ‘Digital University’ it recognises that student teachers need to be digitally competent and literate to meet the requirements of the national curriculum for schools and to support and develop the digital skills and digital judgement of their future pupils. Furthermore, to develop ICT in their ITE curricula they need to integrate the pedagogical use of ICT in schools and classrooms across all programmes and all faculties providing initial teacher education. The university’s institution-wide plan will facilitate progression in ICT and pedagogical ICT competences in all teaching programmes, courses, modules and methods.
3.2 Policies and Frameworks – National, Institutional and Pedagogical

In 2006 Norway became the first European country to develop a national curriculum that made ‘digital skills’ one of the five core general education competences: oral skills, reading, writing, digital skills and numeracy. The 2006 reform\(^1\) of compulsory and secondary education defined how the five basic skills contribute to developing learner competence and qualifications and how they are integrated into all subject-specific curricula.

Today Norwegian schools have higher levels of digital equipment and infrastructure than most other countries\(^2\) and digital skills are a core curriculum skill\(^3\). Despite being a standard setter for the integration of ICT in teaching and learning there is still however an acknowledged gap between schools’ needs for digitally competent teachers and the initial teacher education provided. A recent national survey by The Norwegian Centre for ICT in Education of newly qualified teachers shows that teacher education programmes do not provide all the necessary digital expertise to meet the demands of today’s pupils, student teachers and schools (Gudmundsdottir, Loftsgarden, Ottestad, 2014)\(^4\).

As digital competence is a basic skill integrated into all subjects in all grade levels it is clearly important that all newly qualified teachers are able to teach what the curriculum requires. As a result, in June 2016 the Norwegian Government created new Framework Plans for Primary and Lower Secondary Teacher Education for Years 1 - 7\(^5\) and for Years 5 - 10\(^6\) making both master level teacher programmes that will apply to all admissions for ITE for the 2017/2018 academic year.

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2. European Commission (2012), Survey of Schools: ICT in Education


Digital skills and associated learning outcomes are now more clearly defined in the government’s 2016 Framework Plans:

“The graduate:

- can evaluate and use relevant teaching materials, digital tools and resources in their teaching, and teach pupils digital skills.
- can convey and communicate on issues relating to professional practice and possess digital skills appropriate to the profession.”

Ministry of Education and Research, MER, 2016a, 2016b p: 3

To aid the integration of pedagogical digital competence for initial teacher education institutions, teacher educators, student teachers and teachers The Norwegian Centre for ICT in Education in May 2017 published a new Framework for Teachers’ Professional Digital Competence (PfDK). Having conducted a meta-analysis of more than 40 different national and international frameworks, pedagogic digital competence areas were aligned with general teacher competences as defined by the Ministry of Education. This was done in order to underline that digital competence is an integrated part of teachers’ professional competences and affects all parts of the profession.

The main purpose of The Norwegian Centre for ICT in Education’s PfDK is to establish a shared understanding and a common vocabulary for describing teachers’ professional digital competence in specific teaching-profession skills.

There are seven competence areas in the new digital competence framework. Each competence area consists of 7-10 knowledge, skills and competence descriptions. The focus is on the teacher’s professional digital competence, i.e. that competence which is specific for the teaching profession. Basic competences which are covered in the national curriculum and which form a common basis for all citizens were not necessary to cover and were largely omitted. Digital Judgement and Ethical Use of digital media are emphasised in the school curricula and also in the new Framework for Teachers’ Professional Digital Competence.

The University of Agder’s 5-year master level programme for primary and lower secondary ITE is under development and will be offered for the first time in the autumn of 2017 and will implement the Ministry of Education and Research’s Framework Plans for Primary and Lower Secondary Teacher Education. The university is working closely with The Norwegian Centre for ICT in Education and their Framework for Teachers’ Professional Digital Competence is being used in the development of all guidelines and curricula.

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7 Ibid 5 and 6, p: 3
8 https://iktsenteret.no/ressurser/rammeverk-laererens-profesjonsfaglige-digitale-kompetanse-pfdk
9 Ministry of Education and Research  MER 2016a and 2016b
As part of the 5-year master’s programmes the University is also developing online modules called “ProDig” which will focus on digital skills. A module will be undertaken each semester and will integrate pedagogic digital competence in all subject disciplines and in Teaching Practice.

Pedagogic digital skills will be more integrated, more clearly emphasised, and more clearly linked to learning outcomes than heretofore.

3.3 INTEGRATION OF ICT IN THE ITE CURRICULA

The Teacher Education Unit of the university, working in close cooperation with the university’s subject discipline departments, believes that it is important that student teachers have the relevant pedagogical digital competence to equip their future school pupils for a school education and a working life in the 21st century.

Recognising that there are some mis-matches in how ICT is included within the different subject disciplines and recognising the need for practical training of teacher educators in pedagogic digital competence, the university is intent on addressing both issues in its new ProDig Programme. Not alone are subject discipline specialists helping to develop the new programme, all teacher educators at the university will undertake the ProDig modules in order to receive training on the pedagogic use of ICT.

The new ProDig Programme is being developed in cooperation with teacher educators, subject discipline specialists, teachers in schools, students, teachers from the Department of Information Systems, the Department of ICT and the university’s Media-Centre. The participation of classroom teachers and mentor teachers in the whole process is seen as an essential element as they develop content drawing on their classroom experience, which is relevant and current to the integration of ICT and pedagogical ICT competences.

Sample ProDig themes include:

- Digital study skills
- Technology and teaching practice
- Tools for collaborative learning
- Digital Judgement
- Class leadership in technology-rich classrooms
- Technology for research purposes
- Tools for the administrative work of the teacher

The first online module of the ProDig Course, ‘An Introduction to Digital Skills’ will be available on Canvas LMS this autumn. As well as being an introductory module, it will introduce themes like classroom leadership in the technology-rich classroom; learning tools for collaborative learning; digital judgement and digital resources.
As university students, they will need study and research skills and this too will be part of the first module.

The concepts and competencies of ‘digital judgment’ will be emphasised in the new master’s programmes. The student teachers will work with it in a ProDig module; their teaching subject and their teaching practice. Then in their subject discipline examination they will have to show their learning and understanding of digital judgment connected to a specific issue or topic either in their teaching subjects or in their school teaching practice.

This comprehensive approach is a striking illustration of the clear vision across the institution of the need to create a new pedagogical model where ICT is fully integrated in school curricula and in the education and practice of future teachers.

3.4 INNOVATIVE APPROACHES TO DEVELOPING PEDAGOGICAL DIGITAL COMPETENCE

Teaching practice is an important and integral element of all initial teacher training programmes. At the university, there are various kinds of school placements and teaching practice enables student teachers to teach, develop classroom management skills and increase their professional competence. Student teachers go on placement each year during the five years of the master’s programme, sometimes for a week, sometimes for four weeks. In all they will spend over a hundred days in schools during their five years and are placed in different schools each year and each semester.

Teaching Schools

Third Year teaching practice is taken to a completely new level as part of initial teacher training at Agder. Each student, in a group of 30 students, is placed in a ‘Teaching School’ for three weeks. In Week One the students work-shadow and undertake training with mentor teachers so that they can ‘run’ the school as the ‘teaching staff’ during Week Two. They will have their own ‘Head teacher’, staff meetings and class timetable for the week. While some school staff and university tutors are at hand, the mentor teachers go on study-leave so in reality the student teachers and their ‘Head teacher’ are responsible for running the school and all the teaching and learning for the week. In Week Three the mentor teachers return to discuss progress.
In an effort to improve training in pedagogic use of ICT new training combinations are trialled by the university. In one ‘Teaching School’ in 2016 during Week One the students undertook a course on using tablets in the classroom. The digital skills course was given by teachers at the school so the student teachers were prepared to work with children and the same tablets in Week Two.

As many partner schools are experienced with practical expertise in these skills, the university sees that it is logical to let the ‘Teaching School’ teachers lead the digital skills pedagogical training to the student teachers. The student teachers like this approach and feel they develop practical and immediate skills. This was not a course at the university on how to learn and how to work with tablets; it was preparing them for the very next week to work with the tablets and with the children they would be teaching. The training model was very successful and has been introduced in other ‘Teaching Schools’. Agder is keen to develop this model of pedagogical digital skills acquisition where digital skills can be acquired in the schools instead of only at the university. This they see also as a way to get additional co-operation between the two learning arenas, on-campus and in the teaching practice schools.
The School of Education is also developing a specific ProDig module on digital skills linked to teaching practice. This will be available to the student teachers but also to the teaching practice mentors as well as teacher educators at the university. The ProDig modules will be compulsory for the university staff, the teacher educators, the supervising tutors and the mentor teachers. This way all will know what the student teachers are learning and that learning will become part of the ITE students’ assessment and evaluations. This innovative and holistic approach will ensure that all involved, students, classroom teachers and teacher educators will acquire pedagogic digital competence.

Throughout the process of the integration of pedagogic digital skills in the ProDig Modules and master’s programme the teacher educators, the tutors and the mentor teachers were given the opportunity to meet to discuss pedagogic digital skills and competences. Agder recognises that many schools are ahead of the university in regard to the use of pedagogic digital skills as they have been developing faster than the University because they began using tablets and interactive whiteboards early on. The Municipalities in Norway have worked to provide their young citizens and schools with the digital equipment and skills training that are required to meet the needs of the 21st century.

As with all initial teacher education mentor-teacher programmes, the mentor teachers for the schools are given an opportunity to train and learn together with the teacher educators at the University. However, yet again Agder have innovative plans afoot. Some schools have offered the university’s teacher educators the opportunity to work-shadow for a few weeks in the schools to see first-hand what is going on at the ‘digital chalkface’. Many of the teacher educators would like to do this and arrangements are underway.
Innovative ITE App

In addition to emphasising pedagogic digital competence across all its ITE programmes and courses Agder’s student teachers make great use of its MOSO App. MOSO (Mentoring and Observation SOftware) was developed based on research at The University of Agder and UiT The Arctic University of Norway. The research explored the use of technology in learning and training situations, where feedback and guidance were the essential factors. MOSO is a platform that encompasses the entire practical training process, from preparation, through the practical phase, observation and supervision, all in one system (http://moso.as). It is a channel of communication, which the students and tutors can use together. Lesson plans, videos, images and feedback are shared with all participants before, during and after a teaching sequence.

MOSO has proved very popular with student teachers as it enables them to capture, record and to house artefacts and documents serving as evidence of their teaching placement and their learning. It becomes a history of their teaching practice so that when they are a fifth year student they can look back to their first year and see their lesson plans and the feedback they received. Students like this form of communication with their tutors and mentor teachers and it also allows them to discuss issues with their co-students and show others how they taught something.

Figure 3: MOSO Innovative ITE App

The MOSO tablet project has brought change and is used by students as a ‘portfolio’ to document their learning and to self-assess and peer-assess their knowledge and its application to practice.
While all initial teacher education examinations are digital in Agder they have yet to implement the use of ePortfolios for assessment purposes. However, the new ProDig online modules will enable students to document their methods and coursework for their subject disciplines and their teaching practice placements.

3.5 DISCUSSION

The University of Agder is working to place the concept of pedagogical digital competence at the core of all its initial teacher education programmes.

1: Improving Teacher Educator Pedagogical Digital Competence

The three elements of Agder’s ITE programme are Pedagogy and Pupil-Related Skills; specialised Teaching Subject Preparation and School Practice. Teaching Subject educators at the university teach both teacher education and their specialist subject discipline. When its initial teacher education programme was organised it was decided that there should no longer be a separation between teacher education and the subject discipline studies. Subject matter is taught together with didactics/methodology and the same teacher educators teach both. However not all subject specialists have high levels of pedagogical digital competence, some are not completely connected to teacher education and a few may favour more traditional teaching methods. While digital competence is clearly linked to traditional subject disciplines such as Norwegian or mathematics, prior to this it was up to the subject specialists whether or not they prioritised the pedagogic use of ICT in their subjects. Agder recognise that all teacher educators need to be able to model confident and competent integration of their subject matter and pedagogic digital competence to their ITE students.

The university is intent on addressing the challenge for teacher educators and future teachers to become pedagogically digitally competent and to utilise ICT effectively in teaching and learning. The university’s new strategic plan recognises that digital competence needs to be integrated as a specific competence area that is important for the work of all teachers. They plan that every subject will have its own learning outcomes connected to ICT. In addition the new ProDig Modules will be undertaken by all teacher educators. This will put a focus on the acquisition of pedagogic digital skills and aid the integration of ICT into all subject disciplines.

2: Providing sufficient on-campus digital teaching aids and equipment

Throughout Norway all school classrooms are equipped with interactive whiteboards and digital aids but providing sufficient digital teaching aids and technical equipment for every student teacher on-campus is an on-going challenge. The university has a number of classrooms and labs where students can experiment with
interactive whiteboards and other digital media, and additional ICT rooms have recently been created. Despite the supports and resources it provides, as with most initial teacher education institutions they struggle for example, to have enough interactive screens for each and every student, so the collaboration and shared training courses with ‘Teaching Schools’ could be a very practical solution to this issue. The university’s ‘partner schools’ teachers are experienced with everyday expertise in incorporating digital skills across the curriculum and the university is working to develop in-school digital skills pedagogical training events delivered by teachers to the student teachers.

3: Leadership

The university has developed a strategic plan for the integration of professional digital competence for students and teacher educators in their new 5-year master’s programmes and are working institution-wide to implement it. Having such leadership and vision across the institution for the integration of professional digital competence into all aspects of its initial teacher education is important.

4: Frameworks

Agder recognises that its progress on the integration of ICT is facilitated by having research-based, well-developed national and institutional frameworks to guide and shape their work. Key policy documents are the National Curriculum for Primary and Secondary Schools, The General Plan for Teacher Education (Elementary School)\(^\text{10}\), the 2016 Framework Plans for Teacher Education Years 1-7 and Years 5 – 10\(^\text{6}\) and the newly published Norwegian Centre for ICT in Education’s Teachers’ Professional Digital Competences Framework\(^\text{8}\).

5: Integrated digital competence

Norway’s national policy on digital competence in school curricula means that digital skills are closely linked to all school subject-specific competences. In addition digital competence is integrated with other cross-curricula competences. As this national policy is in place it means that Agder can focus in its new master’s programmes on equipping future teachers with the pedagogic digital competence needed by teachers and schools.

6: Cooperation

Through its recent collaboration with The Norwegian Centre for ICT in Education Agder has not only been able to draw upon its ‘Framework for Teachers’ Professional Digital Competences’ but also to call upon the Centre’s expertise and guidance in respect to content, structure, didactics and integration of digital competence in education.

7: A unified voice

Agder works successfully in close co-operation with a range of stakeholders and partner bodies in implementing their new strategic plan and have agreements with the schools, the unions and also agreements with the Municipality which are renewed every third year. The Memorandum of understanding with the Municipality of Kristiansand for example agrees that the Municipality funds the students and the university provides skills development for the mentor teachers and supervisors throughout the Municipality’s school network.

8: Formal agreements between stakeholders

In Norway there is a central agreement between the teacher unions and the universities called ‘The Practice and Teacher Agreement’. Agder feels it benefits from the formal agreements it has in place with the stakeholders, i.e schools, teacher unions, municipalities. Having fixed agreements and contracts in place allows for long term planning.

9: Funding

The university also works in partnership with its partner schools, teacher bodies, unions and ICT providers. It has agreements with the head teachers and the schools and agreements are supported by resources and money. Mentor teachers are paid by the municipality and by the university, and are given a reduced timetable to enable the teacher to meet with student teachers and support their teaching practice.

10: Shared responsibility

There is a high demand from schools to become ‘Teaching Schools’ and teachers see themselves as teacher educators as well as classroom teachers. This is a result of the strong tradition in Norway where teachers see themselves as teacher educators and schools feel responsible for the next generation of teachers.
3.6 Summary

The University of Agder recognises that pedagogical ICT competences are needed by classroom teachers today. It is ensuring that ITE curricula and programmes in every faculty integrate pedagogical digital competence so that all student teachers graduate with the skills and competences needed for the digital age.

Norway’s school curricula reform of 2006 defined ‘digital skills’ as a core competency; teachers were trained in integrating ICT in education and received ongoing continuing professional development, and schools and classrooms were resourced with digital teaching and learning resources. ITE provided digital competence skills courses to student teachers but not always specific teaching-profession skills or the skills and competence to apply ICT effectively for learning in each school subject. A little over 10 years later Agder is working to design and provide initial teacher education that will ensure that new teachers will be skilled in the pedagogical use of ICT in every teaching subject. By doing so, the gap between school curricular reforms and initial teacher education will be closed.
4 CASE STUDY 2 SPECIAL FOCUS ON INTEGRATING PEDAGOGICAL DIGITAL TECHNOLOGY IN ITALY

The University of Perugia, Italy offers initial teacher education to future primary teachers and has a clear vision on inclusion and the integration of digital technologies across the curriculum.

4.1 BACKGROUND AND CONTEXT

The Università degli Studi di Perugia (University of Perugia) was founded in 1308 in Perugia, which is the capital of the Umbria region in central Italy. In total the university has 16 Departments, with about 23,500 students, 1,100 professors and researchers and 1,000 staff members. The Department of Philosophy, Social Sciences, Humanities and Education offers initial teacher training for kindergarten and primary school.

The 5-year master’s degree in Primary Education Sciences equips future teachers with the pedagogical skills to use a variety of teaching methods and specific training is given on inclusion and the integration of pupils with special educational needs or disabilities. Newly qualified teachers will be able to use integrated teaching strategies and adapt to the needs of each child. Particular attention is given during their studies to the acquisition of competence in English and digital competence.

Figure 4: Student collaboration at University of Perugia
4.2 Policies and Frameworks – National, Institutional and Pedagogic

Italy is bound by the Italian Digital School National Plan (Piano Nazionale Scuola Digitale PNSD 2015)\(^{11}\) to provide digital competence in their initial teacher education courses. The initial teacher education curriculum is also prescribed by law (Law 107/2015) with special reference to enabling inclusion and accessibility to special educational needs students.

Having a national vision on the ICT training of student teachers is regarded as an important factor for promoting competent and confident future teachers. The University of Perugia acknowledge the clarity and purpose that a national policy brings and it helps them to provide courses and programmes for the effective pedagogical integration of ICT.

The Italian Ministry of Education underlines the importance of new didactical methodologies, the use of online learning environments for class management and sharing experiences, ICT for the inclusion of special needs students and the relationship between digital competencies and citizenship competencies.

The digital competence framework used in initial teacher education at the University of Perugia for the last five years is the TPACK Model. TPACK\(^{12}\) is a framework for teacher knowledge of technological, pedagogical, content knowledge. The TPACK approach goes beyond seeing the three knowledge bases in isolation and holds that knowledge about technology cannot be treated as context-free, and that good teaching requires an understanding of how technology relates to the pedagogy and content.

“Teaching mathematics to Year 5 learners requires different pedagogical uses of ICT than teaching history in secondary school or literacy in the early years. In each case, the expert teacher needs to make creative links between what is being learned (content), how it is taught (pedagogy), and the appropriate tools (technology).”

http://www.ttf.edu.au/\(^{13}\)

As an ITE primary education provider Perugia offers teacher training in inclusive education and employs the TPACK model for the integration of technology within special education instruction.

The primary student teachers at Perugia learn their skills using the same methodologies they will use to help their future students to learn – in an ICT integrated cross-curricular, collaborative, active and discovery learning manner.

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\(^{11}\) http://www.istruzione.it/scuola_digitale/allegati/2016/pnsd_en.pdf

\(^{12}\) http://www.tpack.org

\(^{13}\) http://www.ttf.edu.au/ Teaching Teachers of the Future What is TPACK?
Their future pupils’ digital competence will develop through their use of ICT as an integrated resource for teaching and learning throughout the curriculum.

4.3 **Integration of ICT in the ITE Curricula**

ICT is seen as a tool for facilitating teaching and learning throughout the primary curriculum. In Perugia the pedagogical use of ICT is integrated across all initial teacher education subject disciplines and in addition to Education Technologies Courses student teachers have practical hands-on workshops and courses in The Educational Technology Lab over the course of their five years of initial teacher education training. Both the Education Technologies Courses and the Educational Technologies Lab Courses are ECTS (European Credit Transfer and Accumulation System) accredited.

During their five years of study the primary initial teacher education students undertake:

- An Educational Technologies Course of a total of 150 hours studying digital citizenship, special educational needs, classroom management and administration. Six ECTS (equal to 36 hours) are awarded for Pedagogical ICT Competence.
- Educational Technologies Lab time totalling 100 hours working on subject-related, technical, planning and assessment issues. Four ECTS (equal to 60 hours) are awarded.

The Educational Technologies Programme includes courses in ICT in the Classroom; Mobile Devices and 3D Printers in Education, eBooks, eLearning, Communities of Practice and Use of LMS, Social Media in Teaching and Learning and Technologies for Special Needs Students.

In the Educational Technologies Lab Courses students explore interactive whiteboards and their use in the teaching and learning process. They also undertake Syllabus 5 of EDCL as an ICT skills competency course. They take ‘An Introduction to Computational Thinking’ course in their fifth year and create collaborative multi-disciplinary projects with Scratch and Minecraft. Students build an activity in the primary school subjects and they work co-operatively in teams. Interesting projects have been created in all curriculum subjects with some projects showing not only good computational thinking but coding and the use of games or ‘gamification’ in teaching and learning.
In addition, digital literacy and digital citizenship skills are seen as important skills for future teachers to bring to their classrooms and for their own life-long learning.

4.4 Innovative Approaches to Developing Pedagogical Digital Competence

An Inclusive Education

In every primary school in Italy students with special educational needs (SEN) are integrated into mainstream classes and so all primary ITE teachers undertake training on using ICT with students with SEN.

The use of ICT for special needs students’ inclusion is a key priority for the university’s ITE programme. The programme works to develop teacher competences and pedagogies in ICT which prove particularly successful to support SEN learners. Student teachers are given an understanding of digital resources and tools, including adaptive and assistive technologies that can support the participation and learning of students with disability and SEN. New technologies enable students to communicate and participate in new ways.

Blended Learning

An innovative approach adopted in their ITE programme is the use of blended learning for some courses. These courses are taught both in the classroom and online in Moodle. There is a playful approach adopted here where initial teacher
education students co-operatively learn and discover together the potentialities of integrated technologies. This approach also aims to encourage a new teaching culture of sharing resources and materials. The student teachers develop adaptive and ICT literacy skills combining traditional learning techniques with innovative ways of learning. Having used forums, podcasts and virtual learning classrooms and so on as tools in their own learning, the future teachers should be able to present learning that is innovative and exciting for children.

Figure 6: Blended Learning

**Student Feedback**

A further interesting feature of the university’s approach is its use of the student voice to shape its work. Perugia pre-tests and post-tests students’ digital competence and attitudes to ICT in education. The issues of classroom management in the technology-rich classroom, safety, legality and accountability of information are some issues that the questionnaires show are a concern of the initial teacher education students. Throughout the ITE programme they work to dispel any anxieties or doubts that students have around the use of new technologies in their future classrooms. Their curriculum provides both pedagogical and ICT skills and competences and through the use of practical hands-on sessions and co-operative learning in the ICT Lab they explore the concerns of the student teachers.

**Assessment**

ITE students at Perugia are required to create a professional ePortfolio, which is submitted for evaluation. Their ePortfolio will include class teaching and other school experiences; planning for teaching, learning and assessment; personal and professional reflections and a variety of digital artefacts.
The student teacher’s use of ICT is also evaluated by their tutors during teaching practice observation visits.

4.5 DISCUSSION

1: The Pace of Change

The University of Perugia acknowledges that the existence of a national plan for digital schools gives a strong push to teachers and school to change, but recognise that change in some schools can be slow to happen.

During their 5-year course each student will spend 600 hours on school placement. Every school classroom has an interactive whiteboard thanks to the policy of the Ministry of Education but not all classroom teachers are well trained in their use. There are schools that are technology-rich and others that are less so. The university welcomes the creation by the Ministry of the role of Digital Animator or Catalyst to champion and support ICT in teaching and learning in schools. The Digital Animator is a teacher who together with a team in the school helps implement the National Plan for Digital Education (PNSD 2015)14.

2: Need for Integration

The university feels it needs to integrate their courses, laboratory practice and school placement traineeships and work more closely with the classroom mentor teachers. While the mentor teachers attend training once a month working on their role and their support to the student teachers, the university believes it would be good to have a more integrated training programme.

They also see that they could create better connections between the students’ work while on school placement and their academic work and studies. They plan to develop some programmes and activities to build a bridge between their ITE academic courses and the school placements so that student teachers can use ICT in the classroom and then compare practice and theory.

Finally, interviewees from the university feel that there is a need to strengthen the integration of ICT in some subject disciplines of their ITE programme and hope to provide a module of ICT for each subject-related course whether that is Maths, Geography, Italian or other subject.

3: Capturing the Student Voice

The university actively seeks out student feedback. Perugia’s pre- and post-testing of the students’ attitudes and concerns is a very useful mechanism to inform and guide their course development and improvement. They are also interested in following up their newly qualified teachers to investigate if they are using ICT and how they are using in ICT across the curriculum. Feedback on which subjects ICT is most used, whether in music, English or another subject, would help inform new course development.

4: ICT as a cross-curricular pedagogy

As a primary level ITE institution, Perugia realises they are at an advantage as they easily adopt a cross-curricular and collaborative teaching and learning approach throughout their ITE programme. An institution-wide vision and policy for the integration of ICT and the TPACK framework helps to achieve a unity of purpose. Perugia works to integrate digital technologies as a cross-disciplinary topic in all the traditional subject disciplines. Furthermore, assessing student teachers ePortfolios and their use of ICT in teaching practice puts a focus on their pedagogic ICT competence and its application to practice.

5: Supporting pedagogical technological and content knowledge

The University of Perugia’s ITE programme sets out to support pedagogical technological and content knowledge. Three key topics they successfully focus on which are related to the use of ICT in schools are; the use of ICT for inclusion (particularly of students with special needs and disabilities); ICT for cross-curricular or interdisciplinary teaching and learning; and the use of ICT in a constructivist learning environment.

6: More Practical Experiential Labs

Perugia would like grow and develop their practical ICT pedagogical experiential Lab workshops. The university would also like to expand their practical lab course and the number of ECTS awarded to lab work. They also hope to create a new flexible learning space modelled on the Future Classroom Lab15 with a range of equipment including a 360° webcam, interactive whiteboards, 3D printer, BeeBots, Makey Makey Raspberry board, LEGO Mindstorms and Steelcase chairs. Space is an issue which they are currently negotiating.

15 http://fcl.eun.org/
4.6 Summary

The University of Perugia believes all educators, serving teachers and student teachers, should have both pedagogical and ICT competencies for teaching and learning in the digital age.

The university actively works to develop new teachers’ skills in the pedagogical use of ICT and in areas such as personalised learning, inclusive learning and collaborative teaching and learning with ICT.

The university prepares future primary school teachers to fully integrate digital literacy and digital technologies into teaching and learning by embedding ICT as a cross-curricular tool in their own studies and as an integral part of their teaching and learning. The premise is that a good didactical competence scaffolds and spreads out a conscious and creative use of ICT in the classroom, even for special needs students. Teacher educators encourage student teachers, through blended learning and co-operative team work, of the importance of being open to peer collaboration. Student teachers learn that digital technologies can enhance collaborative learning environments and help overcome barriers to participation.
5 CASE STUDY 3 INNOVATIVE APPROACHES ‘FLIP’ TRADITIONAL METHODS IN GERMANY

5.1 BACKGROUND AND CONTEXT

The Julius Maximilian University of Würzburg is a public research university in Bavaria, Germany. It was selected as the third case study because not only does it provide teacher training for very large numbers of primary, secondary and special needs student teachers (approximately 1,400 per academic year in School Pedagogy), but it does so in creative, innovative and imaginative ways.

The Julius Maximilian University of Würzburg, founded in 1402, is one of the oldest institutions of higher learning in Germany. In total there are 27,000 students enrolled in the various programmes it offers of which more than 7,000 undertake initial teacher education training.

While the School of Education and Educational Research coordinates and supports communication between the seven faculties providing teacher education; the responsibility of planning and conducting the programme lies within the different faculties. More than 7000 students are enrolled in the various initial teacher education programmes. All student teachers must study at least two subject disciplines as well as Educational Science, School Pedagogy and Educational Research and of course either Primary, Secondary or Special Needs Education.

In Germany responsibility for teacher training lies with the Ministries of Education and Cultural Affairs of the Länder. Teacher training is divided into two stages: a 3.5 – 4.5 year higher education course at a university followed by 1.5 - 2 year pedagogical training where the graduates teach as assistants to experienced teachers and then take full responsibility of their own teaching.

In Würzburg future teachers of Primary level, Special Needs teachers and the three different forms of Secondary schools "Mittelschule", "Realschule" and "Gymnasium" finish their studies at university with their first state exam. If successful they then can begin school placements and pedagogical training in preparation for the second state exam.

5.2 POLICY AND FRAMEWORKS – NATIONAL, INSTITUTIONAL AND PEDAGOGICAL

The Conference of the Ministers of Education and Cultural Affairs of the Länder (KMK) is responsible for country-wide coordination of educational issues and as Media Education is regarded as a core competence in schools it is therefore considered to be an essential part of pre-service and in-service teacher education.
At Würzburg the new national pedagogical digital competence framework *Pedagogical Media Competencies of Student Teachers* (M³K)\(^\text{16}\) is applied in ITE training. One of 15 ongoing research projects funded by German Federal Ministry of Education and Research on “Competences in Higher Education”\(^\text{17}\) the initial teacher education project "Modelling and Measuring Pedagogical Media Competencies of Pre-Service Teachers (M³K)" developed a structural model of media pedagogical competencies for student teachers.

M³K has three competence areas:

- Teaching with media,
- Teaching about media and
- Developing concepts for school development.

Competency and learning outcomes are clearly defined in the new M³K framework, for example:

“Student teachers are able to:

- Describe concepts of media education and related empirical findings appropriately.
- Assess concepts from an empirical, normative or practical perspective.”

Tiede, Grafe & Hobbs, p. 536\(^\text{18}\)

M³K also includes competency aspects with regard to learning taxonomies for example:

- “Describing and evaluating theoretical approaches
- Analysing and evaluation examples
- Developing one’s own theory-based suggestions
- Implementing and evaluating theory based examples.”

Tiede, Grafe & Hobbs, p. 536\(^\text{18}\)

The pedagogical media competence of teachers is important for students’ successful subject and cross-curricular competence development and for their ability to participate in a media-influenced culture.

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\(^{16}\) [http://www.kompetenzen-im-hochschulsektor.de/249_ENG.HTML.php](http://www.kompetenzen-im-hochschulsektor.de/249_ENG.HTML.php)


Pedagogical media competence framed by M³K is to be integrated across the seven different faculties of the initial teacher education programmes at the university. However it is in School Pedagogy that the most specific and innovative use of ICT and the development of pedagogical digital competence skills are to be seen.

5.3 INTEGRATION OF ICT IN THE ITE CURRICULA

School Pedagogy fully integrates digital media education across its courses and in its methodologies. The university provides teacher training for large numbers of primary, secondary and special needs student teachers. The student teachers are dispersed throughout the seven faculties where they undertake their individual subject discipline studies. However, every student teacher, approximately 1,400 per academic year, will attend the Educational Science Programme in School Pedagogy.

The School Pedagogy Programme consists of three modules:

Module One – An Introduction to School Pedagogy

This foundation course in school pedagogy is offered twice a week to 600 students or so at each sitting in parallel sessions during a semester. Despite the very large number of students and the mix of students attending at each session from each of the school levels (Primary, Secondary and Special Needs) the course and its delivery demonstrates how pedagogy and technology can meet the needs of initial teacher education students.

Module Two – Advanced Studies in School Pedagogy

In order to provide a good learning environment for such large numbers in ‘Advanced Studies in School Pedagogy’, groups of no more than 30 students attend one of the 26 parallel courses on ‘Teaching and Learning with and about Digital Media in the Classroom’ or one of a variety of courses on topics such as ‘Classroom Management and Digital Media’, ‘Video-Based Reflection in Teaching and Learning’ or ‘Teaching and Learning with Augmented and Virtual Reality in the Classroom’.

Groups of 30 students participate in ‘flipped learning seminars’ and workshops in The Media Education and Educational Technology Lab @ JMU (MEET@ JMU) for hands-on collaborative and practical experience. The emphasis throughout is on integrating ICT in education and developing pedagogical media competences in students.
Module Three – Teaching Practice Module with accompanying course, ‘Pedagogical Aspects of Teaching Practice’

Students undertake 160 hours of teaching practice for Module Three. The students will also have other school placements for their two to three subject discipline studies.

Figure 7: The Media Education and Educational Technology Lab @ JMU

School Pedagogy

ICT is deeply embedded throughout the School Pedagogy programmes and the new pedagogical ICT competence framework, M^3K, guides and informs all courses and indeed their delivery. In ‘An Introduction to School Pedagogy’ traditional lectures with 600 multi-disciplinary students in a lecture hall have been ‘flipped’ with technology, collaborative learning and digital aids employed to demonstrate to future teachers how they also can implement new pedagogical models in their classrooms.

‘Flipped Learning’ enables the student teachers to learn new subject material by watching video exemplars or reading digital texts in preparation for the ‘lecture’. It’s an instructional strategy which reverses the traditional learning environment by delivering instructional content, often online, outside of the lecture hall/classroom and it is growing in popularity in schools and classrooms.
Flipped Learning Lectures

In School Pedagogy during the ‘flipped lecture’ the lecturer/teacher educator discusses and elaborates on topics where necessary before asking students to respond to multiple choice or open questions using the ClassLab Response System19 and through the use of other digital tools.

Small group discussions then take place on general topics with the students who are sitting nearby. When given tasks specific to their school level i.e. Primary, Secondary or Special Needs, students change seats to carry out the task with others who will teach at the same school level or who will teach the same subject disciplines.

After discussions have taken place the lecturer moves through the groups to collect exemplary answers with a microphone for feedback and further discussion.

Active Learning Methods

In ‘Advanced Studies in School Pedagogy’ a variety of different courses are delivered to a maximum number of 30 students to allow for ‘flipped seminars’ and hands-on practical experiential learning in their new Media Education and Educational Technology Lab @ JMU.

Its new digital media pedagogical laboratory is equipped with the latest digital aids and media that student teachers need in order to have practical experience of the technical competencies required for their future teaching. This flexible workspace where small groups of students can work collaboratively, has five projector LED panels, a set of laptops, GoPro cameras and a virtual learning environment as well as other technology in a flexible learning space.

The university has given students an opportunity to understand the educational possibilities of augmented and virtual reality (VR) in teaching and learning and will offer a number of courses with VARyFAST20 in the new academic term. VARyFAST is an interdisciplinary project funded by the Bavarian Ministry of Education, Science and the Arts with one million euros for three participating universities (Julius Maximilian University of Würzburg, University of Applied Sciences Würzburg and the University of Applied Sciences Aschaffenburg). The acronym means “Virtual and Augmented Reality in the "FAST"-network” (FAST is the Franconia Alliance of Science and Technology, a network of Universities in North-West-Bavaria). The aim of the project is to promote competencies of university graduates in the increasingly important areas of augmented reality, virtual reality and mixed reality.

19 http://response.smarttech.com/
20 http://www.schulaedagogik.uni-wuerzburg.de/en/research_projects/varyfast/
Another VR project ‘Breaking Bad Behaviours\(^{21}\), creates a virtual classroom encouraging students to practise their classroom management competencies and is used in classroom management courses in Module Two.

There is a wide spectrum of digital technologies for use in the Lab and students work in teams and individually on a range of projects and tasks.

*Figure 8: Students using virtual reality in VARyFAST*

### 5.4 Innovative Approaches to Developing Pedagogical Digital Competences

School Pedagogy at the university provides exciting new pedagogical teaching methods such as using a ‘Flipped Learning’ approach aided by digital technology with very large numbers of multi-level future teachers. While all receive the same courses future teachers of the differing school levels are given different tasks and specific examples to match their needs. With a Flipped Learning or Inverted Classroom approach the students can explore theoretical concepts and empirical research at home in advance of the ‘lecture’. This means there is time during the lecture and seminars to discuss the students’ questions about the text as well as working on complex tasks for example planning a lesson with ICT or analysing software during the lectures and seminars. Having the mix of different types of student teachers is seen to be very positive for the students as they learn from one another. The primary teachers’ future pupils will eventually go to secondary school so it very helpful that the student teachers learn how ICT in teaching and learning is used in each school level.

Future-orientated Education

School Pedagogy at Würzburg now has an innovative and well equipped Media Education and Educational Technology Lab @ JMU. Selecting suitable technologies was the result of intensive market research and visiting conferences and exhibitions with technology providers. Partnerships and cooperation with ICT companies can see a ‘win-win’ situation they believe for both the institution and the ICT solution suppliers. The university students use the best and latest pedagogical technology in the Media Lab or at flipped lectures and that may lead eventually to its use in the student teachers’ future schools and classrooms.

All School Pedagogy courses are created and delivered as pedagogical ICT competency-based courses. Courses like its new Virtual Reality in Teaching and Learning course are enjoyed by the students as they are imaginative, fun and forward thinking.

School Pedagogy stays current with new technology and through its research projects for example, development of a standardised test measuring pedagogical media competencies; participation in interdisciplinary projects like VARyFAST or cooperation with the university’s Chair of Human-Computer Interaction on its virtual reality ‘Breaking Bad Behaviours’ classroom management project.

Addressing Classroom Management Issues

The use of digital tools and devices is acknowledged to create classroom management issues at times for both experienced and newly qualified teachers. Student teachers need to be equipped with the skills to manage the distraction that digital technologies can sometimes bring into the learning environment and School Pedagogy’s playful and imaginative ‘Breaking Bad Behaviours’ pedagogic skills project is an innovative way to build student teachers classroom skills-base for teaching in technology-rich classrooms.

Breaking Bad Behaviours (B3)\textsuperscript{21} is an immersive virtual reality (VR) system for training classroom management skills, with a specific focus on learning to manage disruptive student behaviour in the classroom. The core of the system is a real-time 3D virtual classroom with twenty-four semi-autonomous virtual students. During the 2017 academic term three parallel courses of ‘Classroom Management and Digital Media’ were offered as an elective course in Module Two ‘Advanced Studies in School Pedagogy’. Concepts of classroom management were explored using different management strategies in the B3-system in the MEET@ JMU. The courses were in high demand and overbooked and plans to expand the number of courses next term are underway.
5.5 DISCUSSION

1: Competent Teacher Educators

While School Pedagogy is forging ahead with its innovative pedagogic methodologies and programmes to integrate pedagogic digital competence into its initial teacher education programme, this also needs to take place across the university and in particular in each of the seven faculties which deliver initial teacher education in Würzburg. As is recognised in other ITE institutions all teacher educators need the same pedagogic digital competences as student teachers and the teachers in schools. In order to model best practice, teacher educators need the competence to develop the pedagogic digital media competence of their students.

One way to do this might be to create working groups at the university (with members of the different faculties) to develop concepts of how ICT in university teaching can be strategically implemented. In this way the members of the working groups could consider how their courses and programmes and their delivery can contribute to a comprehensive programme to improve the pedagogical ICT competencies of student teachers in each subject discipline.

2: Institution-wide strategy planning

University leadership too need to stay current with the role and importance of ICT in teaching and learning and in education in general. Leadership can improve funding, human resource development, organisational and infrastructure development. Continuing professional development programmes for university
professors and lecturers about ICT in education and more pedagogical digital media labs across the university would consolidate the implementation of the new national framework ‘Pedagogical Media Competencies of Student Teachers’.

### 3: Assessment

The final state examination is a written paper, a traditional essay-style examination. School Pedagogy has innovated teaching, courses, pedagogical models and designed new lab-oriented education. Assessment and evaluation need to meet the improving digital competence of the student teachers. Additional certificates for ICT in education or a digital badge system might give recognition to their work. Introducing ePortfolios faculty-wide would help students to use feedback from assessment to support their learning. A digital portfolio would allow students to reflect their competence improvement with digital artefacts and pieces of work to show to their future employers. Students would also be able to use such a portfolio as a tool for lifelong learning.

### 4: Flexible Digital Media Labs

Having pedagogical digital media labs in each of the subject disciplines and other faculties would be a great step forward for ICT integration across the university. While School Pedagogy has created a well-equipped digital media pedagogical lab, other faculties which hold the responsibility of planning and conducting the ITE programme are not so well equipped. Student teachers need ready access to good technical equipment such as interactive whiteboards and 2-in-1 tablet laptops throughout the university in all subject disciplines.

### 5: Committed Team

The implementation of pedagogical digital competence in all aspects of School Pedagogy is the result of the dynamic Chair of School Pedagogy and the team leading the programme. They develop and deliver their programmes according to best practice as informed by evidence-based research. Their commitment to research and development in initial teacher education has led to the creation of vibrant programmes that lead the way in rethinking how to integrate the pedagogical use of ICT in initial teacher education. Their research work, funded by the Federal Ministry of Education and Research, helped to lead to the development of the new national ITE framework Pedagogical Media Competencies of Student Teachers. Their current research work on validation measures of media competencies hopes to develop a test or validation instrument to measure initial teacher pedagogical media competences.
6: Innovative Pedagogical Methods

Working with such a very large and diverse student body as it does, School Pedagogy is unique in the university. Students are enrolled in the seven faculties offering various teacher education programmes but every student comes together to undertake the School Pedagogy Programme. Despite the very large number of students and despite the range of school levels and disciplines of the students, the team at School Pedagogy succeeds in integrating innovative pedagogical methods into lectures, seminars and media lab workshops to offer students the type of learning environment they should create in their own future classrooms.

7: Clear Vision

School Pedagogy has a clear vision for the integration of pedagogical media competencies in its ITE courses, programmes and methodologies. It has a defined competency framework as its guide and leading by example is encouraging each faculty delivering ITE at Würzburg to ensure that all student teachers are trained in pedagogical ICT competence. It understands that the pedagogical media competence of teachers is important for students’ successful subject and cross-curricular competence development. Teacher educators and subject discipline specialists across the university also need pedagogical ICT competence to ensure that in the delivery of their own courses all can model the effective use of ICT in teaching and learning.

5.6 Summary

Future teachers experience best practices in the pedagogical use of ICT in their initial teacher education programme in School Pedagogy at the University of Würzburg.

A highlight of their ITE programme is the innovative use of ‘Flipped Learning’ methodologies to up to 600 students per session, as an example of how skilled teacher educators can model effective pedagogical use of ICT to future teachers. The use of the advanced and well-equipped Media Education and Educational Technology Lab enables the student teachers to conduct research and practice with their peers, centred in the pedagogical use of ICT. Innovative practical courses such as the ‘Classroom Management and Digital Media’ course are designed to meet the needs and concerns of the student teachers.
In the School Pedagogy programme, the future teacher receives systematic pedagogical ICT training. The student teachers can see effective ICT use modelled in their lecture halls and seminar rooms and then learn by actively practising in collaborative teams in the Media Education and Educational Technology Lab @ JMU and during teaching practice.
6 CONCLUSION

At all school levels and in every teaching subject, the classroom teacher leads learning and inspires learners. It is well-prepared teachers who design the activities that help students use ICT efficiently and effectively to learn and communicate – a key objective of the European Commission’s ‘Digital Agenda’ which aims to give all European citizens the opportunities to become digitally literate and competent. Classroom teachers clearly require digital competence; but in order to guide students’ successful subject and cross-curricular competence development they also need pedagogical ICT competences. It is therefore important that all student teachers receive initial teacher education that equips them with the pedagogical ICT competences for the classrooms of today and tomorrow.

This is why initial teacher education is now an emerging focus of education policy. Strategy documents like the European Commission’s May 2017 School development and excellent teaching for a great start in life and 2017 Erasmus+ funded projects like ITELab call for the exchange of ITE best practice in order to support high quality, inclusive and future-oriented education. The need to prepare young people for a digital world requires teachers who are themselves pedagogically digitally competent.

In these three ITELab case studies we find ITE institutions whose innovative teacher education programmes have been designed to provide student teachers with the necessary pedagogical digital expertise to meet the demands of today’s schools and classrooms.

The University of Agder, Norway, emphasises pedagogical digital competence as a central and intrinsic dimension of its primary and secondary school educational programmes which begin in the autumn of 2017. Agder recognises that while ‘digital skills’ and ICT are integrated across school curricula since 2006 there is a need to match their programmes to these curricular reforms. They have therefore incorporated The Norwegian Centre for ICT in Education’s recently published Framework for Teachers’ Professional Digital Competence in their new programmes to support teachers’ development and readiness to teach and lead learning in the digital age. Agder is embedding pedagogical ICT competence in the wording of learning outcomes, methods and forms of assessment in the course descriptions of all subject disciplines and in the teaching practice elements of their ITE programmes.

24 http://itelab.eun.org/
This approach carries the message that pedagogical digital competence is an integrated part of teachers’ professional ICT competence because it is so important for school students’ learning and their digital competence development.

The University of Perugia, Italy prepares future primary school teachers in the pedagogical use of ICT to facilitate teaching and learning throughout the primary curriculum. Specific training is given on inclusion and the integration of pupils with special educational needs. Student teachers learn to support effective pedagogies including differentiation and personalised learning. The 2015 Italian Digital School National Plan, part of a national strategy involving all actors in education, prescribes the acquisition of digital competence as part of all initial teacher education programmes with an emphasis on how ICT in schools should serve the active learning of students and the innovative practices of teachers. In Perugia, through their Educational Technologies Courses and Lab, they work to ensure that student teachers will no longer merely use ICT to present to pupils. As teachers they will enable their pupils to become learners who are capable of using digital media and ICT in effective and productive ways. This means a shift from teacher-led use of ICT to a student-led use of ICT to improve learning, collaboration and communication. Perugia through the use of ePortfolios and the evaluation of the pedagogical use of ICT during teaching practice placement has integrated assessment measures to accredit teachers’ pedagogical digital competence.

The Julius Maximilian University of Würzburg, Germany supports innovative ways of organising learning in its School Pedagogy Programme, committed to the principle that the pedagogical ICT competence of teachers is important for successful subject and cross-curricular competence development. Course content and delivery methodologies in School Pedagogy are guided by the new national framework Pedagogical Media Competencies of Student Teachers and research work is underway on methods of measuring teacher media or ICT pedagogical competence. ICT is used as a cross-curricular tool to enable learning and to encourage active learning, collaboration and personalisation. The School Pedagogy Programme engages large numbers of student teachers across a range of school levels and disciplines to develop and refine their own pedagogical media competencies, through innovative pedagogical methods and course content in lectures, seminars and media lab workshops.

These first three ITELab case studies highlight a variety of approaches to equipping future teachers to prepare young people for a digital world.

Successful approaches include having:

1. a **national digital strategy** in each country emerging from communication and dialogue between all actors in education i.e. governments, education policy makers, ITE providers, teacher bodies, schools, teacher continuing professional development providers and ICT industry, to ensure that initial
teacher education keeps pace with school curricular reform and produces teachers who can lead learning in the digital age.

2. **ICT integrated across the curriculum.** Arising out of a national digital strategy the use of ICT in primary, secondary and initial teacher education when clearly defined will ensure that newly qualified teachers will be able to teach what the curriculum requires.

3. **leadership and a clear vision** across each ITE institution for the integration of pedagogical digital competencies in its all ITE courses, programmes and methodologies in every faculty offering initial teacher education programmes. Pedagogical digital competence needs to frame ITE curricula, programmes and training methodologies.

4. a **pedagogical ICT competence framework** and competence requirements embedded in the wording of learning outcomes, methods and forms of assessment in the course descriptions of all subject disciplines and in the teaching practice elements of ITE programmes.

5. **assessment and accreditation measures** to match the pedagogy-led training of student teachers.

6. **pedagogically ICT competent teacher educators** and tutors in all faculties and all teaching subject disciplines of ITE institutions. Training in ICT should be an integral part of subject didactics and linked directly to individual subjects by confident and competent teacher educators.

7. **structural investment** to create educational media labs across the university, creating flexible learning spaces equipped with digital teaching equipment and resources to encourage project-based and collaborative learning by student teachers.

8. greater **co-operation** between school practice, mentor teachers, classroom teachers and ITE providers.

9. support and **mentorship programmes** in place to support newly qualified teachers in their early years to evaluate the effectiveness of ITE programmes.

The demand from newly qualified teachers for ICT continuing professional development demonstrates that many emerge from ITE lacking in such skills or competences. The case studies of year one of the ITELab Project illustrate how it is possible to create a new pedagogical model where ICT is fully integrated in school curricula and in the education and practice of future teachers.

The case studies illustrate how ITE providers work with ICT vendors to support innovative projects such as Flipped Learning Lectures and The Media Education and Educational Technology Lab (ref. University of Würzburg). There is also evidence of joint working using ICT vendors’ software and CPD resources for teachers which will

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be further explored in Series Two and Three of the case studies, one each in year two and three as the ITELab project develops. The future case studies will examine how approaches like those listed above are being addressed and identify how specific topics and issues related to use of ICT in schools are covered in ITE curricula. They will also highlight examples where ITE providers work successfully with the ICT industry and use existing CPD resources for teachers related to the pedagogical use of ICT that can be adapted for use within ITE.

The ITELab Project has been designed as part of a long-term strategy that EUN is developing with its supporting education ministries and ICT industry partners focused on mainstreaming effective, productive and innovative use of ICT in schools. ITELab will develop and pilot a set of open educational resources and training materials to aid ITE providers adapt their curricula and pedagogical approaches and address the new competences required by teacher educators. These resources, in the form of taught modules and a self-paced MOOC, will help equip student teachers with the pedagogical digital competence and skills needed to work successfully in technology-rich classrooms.
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