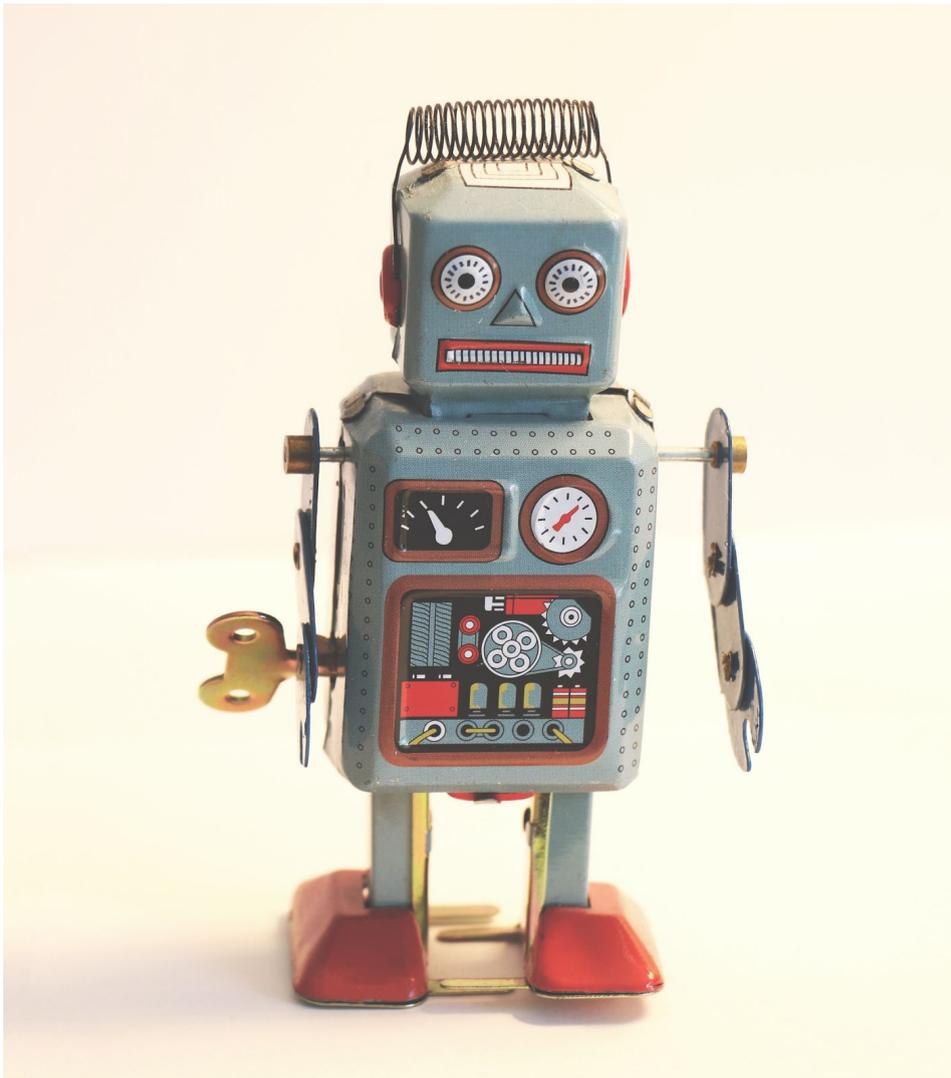


Sharing good practices across Europe

when developing ICT in teacher education (DICTE)



Overall the **Sharing practices (O4) report** provides reflections on the insights the DICTE (Developing ICT in Teacher Education) group has gained in the project by sharing digital practices in teacher education. The complete templates with practice examples from each country, are attached in the appendix. The report summarizes the main points of the practices and connects to the PEAT model which has been developed by the project group.

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Introduction

This report is the fourth and final output from the DICTE project, Developing ICT in Teacher Education. The project partners are from the University of Limerick, the University of Malta, the University of Valencia, the University of Oslo and Oslo Metropolitan University. All partners have collaborated and contributed by providing their experiences and reflections regarding good digital practices in teacher education. Oslo Metropolitan University and the University of Oslo have coordinated the work on this output and have been mainly responsible for the writing of this section of the report.

Different practices are being used in order to develop methods of integration of good digital practices and competencies in teacher education in the five teacher education institutions across Europe. Our endeavour in this report is to cover and discuss the examples of digital integration and describe the possibilities of sharing and replicating these practices across the five institutions.

This report documents different practices as each institution has identified examples of good practices and elaborated on how they relate to the PEAT model (DICTE 2019) developed by the DICTE project (pedagogical, ethical, attitudinal and technical dimensions - see methodology section). The dimensions in the PEAT model describe student-teachers' and teachers' professional digital competence. The PEAT model was developed through a systematic review of literature which also reviewed current models of teachers' digital competence. The PEAT model emerged as a result of this review (McGarr & McDonagh, 2019; DICTE 2019). Project members have aimed to identify good practices, spanning from organisational practices on a macro level to hands-on classroom practices on a micro level keeping in mind the strengths in each institution as well as areas of shortcomings. Through discussions and reflections in the DICTE project team, members are encouraged to adapt practices across institutions after adjustments and improvements in the existing practices. This provides a huge opportunity to learn from each other, and further develop current practices for better integration of ICT in teacher education.

The original goal of output 4 in the project description was to identify examples of best practice in technology integration in teacher education and to share them with the project partners so that these practices could be tried out by other project team members. However, during the project, the team members decided on not using the term 'best' regarding these practices as a common understanding was that 'Best' practices is a relative term and therefore not fitting in the context of the project. Project members concurred that the important goal of the project was to identify the practices that worked well and were effective in different teacher education programmes and to share these practices.

While identifying good practices, the need to include the contextual issues came across as crucial in order to understand why the practices were identified and included as good by each institution. As a guideline, each country listed the contextual issues related to use of

ICT in teacher education, focusing on several levels: national policy level, local/regional policy level and institutional policy level.

All the practices identified in this report have been connected with one or more aspects of the PEAT model and the model was used to categorise and analyse the various examples according to the four dimensions of the PEAT model: pedagogical, ethical, attitudinal and technical dimensions (see next section).

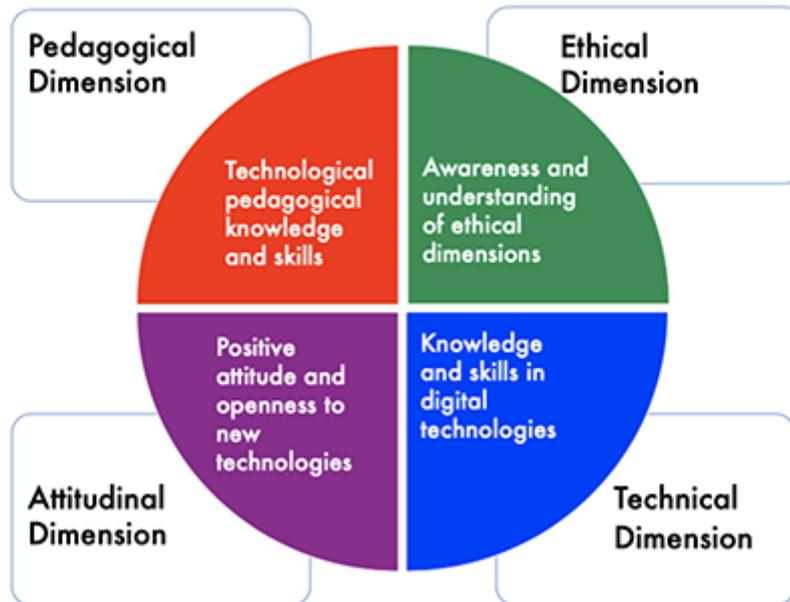
The report is structured as follows: first, we briefly describe the methodology used in order to identify good practices across the five institutions. Then we describe the contextual issues for each of the four countries and five institutions. We then present the good examples in brief (a more in-depth description of each is found in the Appendix). Then we identify the similarities and differences observed in these practices and later discuss the key issues related to sharing practices. Finally, we present our conclusions in the light of the discussions regarding these good practice examples.

Methodology

Sharing good practices has been a main element in the project from the beginning. This was initially done by presenting different teaching practices and experiences from different institutions. The institutions started by presenting the different policies at each institution, as well as examples. Through these presentations, the institutions aimed to identify elements of similarities and differences as well as reflecting on how these practices could be transferred between the different institutions. Similar activities have been carried out in all project meetings.

A template was developed to streamline the presentations of different practices and make them easily comparable. The template includes a short description of the example, the target group and the related technology in use. Additionally, the template highlights which of the parts in the PEAT-model (Pedagogical, Ethical, Attitudinal and Technical dimensions) are relevant for this particular example.

Pedagogical, Ethical, Attitudinal and Technical dimensions (PEAT model)



The **pedagogical** dimension incorporates pedagogical practices that technology can offer particular to different subjects as well as broader professional practices.

The **ethical** dimension includes issues related to privacy, copyright, source criticism, freedom of expression as well as personal ethics related to a professional understanding and use of digital technology.

The **attitudinal** dimension includes the ability to adopt and adapt new technologies in a professional context. To be able to creatively use digital technologies to support teaching and learning processes, creative use of digital technologies to support teaching and learning processes, the ability to adapt new technologies to a professional context, as well as forming a deep understanding of the role of digital technologies in society.

The **technical** dimension refers both to the practical skills and competencies needed to use software and hardware in specific educational situations as well as an understanding of technological networks and a knowledge of how digital devices operate and communicate with each other.

Many of the examples we will present touch upon more than one element of the PEAT model but we categorize the examples according to the most *dominant* element in the example (that is either pedagogical, ethical, attitudinal or technical).

The different partner institutions decided which examples would be relevant for them to try out locally and reported from their experiences, including student feedback if this was available. Each institution included this in the comments section in the template, aiming to improve and exploring existing practices.

Contextual issues

While sharing good practices, the need for contextual understanding on different levels was recognised. Both to learn from each other how the use of technology is focused and emphasised on a policy level in each country, and to get a better understanding on the background for the chosen good practices. In this section we present contextual issues from all the participants in the project, focussing on national, regional and institutional policies.

Ireland - contextual issues

National and Regional policy

Ireland has had a succession of national policies in the area of digital technologies in education stretching back to the late 1990s. Since then there have been a succession of national policies launched, all aiming to increase digital practices in primary and post-primary schools. The most recent strategy, the Digital Strategy for Schools in Ireland – Enhancing Teaching, Learning and Assessment was initially launched in 2015 and since then there have been several initiatives implemented to advance its goals. The overarching aim of the strategy was to “realise the potential of digital technologies to enhance teaching, learning and assessment so that Ireland’s young people can become engaged thinkers, active learners, knowledge constructors and global citizens to participate fully in society and the economy” (p.1)

Four key themes were outlined within the strategy to achieve its aims. They included: teaching learning and assessment using ICT, teacher professional learning, leadership, research and policy and ICT infrastructure. In relation to teacher professional development, the strategy drew on the UNESCO ICT Competency Framework for Teachers to frame the provision of teacher professional development.

The Department of Education and Skills developed a series of actions under each of the above four key themes to progress ICT integration over the lifetime of the Strategy. These objectives, and the entire strategy, are underpinned by five key principles, which were identified during the consultation and research phase of the strategy’s development. These included:

1. A constructivist pedagogical orientation underpinning the embedding of ICT in schools
2. The use of ICT in teaching, learning and assessment, which can enhance the learning experiences of all students.
3. The use of ICT in teaching, learning and assessment becomes embedded in the school curricula and ethos.
4. That ICT will be used in an ethical and responsible way.
5. That ICT planning is necessary to ensure effective ICT integration in teaching, learning and assessment.

As part of the implementation of the plan the department established a steering group consisting of key stakeholders to oversee the implementation of the plan in the following years. This group continues to guide the roll-out of the strategy and advises the minister on an ongoing basis.

As educational policy in Ireland is centrally devised and administered by the Department of Education Skills, there are no local or regional variations in the implementation of this digital strategy.

Teacher Education Policy

Teacher training/education in Ireland has traditionally been provided by the third-level sector and there are a number of universities and colleges of education that deliver either 4-year bachelor programmes or 2-year postgraduate Professional Masters in Education programmes. To be recognised and accredited by the Teaching Council of Ireland, the national statutory accreditation body for teachers, these programmes must adhere to specific regulations relating to the duration of the programmes, the number of ECTS credits assigned to various components of the programmes (including pedagogy, school placement, subject content and educational theory). Under these regulations, ICT in education is listed as a core area of study in the educational section of the Teaching Council's criteria and guidelines. However, there is significant autonomy at an institutional level in relation to the depth and breadth of exposure to ICT in education. At the time of writing, the new accreditation guidelines have provided greater specificity in relation to what aspect of ICT in education should be addressed.

Educational Technology and Teacher Education at the University of Limerick

Within the University of Limerick, educational technology is integrated across the teacher education programmes where digital practices occur across modules as well as within a specific educational technology module offered to all first-year teacher education students. This module addresses issues related to technical competence, pedagogical uses of ICT and cyber ethics. Examples of integrated practices across the teacher education programmes include the creation of digital artefacts as part of key educational assignments that can be showcased in students' digital portfolios and the use of digital technologies in pedagogical preparatory modules as part of students' school placements. These digital practices evolve on an annual basis and reflect emerging technologies and practices within placement schools.

Norway - contextual issues

National strategy on digitalisation in higher education

Norway has a digitalisation strategy for higher education (Digitalisation Strategy for Higher Education - 2017-2021) for students, faculty, researchers, and management at all levels, infrastructure and administrative systems. This is a long-term plan where higher education has to define aims and measures for digitising learning processes and new forms for

learning, in order to enhance the quality of higher education (p. 15). In this context, aims focussing on the students are the most interesting. One of the aims is for all students to be part of an academic community where the potential that lies in digitalisation is utilized for varied, active and student-centred learning and assessment. Another aim is for students to have the possibility to develop their digital competence as a generic skill for learning, including ethical, legal and security issues. This is part of different measures that are meant to enhance the quality of higher education, and among other things, linking research on digitalisation of learning processes and competence in employment.

National guidelines for teacher education for primary, lower and upper secondary education

In Norway there are three main tracks in teacher education. The first covering primary education (1st to 7th grade), the second covering lower secondary, including middle years (5th to 10th grade) and the third for lower and upper secondary (8th to 13th grade). All three tracks take five years to complete, and student teachers do not get any kind of qualifications as professionals before the five years have been completed. In addition, there is also the possibility to take a one-year intensive programme to gain a teacher's certificate on top of a regular Master's degree.

Primary and lower secondary (1-7/5-10)

In the guidelines for teacher education for primary and lower secondary school, each subject is responsible for ensuring that the students have the knowledge about how they can work with pupils' development of basic skills, including digital skills. Digital skills are also mentioned with regards to teaching practice, focussing on the students' being able to develop pupils' digital competence. In addition, student teachers following the 5-10 track should develop knowledge about children and youth's general and cultural development and learning and in digital contexts. Furthermore, in both tracks, digital skills are mentioned specifically in each subject as part of the learning outcomes, both as teaching activities, using and evaluating digital learning resources and using digital technologies for assessment purposes, from the specific subject's point of departure. At Master's level, students should be professionally digital competent teachers.

Lower and Upper Secondary (8-13)

In the policy guidelines for Teacher Education grades 8-13 (lower and upper secondary education) which are the levels that teacher education at UiO targets, there is a particular section on professional digital competence (PDC). There it is stated that teacher education needs to address that technology is affecting every aspect of life including the way we learn. Teacher education needs to contribute to digital responsibility, and help counteract a digital divide.

Professional digital competence (PDC) is developed across several areas of knowledge and learning areas and includes both general digital competence as well as subject specific PDC and professional knowledge and skills. Teacher education must therefore facilitate the student through various learning activities on campus and in practice, so that they can

develop their PDC, but also gain relevant experience in the educational use of ICT in their subjects.

Teacher education also needs to address student teachers' competence in being able to critically assess when, and in what way ICT should be used to promote learning and support the pupils' learning outcomes. Partner schools (where practical training takes place) also have a particular responsibility to arrange for the student teachers, in collaboration with practice teachers, to ensure students get opportunities to explore innovative use of ICT within their disciplines.

Student teachers also need to be able to familiarise themselves with ethical and legal issues such as copyright and privacy issues connected to GDPR.

The University of Oslo (UiO) local ICT policy

University of Oslo has an IT masterplan <https://www.usit.uio.no/om/it-dir/strategi/masterplan/> and <https://www.usit.uio.no/om/it-dir/strategi/masterplan/anbefalinger/saksdokument-om-masterplanen.pdf> which serves as an overall management document with clear guidelines for specific initiatives, projects and IT initiatives in all faculties at UiO. Within the department of teacher education and school research (the home department of DICTE) there is a Centre for Professional learning in Teacher education (ProTed) which focuses on use and implementation of various ICTs within teacher education. The Centre work focuses on developing a professional education which provides student teachers with the tools and competence necessary in a multicultural and technology-rich knowledge society. This is done through various initiatives, development projects and through research. The teacher education program is a so-called integrated programme which seeks to integrate pedagogical and subject didactics in all aspects of the programme. In this integrated approach the use of ICT is used in various ways, firstly to meet the teaching pedagogy and also subject didactics, where great emphasis is on the use of ICT by the teacher educators in order to model the potential of ICTs for the student teachers.

Oslo Metropolitan University

Local strategic plans

OsloMet's strategic plan emphasises that OsloMet will be the leading institution in introducing new technology, innovative solutions and efficient work methods through different activities. One of these activities is to make digital and technological expertise an integral part of OsloMet's study programmes and academic environments. Furthermore, OsloMet aims to develop its position as a provider of decentralised teaching using digital teaching methods. OsloMet also emphasises the facilitation of new student-active work methods in teaching.

At institutional level, the Department of Primary and Lower Secondary Education has included the use of digital tools in subject course descriptions and assignments. Furthermore, a specialised unit on digital competence with 12 full time faculty members has

the responsibility for integrating digital competence in and across all levels in teacher education (pre-service and in-service courses at both bachelor and master's levels as well as continued professional development). The unit, in collaboration with the department, has defined a plan for implementation which considers a progression from basic to advanced digital competence. During their first year the focus is on digital skills for students, while the latter years focus on different methodological approaches to using digital tools for teaching and learning. Furthermore, cyber ethics, covering ethical and legal aspects, is an integrated part throughout the five-year education.

National strategy for digitalisation for primary and lower secondary education 2017-2021

A national strategy for the digitalisation of primary and lower secondary focuses on the need for educating pupils for a changing future market, and highlights the necessity of an updated and relevant education for future needs. This includes learning to live with the possibilities and challenges that a digitalised and technological society offers. The strategy focuses on:

- Pupils' learning, renewing core elements in school and developing digital learning resources.
- Teacher competence, emphasising in-service teacher education
- Infrastructure

ICT policy in Norwegian schools - Framework for basic skills

The Framework for basic skills is a document defining the five basic skills, where one of them is **digital competence** and describing what the pupils should learn in school. Since 2006 the *school curriculum* includes digital competence in all subjects at all levels (grades 1-13). The framework for digital competence in the school curriculum can be found here <https://www.udir.no/laring-og-trivsel/lareplanverket/grunnleggende-ferdigheter/digitale-ferdigheter-rammeverk/> (in Norwegian). <https://www.udir.no/in-english/Framework-for-Basic-Skills/> (The English translation is not updated according to revision of the framework in 2017)

The basic skills describe different competence levels. The requirements at each level are general and serve as a reference point when developing digital competence in the school subjects. Developing digital competence means learning to use digital tools, media and resources and learning to make use of them to acquire subject-related knowledge and exercising digital responsibility. This implies developing increased independence and responsibility in the choice and use of digital tools, media and resources relevant to the task in place.

There are five levels which operationalize digital competence in the basic skills framework. These are:

1. Using and understanding
2. Searching and processing
3. Producing and reproducing

4. Communicating and interacting
5. Exercising digital responsibility

National curriculum

In August 2020 a new reform, *the subject renewal policy*, replaced the *Knowledge promotion policy* from 2006. The concept of competence has been strengthened even further in the new policy. Moreover, the framework for basic skills still keeps a central role as a point of departure for the national curriculum. A specific section on digital skills is included in the curriculum plan, related to each subject, furthermore each subject has competence goals where the use of digital tools is explicitly mentioned.

Digitalisation of education in Norway has been an issue for over two decades. In the revised curriculum, digital citizenship and computational thinking have been highlighted related to subject specific domains such as social studies, mathematics and science.

Malta - Contextual issues

National ICT policy for Schools

In Malta the point of initiation was in 1994 by the National Strategy for Information Technology (NSIT) that invariably went beyond the black box integration status of IT in work and Education to the building of a well IT oriented and educated future worker. Other policies ensued namely, Vision 2000 that looked at the intricate relationship between the Internet as a technology for the attainment of the eGovernment and the setting of a strong base for the Maltese information Society. This eventually materialised into the National ICT Policy of 2004 and eventually evolved into two complementary strategy documents, SMART Islands that looked at reducing the resistance to IT infused change and SMART Learning that tackled the issue of resistance to ICT by fostering formal educational programs including the introduction of the IWB in all schools. In Malta, being mainly a service-based economy, education was always seen as part and parcel of socioeconomic development. Thus in 2009, Malta experienced the issuance of the MITA Strategic Plan 2009-2012 which besides other things provoked the setup of The National policy and Strategy for the Attainment of Core Competencies in Primary education. Specifically, this document devoted a whole section for the inclusion of eLiteracy trends; the same importance was given by the long anticipated National Curriculum Framework document launched in 2012. Both documents asserted that in response to changing demands, globalisation, ICT developments and new paradigms (NCF, 2012), digital literacy became defined as an indispensable core competency and on par with other more traditional educational pillars such as Mathematics, Science, English and Maltese.

2014 and 2015 saw the roll-out of several strategy documents. One of the strategy documents entitled 'Framework for The Education Strategy for Malta 2014-2024' (MEDE, 2014) sought to: "[...] build more effective synergies between education, the economy and civil society" (p.6). It essentially offered directions and structure to enhance the link

between education, national developments, and therefore mechanisms for employability. Two other major ICT strategies were also presented: Digital Malta 2014-2020 (MITA, 2014), focusing on issues of ICT and the economy; and The National Lifelong Learning Strategy 2020 (MEDE, 2014), primarily directed towards adult education. These were also complemented by a green paper, Digital literacy (Department of eLearning, MEDE, 2015), offering an academic perspective and purposefully written to educate and offer insights into digital literacy in the context of local policies and the Maltese educational system. Finally, there was the rollout of the Learning Outcomes Framework (LOF) (MEDE, 2015). The LOF offered directions in a push to move away from centrally imposed models to contextualised and adaptive learning models that sought to address better students' specific learning needs. Lately and starting a new chapter, a policy that looks at AI and how education should be adapted to enhance future worker participation in an infused reality has been presented

Teacher Education ICT policy

The Faculty of Education works within the parameters of the UoM Distance and E-Learning Policy launched in 2018. When student teachers are on practice placements in schools they receive guidelines from faculty but mainly refer to the national policy documents as issued on a national level for all schools.

Local/Regional ICT policies

This aspect is not relevant for Malta since we have one Directorate of Education and no regional educational school districts or local educational areas. Thus, we have a National Policy as shown previously above.

Institutional Policy

The University of Malta has issued a Distance and E-Learning Policy in 2018 intended to enable and guide academics with ensuring the highest quality learning in the prevalent digital era, and to secure the provision of sufficient support. It draws on the belief that distance education and e-learning seek to provide enhanced and new windows of learning opportunities for students, and academics. The policy draws upon the contention that the quality of the teaching and learning across distance and e-learning education is to match the excellence intended with face-to-face approaches to teaching and learning at the UM. Inherently the policy is directed and involves all the academics within the institution. Incidentally the policy presents the parameters within which distance education and e-learning initiatives and programmes are to be developed and delivered by academics at the UM, and how quality standards for the delivery and assessment of distance education and e-learning are to be maintained. The policy does refer to particular pedagogical theories and approaches associated with distance education and e-learning. Cognizance of such are however assumed in the training/ experience expected amongst academics who adopt distance and e-learning initiatives at the UM.

Spain - contextual issues

National ICT Policy for schools

National curriculum from 2013: "The Ministry of Education, Culture and Sport will draw up, after consulting the Autonomous Communities, a common reference framework of digital teaching competence to guide the ongoing training of teachers and facilitate the development of a digital culture in the classroom". "Digital Competence" as one of the seven essential competencies for students (defined more broadly in the national Order ECD/65/2015 relating to competences).

Teacher Education ICT Policy

The educational policy on Digital Teacher Competence is set out in the "Common Digital Framework for Teachers" (2017)

<https://intef.es/Noticias/common-digital-competence-framework-for-teachers/> based on the European DigComp framework. The document is written with the intention of providing a descriptive reference that could be used for teacher training and education purposes. It thus establishes a common framework that forms part of the "Plan for Digital Culture in Schools" (2012) and the "Strategic Framework for the Professional Development of Teachers" (2013). These plans provide support through training and infrastructure to help teachers integrate technology, but are rather vague in describing the characteristics of the planned integration. More recently, through the establishment of national working groups representing all communities and the state, consensus and approval was achieved to identify lines of future action. These seem to underline the importance of teachers in helping students to acquire significant digital competence.

Regional level

The Spanish education system has transferred the competences in education and teacher training to the autonomic governments. This means that the central government establishes a framework document of national application, which is developed in each community serving as a reference. In the Valencian context, references to Digital Competence are quite imprecise and vague in local regional curricula for Primary and Secondary Education.

Institutional Curricula in Teacher Education

In the Faculty of Teacher Training (Universidad de Valencia) there is no specialised module/subject in educational technologies for all students. However, there is a specialisation, within the teacher's degree, dedicated to training as a Specialist Teacher in ICT. This specialisation is taught in the third and fourth years and consists of a total of 36 ECTS credits divided into six subjects (three per academic year). To complement the digital training of the rest of the teachers at the UV we have the "Manuel Sanchis Guarner Center for Education and Quality" which is dedicated to continuous training in Innovation and Digital Competence. In addition to this, the University has a legal framework that is the "UV TIC Resources usage regulation"

<https://www.uv.es/uvweb/information-technologies-service/en/rules-procedures/uv-tic-resources-usage-regulation-1285874221018.html>

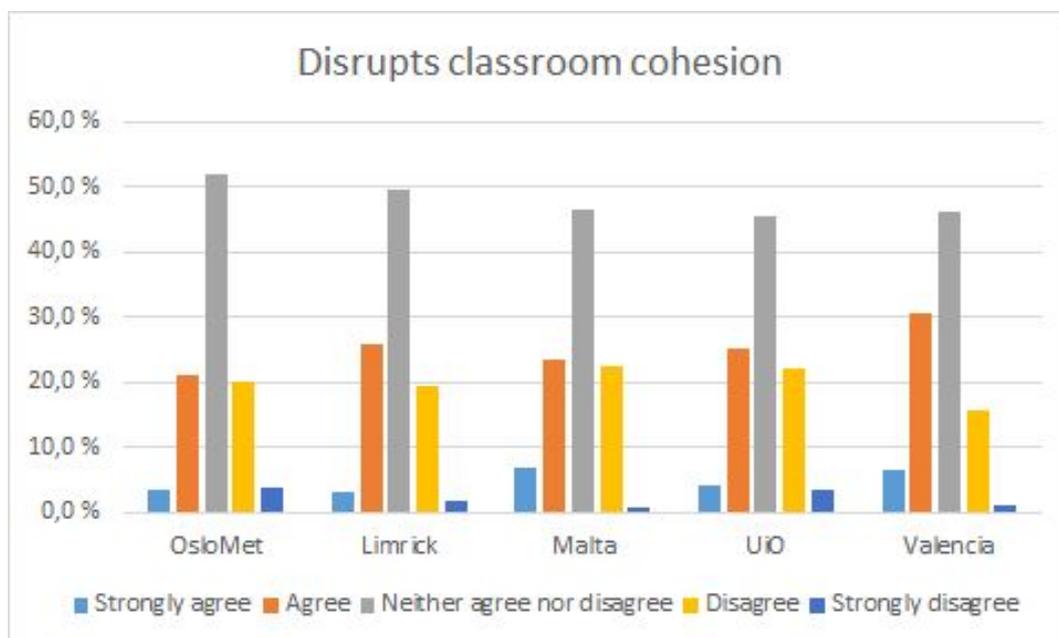
However, as is the case in many other Spanish and European universities, a large part of these experiences depend on the enthusiasm, interest and experience of the professor in the field of digital technologies, which leaves many proposals reduced to personal and individual areas.

Pre-service student teachers' digital competence

In order to further explore the contextual issues within the different countries and institutions, we present a snapshot of pre-service student teachers' digital competence from the findings from our survey tool to exemplify the four dimensions of the PEAT model, and the differences between the participant universities, focusing on similarities and differences. The examples provided are from the 2019 survey for each institution on each dimension of the PEAT model.¹

Pedagogical dimension

When it comes to the pedagogical dimension, we have chosen to exemplify this dimension with a question about to what extent digital technologies disrupt classroom cohesion. The student teachers had five response options: Strongly agree, Agree, Neither agree nor disagree, Disagree and Strongly disagree.

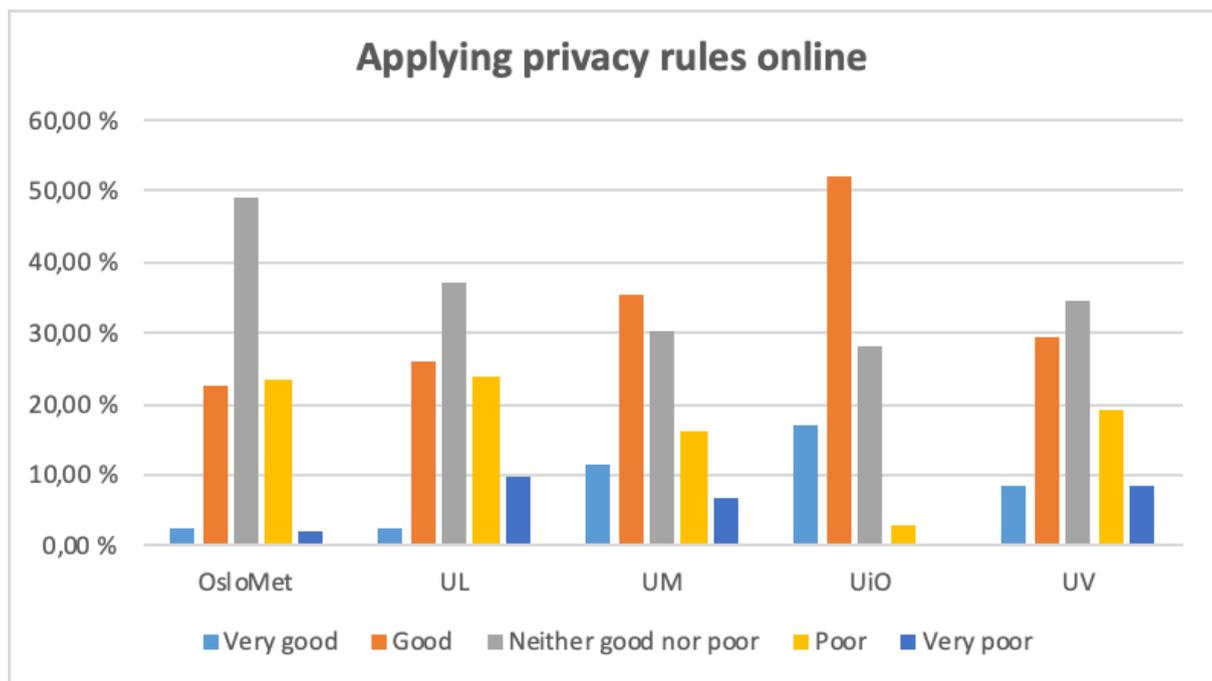


¹ OsloMet - Oslo Metropolitan University; UL - University of Limerick; UM - University of Malta; UIO - University of Oslo; UV - University of Valencia

Overall, the majority of the student teachers reported that digital technologies did not disrupt classroom cohesion. However, there are some variations between the institutions. For example, almost 40% of the UV student teachers and almost 24% of the OsloMet student teachers did agree that digital technologies could disrupt classroom cohesion.

Ethical dimension

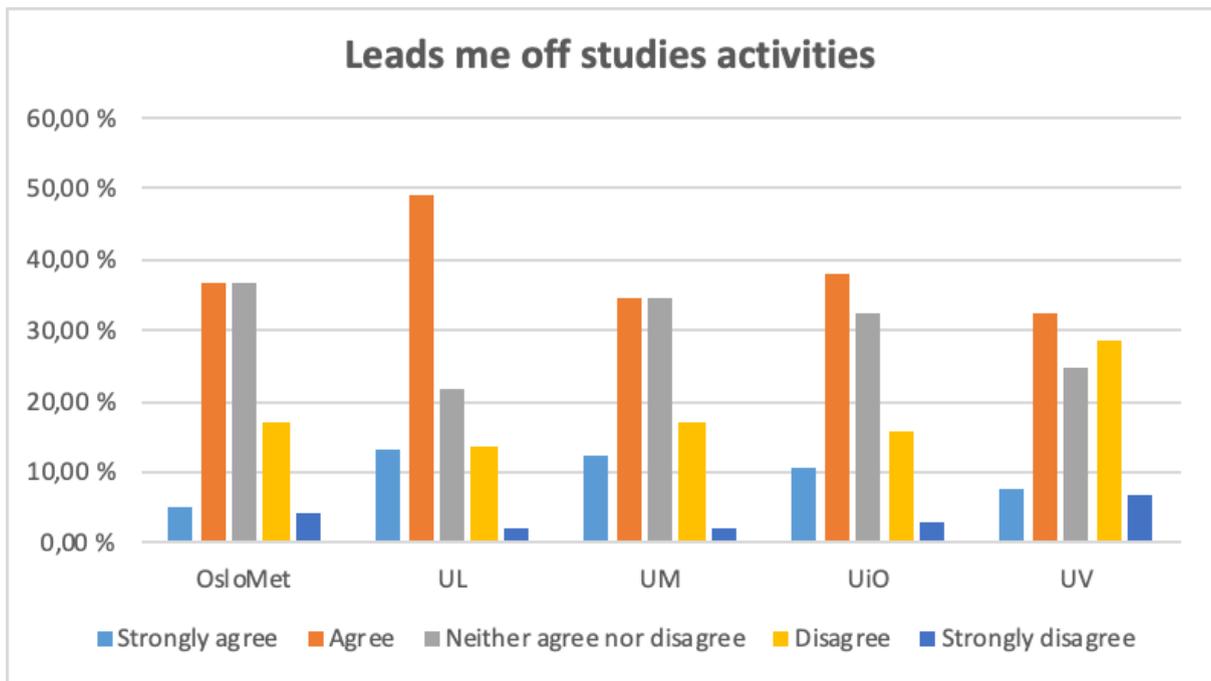
The question about student teachers own competence when it comes to applying privacy rules online, is presented to exemplify this dimension. The student teachers got five response options: Very good, Good, Neither good or poor, Poor and Very poor.



There are differences between the student teachers when it comes to what they report on their own competence. Almost 70% of the student teachers from UiO answer good or very good, whereas almost 25% of the OsloMet student teachers report good or very good.

Attitudinal dimension

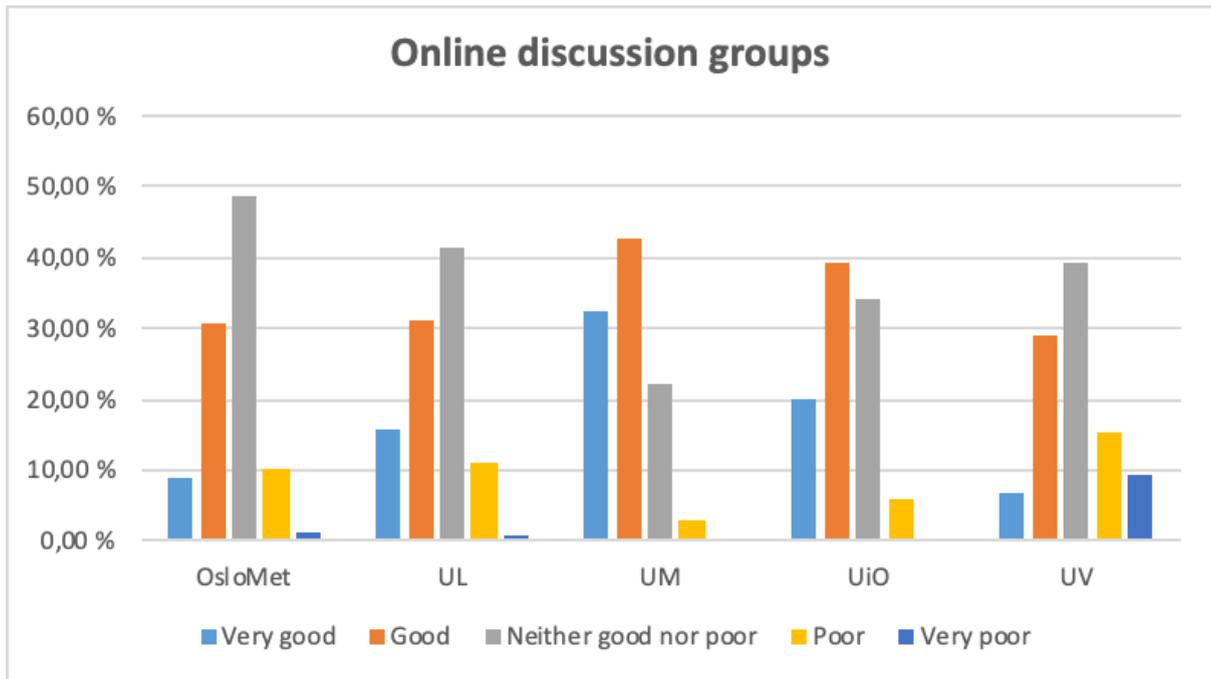
When it comes to the pedagogical dimension, we have chosen to exemplify this dimension with a question about to what extent digital technologies lead the student teachers off studies activities. The student teachers got five response options: Strongly agree, Agree, Neither agree nor disagree, Disagree and Strongly disagree.



There are some variations between the institutions. For example, the majority of the UL student teachers did agree that digital technologies could lead them off studies activities. However, less than 45% of the UM and UV student teachers agreed that digital technologies could lead them off studies activities.

Technological dimension

The question about how they perceive their own competence when it comes to using online discussion groups. The student teachers got five response options: Very good, Good, Neither good or poor, Poor and Very poor.



There are differences between the institutions on the statement about perceived competence in online discussion groups. More than 70% of the student teachers from UM answer good or very good, whereas less than 40% of the OsloMet and UV student teachers report good or very good.

Good practice examples

In this chapter we give a summary of our good practice examples (the template as well as the complete descriptions of the examples can be found in the Appendix). The examples are organized in the four categories based on the PEAT model.

Pedagogical

Minecraft in Social Studies – Oslo Metropolitan University

The example describes the use of Minecraft Educational Edition (MEE) in Social Studies for generic and knowledge specific (Social Studies) skills. Student teachers build historical buildings and create a script and a role play where the aim is to contribute to the students (and ultimately pupils) understanding on how people lived in the past, or made political decision processes etc. The role play is filmed (screencast) and presented in class. Student teachers then try out MEE in a school (6th or 7th grade) where pupils recreate historical buildings, create a role play that is filmed and discuss this in class. The student teachers are responsible for this session.

Connecting to the PEAT model

- **Pedagogical:** Using MEE as a tool for building historical sites and simulating micro-histories in a specific time period. Problem solving and finding different ways to both create buildings, using different information sources.
- **Ethical:** Behaving ethically online, such as not destroying others' buildings,
- **Attitudinal:** Towards using games for learning, creative use of technology
- **Technical:** Minecraft Education Edition, screencast tools (screencast-o-matic; quicktime), editing videos, using projector for presenting.

Multimodal texts - Oslo Metropolitan University

The use of tablets in Norwegian schools has often focused on the use of apps to process and present content and to stimulate creativity. A case study exploring pupils' creation of fairytales combined with observations of pupils' production of various multimodal texts in school, initiated the idea of designing a teaching experience for student teachers similar to what pupils do at school.

These sessions also aim to give the student teachers an example of how to integrate digital tools in different subjects. The teaching session consists of a lecture on the use of tablets in school with some practical examples, a lecture to plan the multimodal book and one day to develop the book. Finally, a lecture at the end, to present the book to getting feedback from fellow students and the teachers and reflecting on the use of tablets and production of multimodal texts in learning.

Connecting to the PEAT model

- **Pedagogical:** Creating digital multimodal books as a method of approaching different topics in language learning

- **Ethical:** Copyright issues regarding the use of images and music in class and the sharing of IP content. Get to know sources of multimodal content that are free to use.
- **Attitudinal:** Creative use of digital tools, using digital tools in a student-centered learning approach
- **Technical:** Video, images, audio, the app BookCreator, commonly used with iPad in Norwegian schools.

Digital Competence for teacher educators - Oslo Metropolitan University

The rationale behind this CDP is that to educate student teachers who are able to fulfil the Norwegian curriculum requirements in integrating digital skills in subjects in school. Teacher educators should have a certain insight and skills in using digital tools for learning. The Unit of Digital Competence at the Oslo Metropolitan University has developed a 3.5 years plan for developing digital competence for the faculty staff (teacher educators). One of the challenges is that the faculty members, as a group, have a very diverse digital competence. Therefore, the topics chosen for the program are based on educational topics that all teacher educators are expected to find relevant. The themes and topics selected are based on the national curriculum for schools, policy and digital strategies for higher education and local guidelines and strategies for OsloMet. The organisation of the program is based on already established organisational structures and meeting points such as a monthly staff meeting and meetings for each unit. The idea is that all topics start with an initial lecture that is followed up through the discussions in each unit where the competence and the competence needs are identified. Different types of courses, like general courses, customised courses, and workshops are offered to follow-up individual needs, or the needs of the different units. In addition, an online module that covers the topic and links to technologies, resources and relevant research.

Connecting to the PEAT model

- **Pedagogical:** The idea is that each of the modules relates technology to a pedagogical topic. The inspirational lecture aims to provide insight into and examples on educational use of technology.
- **Ethical:** One of the modules deals specifically with ethics and legal topics such as privacy and copyright.
- **Attitudinal:** The initiative from the management and their commitment to the program itself, signals an attitude towards the importance of technology use in teacher education. The program aims to give teacher educators insight into different digital resources for teaching and learning. In turn, this may influence teacher educators' attitudes towards the use of digital technologies in their own teaching and learning.
- **Technical:** Relevant digital tools related to each module is presented in Canvas along with instructional videos on practical ways to use them.

Digital competence modules on Canvas LMS - University of Oslo

At the University of Oslo, online modules of digital competence (PDC) have been developed and published for student teachers on Canvas. These modules are used parallel to campus teaching. The modules are primarily on generic digital competence and address issues such as ICT competence in the various teaching subjects, digital resources, ICT and class leadership, ICT, learning and research. The structure of the modules is first a short introduction of a theme, then an online discussion forum is provided, reflection questions and various group activities. The modules are not obligatory for the student teachers to complete but they are designated to support student teachers' digital competence development and are seen as a supplement for campus teaching. They are placed and integrated to match certain weeks of the campus courses and activities. After that, the student teachers have open access to the modules and can use the content of the modules as supporting materials during their studies and during their practical training in schools.

Connecting to the PEAT model

- **Pedagogical:** Making sure all the student teachers get a basic PDC and use of various technological tools in a pedagogical manner as well as PDC as a cross-disciplinary competence. Example of pedagogical take on PDC is the module on how to teach in a technology rich classroom and hinder pupils' online activities not related to the class or other types of distracting surfing.
- **Ethical:** modules on digital responsibility, copyright and privacy rights
- **Attitudinal:** Preparing teachers in making PDC as a natural part of student teachers' teaching and learning in all subject fields (in accordance with the national curriculum in Norway)
- **Technical:** Various digital tools are introduced in the different modules

Flipped learning in teacher education - University of Oslo

Flipped learning has been used in the part-time four year certificate programme for teachers. Online Canvas modules are developed prior to each campus seminar in pedagogy. The flipped learning model is based on a coherent-constructive alignment (Biggs, 2011) with step 1 being online home assignments and step 2 (group) work on campus. We produce videos with thematic focus and introduction of the topic relevant to the campus seminars. There are questions and assignments accompanying the videos as well as tailored readings and questions/assignments. These are followed up with hands-on activities on campus.

Connecting to the PEAT model

- **Pedagogical:** This is a particular pedagogical design and all the lessons are designed according to a certain pedagogical approach.
- **Ethical:** NA
- **Attitudinal:** The flipped learning design is used to model student teachers' use of technology in their own classroom and as such influences their attitudes on

various teaching methods and the methodological variety and potential of ICT use in teaching.

- **Technical:** Videos – various tools to record film sequences and make the preparatory part of the introduction to the seminars (the flipped part).

Developing critical media literacy - University of Limerick

This example is delivered as a lecture to students, technology used include display technology and PC. The theme is on developing critical media literacy by interrogating alcohol advertisements. Our ability to deconstruct the complex mix of multimedia presented in websites and understanding the message presented to us can be a challenge. This ability to deconstruct these complex media messages is a skill that must be taught to novice users as they may not necessarily understand the way they are being manipulated by the message. Websites are complex messages using a wide range of media and we must educate people to understand the complex way in which websites communicate information and values. This form of literacy is critical media literacy. It is a literacy that can deconstruct the complex media messages so that we can see the true intention of the message presented and the hidden assumptions and values embedded in it. This activity involves the teacher taking a well-known website advertising a product and critically analysing it using 5 key questions, namely:

1. Who created the message?
2. What creative techniques are used to attract my attention?
3. How might different people understand this message differently?
4. What values, lifestyles and points of view are represented in, or omitted from, this message?
5. Why is this message being sent?

Having understood this process, the students then select a website of their choice and analyse it using these questions. Their analysis is subsequently presented to their peers so that all learners can benefit from the exercise. This experience then aims to develop their ability to critically, rather than passively, consume digital media.

Connecting to the PEAT model

- **Pedagogical:** Allows student teachers an opportunity to challenge media with a new set of lenses.
- **Ethical:** Introduces student teachers to concepts around advertising that they may not have thought of or understood before.

Virtualising reality - Universidad de Valencia

With this practice example, students acquire geolocation knowledge by locating the referenced points on a map and learning how to enter information about them (Google Maps). In addition, they become familiar with the use of QR codes and their possibilities (QR

Code Generator) and, finally, they learn the basics of editing pages and blogs on the Internet (Wix/Wordpress/Blogspot/Blogger). The student teachers find this experience engaging because they are not only acquiring new knowledge, but also useful skills for their academic and personal life.

Connecting to the PEAT model

- **Pedagogical:** using and knowing different tools for pedagogical purposes
- **Ethical:** learning about privacy and copyright on the Internet.
- **Attitudinal:** using Internet resources for learning.
- **Technical:** Familiarisation with different tools.

Educational documentaries - Universidad de Valencia

With this practice, students acquire knowledge in image, video and audio editing by creating short documentaries based on interviews and reports on different problems related to the Spanish educational system. In addition, they engage with the basics of audio-visual communication, which is so important today. The student teachers are using video editing software such as iMovie/Final Cut/Adobe Premiere/Vegas Pro, and Audacity or similar sound editing software. The student teachers initially find this experience somewhat overwhelming due to complexity of the process in its three phases: pre-production, production and post-production, but as they advance in the project they turn it into something personal that connects them to their most immediate professional and personal reality, which generates great satisfaction when they experience the final result.

Connecting to the PEAT model

- **Pedagogical:** using audio-visual narratives as a way to learn and do a didactical transposition of a content using the cinematographic language.
- **Ethical:** the practice also serves to reflect on the use of the image in the making of the message and development of citizens' skills based on the development of a comprehensive audio-visual resource.
- **Attitudinal:** other forms of storytelling are explored and the importance of audio-visual products in education is reflected.
- **Technical:** using and knowing different video and sound editor tools for elaboration of a complex audio-visual discourse.

Recreating the past - Universidad de Valencia (UV)

Historypin is used for working with photographic resources for the comparison between the past and present. Students use documents from the family past (pictures, videos...) to make comparisons between the past and the present using the Historypin app.

This practice helps students to connect present and past and to recover the memory of spaces and places, which makes historical and literary learning accessible and close and gives it an important emotional component, especially when working on the closest and most familiar spaces.

Connecting to the PEAT model

- **Pedagogical:** the tool allows you to compare images and resources from the past and the present, inserting a complex description of each record.
- **Ethical:** use of documents from the past allows the development of skills that have to do with valuing the historical environment and family heritage, as well as respect for autochthonous traditions and culture.
- **Attitudinal:** the description of complex elements of photographs and elements of the past, allows the development of fundamental descriptive and analytical capabilities.
- **Technical:** work with cartography and insertion of elements on a map.

Game based learning - University of Malta

In this example student teachers are taught and guided on how to employ digital applications to enhance soft skills training invoked through video games such as *Minecraft*. Such computer games can enhance group work and creativity. Games available for hand held devices such as *Plague Inc* are also possible to use with student teachers to, for example explain how disease can spread through mutation and what can be done to stop it. Games on larger consoles such as *Assassin's Creed* that offer interesting walk through historical scenarios and *Total war* that allows student teachers to study war tactics by various historical factions such as the Romans or the French in the Napoleonic wars in more modern times.

Connecting to the PEAT model

Pedagogical: The learning process takes place through different and attractive scenarios. The learning process is based on overcoming different challenges. The learning experience is positive and interesting.

Ethical

Cyber ethics – Oslo Metropolitan University

This example is based on two mandatory lectures, one on privacy and netiquette and one on copyright and source awareness. Guest lecturers come from the police, who focus especially on internet crimes, and are used by schools to give advice on internet criminality, The Norwegian Directorate for education and training, presenting resources for schools (You Decide) <https://www.dubestemmer.no/en> and the Independent media organisation that focuses on checking facts (for example related to fake news, current news and debates).

Connecting to the PEAT model

- **Pedagogical:** Give student teachers a grounding in how to teach and tackle the legal and ethical sides of behaviour on the internet, as well as an overview of some of the resources that can be used with pupils.
- **Ethical:** Copyright and privacy issues as well as netiquette and source awareness

- **Attitudinal:** Insight in the legal and ethical aspects of cyber ethics, of using different technologies in teaching and learning, and develop student teachers' awareness of these aspects
- **Technical:** different resources (websites)

Digital responsibility (cyber-ethics) in practice placements - University of Oslo

Digital responsibility as a concept is part of a student teachers PDC and is emphasised in the Norwegian curriculum for grades 1-13 as a cross-disciplinary competence necessary for all teachers. At the University of Oslo the student teachers work with digital responsibility in several ways during their teacher education programme. They get a two hour lecture on the topic and then they get an assignment related to their practice placement. The first part of this assignment is that they get a case on online bullying and they are supposed to interview staff within their practice school regarding digital responsibility and how they handle digital bullying. The second part of the assignment is group work. In groups the student teachers decide what aspect of digital responsibility they would like to address (for example online bullying, copyright, privacy, plagiarism and so forth). Together they make a lesson plan for 2-5 lessons for a targeted student group with a clear plan on how they can approach the issue of digital responsibility in the classroom. These group assignments are also delivered into the Canvas platform. The final part of this assignment is that the student teachers need to peer review an assignment from another group of classmates that have written another assignment on digital responsibility. The peer review has some predetermined elements they need to assess.

Connecting to the PEAT model

- **Pedagogical:** Making your own lesson plan on digital responsibility related to your subject of teaching. Use of various technological tools in a pedagogical manner and in ethical ways.
- **Ethical:** The assignment is on digital responsibility and thus touches on various ethical issues student teachers address in their subject teaching.
- **Attitudinal:** The assignment is designed to raise the awareness of the student teachers on the topic of digital responsibility being a part of pupils/teachers PDC.
- **Technical:** The student teachers involve various educational tools in their lesson plans depending on which activities they include in their plan.

Developing critical digital citizenship - University of Limerick

This example on developing critical digital citizenship is delivered as a lecture to students, technology used include display technology and PC.

Rationale: In a recent paper by Emejulu and McGregor (2019) they put forward the idea of *radical digital citizenship*. They define this as, '*a process by which individuals and groups committed to social justice critically analyse the social, political and economic consequences of digital technologies in everyday life and collectively deliberate and take action to build alternative and emancipatory technologies and technological practices*' (p. 140).

To respond to this need the University of Limerick has introduced a project into the student teachers' digital technology module that aims to teach the student teachers about the social, environmental and economic effects of unsustainable practices in the digital technology industry. The unit consists of one large face-to face lecture, a two-hour tutorial and an online web-based tutorial completed by the students individually. The unit teaches the students about the exploitation of natural resources in developing countries to source materials for technology products, the exploitation of workers involved in the manufacturing of digital technologies and the unsustainable practices of developing and marketing new technology innovations to maintain a constant demand for products. On completion of the lecture, tutorial and web-based material the students then create a video to show what they have learned themselves on the subject and the overarching aim of the video is to inform younger pupils when on school placement and further into their careers. In this way the task not only revises the content for them, but it also gets them to consider their roles as educators. At its heart, this learning unit aims to challenge the simple and naïve notion that technological development can progress unchecked and that any issues related to sustainability and environmental impacts can be addressed through technological and scientific advancements (Knutsson, 2018). As Hornborg (2009) notes, the high level of technological consumption enjoyed in the wealthy areas of the globe results in negative impacts of the environment and society in poorer areas. In essence, environmental destruction is outsourced to poorer areas – where so called 'technological solutions' will not address this fundamental inequality. By highlighting this fallacy, this learning unit

Connecting to the PEAT model

- **Ethical:** – This develops the student teachers ethical understanding in the area of critical digital citizenship.
- **Attitudinal:** – This can challenge the student teachers' current beliefs and knowledge in the area of critical digital literacy.

Using the Internet - University of Malta

In this example from the University of Malta the open democratic nature of the Internet is discussed. Focus is placed on the importance of user generated content as a modality of creativity but also in terms of responsibility on the type and quality of such user-generated content. Internet ethical issues are then discussed in context of three levels of ethical principles mainly individual, social, and global.

Connecting to the PEAT model

Ethical: especially in context of privacy, what should be shared and not and OERs.

Attitudinal

Unpacking the complexity of privacy in an online age - University of Limerick

This example is delivered as a lecture to students, technology used include display technology and PC and aims to unpack the complexity of privacy in an online age. With access to mobile phones and cameras, students often use their cameras and recording devices to capture everyday events, however many are not aware of the issue of privacy and how this needs to be considered in a media-rich age. In order to raise the students' awareness of privacy and the issues it raises when using mobile devices, this example details how using a form of Socratic dialogue in large lecture settings can problematise everyday experiences of students and raise issues of privacy for the students to consider. This activity begins with showing a picture of a famous national celebrity that the students can relate to (and one that they would be likely to photograph) in a large lecture setting or classroom. When this image is shown on the screen the students are asked the question, 'if you saw this person walking down the street what would you do'. Options can be provided to the students, such as 'say hello', 'take a picture and send to my friend', 'ask for a selfie', or 'ignore them', but these are not necessary as the students are likely to mention these. Most students are likely to indicate that they would take a picture and send it to a friend. Having identified this as the typical response then the conversation shifts to 'do they not have a right to privacy?' This discussion can be led to enable both sides of the argument to be sustained. Some will argue they are a public figure and hence can be photographed, others will oppose this. Issues of 'being in the public eye', are likely to emerge and from this but when it is related back to the students own experiences they may also recognise the need for privacy for all people. This debate will untangle the complex issues surrounding privacy. For example, when is a person in the public eye and when are they not? Is it ok to picture a president at a government building but not at the gym when they are working out? What if they were engaged in illegal or unethical behaviour? Is it permissible to take photos sometimes and not at other times? In this way the 'black and white' nature of privacy can be interrogated. The ultimate goal of this exercise is to problematise our day-to-day actions with our mobile devices and highlight the complexity of this issue. It should result in students considering their use of mobile devices in capturing images of others and the implications it has for their privacy.

Connecting to the PEAT model

- **Ethical:** This lecture problematizes our day-to-day actions and challenges student teachers to reflect on issues such as privacy and also challenges many students to reflect on their current use of social media.
- **Attitudinal:** This lecture challenges student teachers attitudes and perceptions around the use of technology in their teaching.

Digital storytelling - University of Malta

Digital Storytelling employs visual and auditory applications. In this good practice example, student teachers are instructed to avail themselves of their mobile phones and/or other handheld devices such as tablets as tools for convergence through which they can access various Internet applications, access music, videoclips and take photos and videos that can be used to build up stories including serious stories telling that employs the use of LEGO.

Connecting to the PEAT model

- **Pedagogical:** in modern formal educational contexts the interpretation of the teacher's role has migrated from a central point of reference, to mentors of knowledge and ultimately as facilitators for the creation of knowledge and the ability to learn. In this case this is entailing a new form of Pedagogy which is more relevant in digitally mediated environments.
- **Ethical:** digital storytelling is multimodal. It makes use of teacher self-developed material including material that is obtained from photography. In this the students are made aware of ethical issues on what they should capture, what and how they can share content online.
- **Attitudinal:** Our students who are expected to teach with and through technology have themselves been taught otherwise. This implies an attitudinal shift towards digitally mediated pedagogies. In this case students are expected to adopt the technology, adapt to technology and through contextualization in various learning environments and according to disciplines and year groups enact a new form of digitally mediated technological aptitudes. Thus, it is believed that PEAT will serve its purpose to measure attitudinal shifts in the employment and deployment of digital technologies for and in formal educational settings.
- **Technical:** According to this dimension students need to master various technical aptitudes so that they can employ various multimodal strategies in digital storytelling.

Technical

Using Scratch for educative tutorials - Universidad de Valencia

With this practice example, student teachers create short tutorials for primary school students using Scratch. Practice is proposed as an introduction to coding with Open Source Software. At first student teachers are a little worried about the idea of coding and programming, but gradually, through the development of the creative part, they become familiar with the software and enjoy working in a team.

Connecting to the PEAT model

- **Pedagogical:** using coding for teaching.
- **Ethical:** the student becomes familiar with the use of Open Source Software.
- **Attitudinal:** create a willingness towards coding and ICT as a learning tool.
- **Technical:** Familiarisation with coding and programming.

Using technology for statistics and record keeping - University of Limerick

While there is a belief that young people have a wide range of skills in technology, in reality they often possess a very narrow range of skills and knowledge of specific software applications. As teacher educators we have been surprised by our students lack of skills in the area of spreadsheet design and manipulation, which we believe is an important technical skill needed by teachers to handle student data such as test scores, attendance etc. which can then be subsequently analysed to see if there are issues that the teacher

needs to address. To that end we introduced an activity for our student teachers where they were provided with a sample data set from students that included tests scores and other numerical data. From this, the students were required to explore and complete various tasks in order to develop their skills in manipulating data of this sort and gaining information on it.

Connecting to the PEAT model

- **Pedagogical:** Helps develop a student teachers understanding of how software such as Microsoft Excel can be integrated into the classroom
- **Attitudinal:** Can help improve teachers understanding and help position ICT as part of teaching
- **Technical:** Helps improve teachers' understanding of spreadsheet software and its potential use in their classrooms.

Viva-application to link theory and practice - University of Oslo

The University of Oslo has developed an application for mobile devices intended for student teachers to record sequences of their teaching practice in schools. The application is in accordance with the European GDPR and is therefore following strict rules and regulations on privacy when it comes to saving content and processing data.

Connecting to the PEAT model

- **Pedagogical:** the student teachers are using authentic videos of their own teaching practice to reflect on pedagogical issues in their teaching together with a teacher educator on campus and their supervisor at the practice school.
- **Ethical:** use of videos and filming students involves strict ethical privacy rules and before the student teachers are allowed to use the VIVA-application they need to attend a course on ethics and the use of the app.
- **Technical:** The student teachers use the VIVA app to record their teaching during placements in schools. The recordings are sent to a secure server on campus.

Web design - University of Malta

At the University of Malta student teachers are taught how to design a website making use of readily available platforms such as Wix. In the process students are guided through various implications underlying web design across the various dimensions of educational implications according to content and levels of interactivity through blogs, fora and the employment of other social media. While the required technological aptitudes are not difficult to overcome, still the student teachers must take note of the nature of available digital tools. They also have to learn how much they can articulate content and requirements with technique and ultimately how well they can make use of the technology available to facilitate the learning process. Student teachers either design a personal website that can be used as a platform to launch them professionally or they design a

website which is more related to the subject content. In this case a focus is placed on various attributes that include ways that go beyond the relay of content, to flipped situations where student teachers are taught to facilitate discussions and how to organise and enhance student participation. As an example, web design was provided for students who were being taught the implementation of digitally mediated learning for Science education. Much like the Scientific Method, the design process involves coming up with a solution to a problem. It involves following a systematic series of steps to come up with a plan, and then to implement that plan to completion.

Thus, the following criteria are set.

A. Discover:

- 1) When creating a web page, what might be part of the “discovering” process?
- 2) How might this be different if one is developing a personal page or else for someone else?
- 3) What information is required before starting a project?
- 4) How is the importance of information discerned and classified?

B. Design:

- 1) In this sense, design means creating a “rough draft” of a website. How might it be beneficial to the, the developer to create a rough draft before actually developing the page.
- 2) How might the design of a web page appeal to an audience? Might there be anything on a web page that could distract the audience?
- 3) From one’s “critique” and knowledge sharing, what will one learn about the overall design and layout of a webpage?

C. Development:

- 1) Learn to focus on the considerations when actually implementing the design.
- 2) What are the benefits of checking links, downloads and compatibility?
- 3) Focusing on the most important part of the development process.

D. Delivery and evaluation:

- 1) Learning the implications for the designer to “deliver” the final product.
- 2) Thinking about the importance underlying the conduct on evaluation.
- 3) Thus, the benefits of the evaluation process.
- 4) How might the public know a web page to be valid and credible? (purpose, audience, validity)

In this example student teachers were taught how to analyse and think on the purpose of the Web Site. They had to ensure that the purpose for the website was clearly planned and eventually stated through the nature and style of the information that would have been included in the website. This was then followed by an impact analysis exercise that was directed to the intended audience to whom the website content was being directed. This subsequently involved knowledge sharing through group discussion where the student teachers discussed their strategy and ultimately if required how things could have been done differently to make the content more evident to the intended audience. Subsequently

this involved the helpful investigation and assessment of the utilised tabs including those “about, about us, author, resources and their credentials, and, how, why and when the website is being updated with the listed date.

Connecting to the PEAT model

- **Pedagogical:** The design of the website is not only directed for the portrayal of subject content but also incorporates sections such as discussion groups and fora that allow students to take a more active role in the teaching and learning process.
- **Ethical:** learning about privacy, copyright, what to present and share, and the implications of Open Educational Resources.
- **Attitudinal:** This can help students learn to contextualise and project their needs according to the content and age groups they will be working in. They will also develop an attitude of reflecting on the nature and quality of the content and what they intend to portray and present.
- **Technical:** Students will learn about screen design, windowing environments, choice of colours, content density refresh rates etc. they will also learn what it means to design a website that works on different screens.

Reflection on the good practice examples

We have presented 20 examples of good practices in teacher education in the DICTE participating institutions. The examples are different in both dimension and approach. Whereas some of the examples include a rather broad approach to using ICT in teacher education, others are more specifically targeted at certain subjects or certain competencies. Furthermore, we have categorised the examples as to which PEAT dimension is the dominant one in each of the examples. Some of the examples deal with all four dimensions (pedagogical, ethical, attitudinal and technical) but have one dimension that can nevertheless be highlighted as the dominant one. Other examples have elements of all the dimensions and are therefore more difficult to place into a certain dimension. In such cases the partner involved has categorized it in the most fitting dimension.

Furthermore, reviewing the lessons learnt from these good practices we can say that while the terms 'good' and 'best' practices are used in relation to technology in teacher education, it can be argued that the use of the term good practice reflects a rather simplistic understanding of pedagogy and educational change. Practices devised in one pedagogical context can effortlessly be transferred to another context. In addition, due to the different work contexts of the project partners, what would be considered 'good' in one setting may not necessarily be as good in another. Therefore, while recognising the value of sharing pedagogical practices, the greatest value of this exercise has been twofold: 1) deepening our knowledge and understanding of the different national and local contexts of the project partners and 2) in raising issues regarding digital competence for further discussion. The project has therefore heightened our awareness of the importance of the institutional setting and how the norms and practices influence responses to digital competence within teacher education in different contexts.

Recognising the unique contexts of all the project partners raises questions about the transferability of the shared practices. To help organise the examples of practices, as to increase their accessibility and use by other teacher educators, we considered several ways in which the examples could be organised. We considered organising them including 1) the scale of the pedagogical change, 2) the type of technology used (for example, whether it used a plugged or unplugged example) or 3) whether the example required specialised software or commonly used and available technologies. Having discussed this within the project group it was decided to categorise the examples by the PEAT model - highlighting whether the example drew on Pedagogical, Technical, Ethical or Attitudinal dimensions. This also has the added value of providing examples of each of the strands of the PEAT model to further substantiate the model.

In presenting these examples however it is important to highlight that they are not presented as examples to be used 'off the shelf' but rather they should be seen as examples of practice that should be used to inspire and challenge teacher educators to consider how these examples could influence their practices. Therefore, the models presented here are first and foremost meant to inspire teacher educators to reflect on their own practice and to open further professional dialogue on digital competence in teacher education.

It is interesting to see that the five institutions focus on common aspects with regards to developing student teacher's digital competence by providing opportunities through lectures to acquire new knowledge on current themes covering multiple dimensions of the PEAT model. Even though some of these activities are not directly transferable to their teaching activities when in placements in schools, the pedagogical benefits are however immense.

Particularly, in the case of Norway as digital competence is considered as one of five basic skills to be integrated with the competence aims of all school subjects in compulsory education (Norwegian Directorate for Education and Training, 2012), it is pertinent that information is given about the Norwegian curriculum requirements in integrating digital competence in school subjects through lectures /online modules and courses and workshops at OsloMet and University of Oslo.

At the University of Valencia following the guidelines of the "Manuel Sanchis Guarner Center for Education and Quality" which is dedicated to continuous training in innovation and digital competence, all activities are task based and focus on providing knowledge about specific software applications and building skills with peer interaction. The underlying aim is that student teachers make use of these skills and their knowledge in their practice teaching.

The majority of the participating institutions provide student teachers opportunities to become familiar with specific software applications through individual and group activities. These are for example software on coding and programming through which student teachers get the chance to develop their ICT skills via hands on training.

Most of the good practices introduced here can be connected to all of the four dimensions in the PEAT model. A few of the practice examples state specifically that the student teachers get the opportunity to directly use them in their placement in schools. Others are directly related to student teachers practices but it is up to each and every student or practice teacher whether they get the opportunity to try them out in practice.

Further, we see that within the pedagogical dimension (P) all ten practices are designed according to a certain pedagogical approach and most of them have clear connections to the ethical dimension (E) and teachers and student teachers' attitudes (A) to the technology and methods used is prerequisite for good integration of technology in teacher education. Finally, all of the examples demand a certain access to and knowledge of technical tools/software (T)

What we clearly see is that most examples were categorised as having the pedagogical aspects as the dominant one, whereas the ethical dimension is the dimension with the least examples. Whether this has to do with the lack of awareness of the ethical dimension in teacher education in general is too early to say. However, we can see similar results in a research where teachers were asked during the COVID-19 outbreak to elaborate on their online teaching where their answers were categorised by the PEAT model (Gudmundsdottir & Hathaway 2020).

In Table 1 we see a synthesis of the various examples from the different universities and the dimensions they address. Note: P, E, A, and T stand for the four dimensions in the PEAT model. Also, P stands for included aspect and O for aspect not included.

Table 1 Synthesis of good examples across universities

	Oslo Metropolitan University	University of Oslo	Universidad de Valencia	University of Malta	University of Limerick
PEDAGOGICAL DIMENSION					
<u>Ex.1</u>	Minecraft Educational Edition (MEE) in Social Studies (task based). P: P E: P A: P T: P	Professional digital competence modules on Canvas LMS (integrated modules / discussion). P: P E: P A: P T: P	Virtualizing reality (Google maps/QR Code) (task based). P: P E: P A: P T: P	Game based Learning using hand-held devices (task based). P: P E: O A: O T: O	Developing critical media literacy by interrogating alcohol advertisements (lecture / analysis). P: P E: P A: O T: O
<u>Ex. 2</u>	Multimodal text book: use of tablets (lecture / task based). P: P E: P A: P T: P	Flipped learning in teacher education (assignment / group work) P: P E: O A: P T: P	Educational documentaries using video editing software) (task based). P: P E: P A: P T: P		
<u>Ex.3</u>	Digital Competence for teacher educators (CDP) (lecture / discussion). P: P E: P A: P T: P		Recreating the past with photographic resources: Historypin (task based). P: P E: P A: P T: P		

ETHICAL DIMENSION

<u>Ex. 1</u>	Cyber ethics (lectures). P: P E: P A: P T: P	Digital responsibility (cyber-ethics) in practice placements (lecture /assignment /discussion). P: P E: P A: P T: P		Using the Internet (discussion). P: O E: P A: O T: O	Developing critical digital citizenship (lecture/tutorial). P: O E: P A: P T: O
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ATTITUDINAL DIMENSION

<u>Ex. 1</u>				Digital Storytelling (discussion, lecture and task-based). P: P E: P A: P T: P	Unpacking the complexity of privacy in an online age (lecture/discussion). P: O E: P A: P T: O
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TECHNICAL DIMENSION

<u>Ex. 1</u>		Viva-application to link theory and practice (task based). P: P E: P A: O T: P	Using Scratch (Open Source Software) for educative tutorials (task based). P: P E: P A: P T: P	Web designing using Wix (task based). P: P E: P A: P T: P	Developing student teachers' abilities to use spreadsheet for statistics and record keeping (task based). P: P E: O A: P T: P
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Replicating or re-interpreting across institutions

On reflecting on the sharing of good practices there are a number of issues that have emerged from this project.

The first relates to the variety of strategies employed and the range of interpretations of digital practices in the different teacher education institutions. While it could be argued that the diversity could be seen as unhelpful, instead it highlights the diversity of affordances provided by digital technologies in teaching and learning and the many different ways in which it has been harnessed.

Therefore, while reflecting on the examples of good practices proposed by the different partners and analysing their capacity to be replicated or adapted to the different universities some parameters must be considered.

- 1) the very structure of the different curricula is an element that facilitates the implementation of these practices in their contexts and, at the same time, can make it difficult to adapt them in others.
- 2) environmental conditions are fundamental to understanding the applicability or otherwise of a proposal. We are referring, fundamentally, to determining factors such as the *ratio* of students per classroom, the versatility of the work spaces and, of course, the technological capacities of both study centres and students themselves.

At the University of Valencia for example the high number of students per classroom, which together with somewhat obsolete technological facilities (old computers, some problems with the Wi-Fi-network, outdated software) creates problems for working in the classroom and in many cases BYOD solutions are chosen. However, we would like to emphasise that many of the good practice examples do not require large technical implementations and are useful in developing digital competence by our student teachers as well as among the teacher educators – faculty staff. The examples can further be used by student teachers in their own practical training during placements in schools.

Another reflection that emerged from our reading of the other practices was the extent to which technology in teacher education in for example Ireland lacks a strategic and guiding framework. In Ireland teacher education providers are given a significant level of autonomy in relation to how digital practices are integrated into teacher education. Digital practices are therefore determined by the level of expertise of the institution, their level of resources and their level of interest and commitment to the issue. While there are moves to provide greater specificity for teacher educators in Ireland in relation to digital technologies, there remains a lack of guidance that would ensure that all qualifying teachers have addressed the range of competencies outlined in the PEAT framework devised by this project.

The University of Limerick team have ensured that the PEAT framework has informed more recent national guidelines to teacher educators issued by the Department of Education and Skills but the extent to which these will result in a shared understanding of the different dimensions of teachers' professional digital competence amongst teacher educators in Ireland remains unknown.

At the University of Malta we believe that from the examples of the other partners there are always new milestones that can be achieved. Yet within the contextual limitations found in the curriculum not all are applicable at least in the short term. With this in mind and again from what this project is revealing for Malta, an important aspect on which we feel that we need to work on further is the ethical dimension in the PEAT model.

In short, the University of Valencia is proposing a set of very interesting examples and most of them with possibilities of application in various educational context, even if they have to be slightly modified and adapted to the educational reality, local context and teaching needs in each country.

The Oslo Metropolitan University and the University of Oslo both have strong emphasis on cyber-ethics and digital responsibility in their teacher education programs. Providing some of the examples in the DICTE has been rewarding and we have realised that we are fortunate that we have rather strong institutional, local and national guidelines which include digital competence and digital responsibility in official guidelines and curriculum. At the same time, we have learned a lot from our partners on various other aspects of digital competence in different settings, what the challenges and opportunities technology bring to teacher education, the value of team effort and sharing of practices across borders.

Yet another reflection is with regards to the ethical dimension. The depth of the treatment of cyber-ethics by some of the other project partners has helped us to reconceptualise how we address this issue in our teacher education programme and has helped to initiate wider conversations about what it means to be a 'competent' teacher in the 21st century. The evolving nature of cyber-ethics means that this is not a topic that can be pinned down and tightly defined but rather an ongoing evolving practice that teacher educators must constantly interrogate.

It is useful to divide the good practice examples into two groups: those of a more general nature and related to the attitudinal dimension in which elements such as cyber-ethics and cyber-security are fundamental. These examples are related to major issues such as: responsible use online, cyber-bullying, data protection, protection of children on the Internet etc. Many of these themes are already being worked on in Spain and Norway (Gudmundsdottir et al. 2020), especially those related to harassment on Internet and cyber-bullying. Although much remains to be done in the field of digital responsibility and the proper use of the Internet as a source of safe and reliable information, both in the personal and professional arenas. Examples from the University of Limerick also include critical awareness and in Malta on the use of the Internet.

Admittedly cyber ethics is a very intriguing, evolving and multifaceted concept that has surfaced as being quite absent from the student teachers in Malta. Greater awareness

towards this aspect is needed from underlying cyberbullying that may start from a seemingly inconspicuous unwanted tag on social media to conscious and persevering pressures on vulnerable individuals. At the multiplier event in Malta the project team included other professionals from NGOs and other related governmental institutions insights into the meaning and awareness of the implications of cyberbullying and online harassment.

The same applies to the use of the learning process connected to flipped classroom where the teacher educator changes his/her role from the source of information to mentoring and facilitating the learning process of the student teachers. This is similar to what is pointed at in the example of Digital Storytelling where the learners are creatively becoming their own creators and administrators of content and thus enhancing awareness towards privacy, who should be in the photographs taken and also the importance of consent. An important aspect in this case is also directed towards issues of creative commons, the implications of OERs, what cannot be reproduced and what can be reproduced for educational purposes.

Yet another dimension which is more instrumental or technical in nature can be related to national preferences for a particular software (such as Minecraft) or LMS platform (Canvas). However, any software that provides training possibilities of our student teachers should be embraced no matter which software or technological platform is used. It is rather the pedagogical or attitudinal dimensions that should be highlighted rather than which technological platform is used. Having said that it is important for student teachers to be able to get acquainted with various programmes so that they can choose what best fits their purpose for the particular lesson which is planned.

Aspects such as Digital Storytelling or Game based Learning have been a part of teacher education in all the countries for a while and examples connected to Flipped learning in teacher education have become more necessary than ever in the current COVID-19 context, and there are strong indications that the future of teaching will turn more to flipped or blended models.

In the case of Geolocation and use of Google maps we are presenting a case which is subject specific to primarily geography or history. Research shows that teachers and students segregate between the use of digital tools in personal and professional life but this example inspires the transfer between contexts. The student teachers in Valencia benefit from the familiarity of their mobile phone and avail themselves of its ability to read and also generate QR codes which can then be employed in the teaching and learning of a particular subject. In this case student teachers can familiarize themselves with a technology that besides converging personal and professional aptitudes they also realise the potential underlying this device including the ability to take and edit photos and videos, do podcasts, employ QR coding, creatively integrating digital storytelling in the teaching and learning of geography.

Summing up the sharing of practices in the DICTE project, it has highlighted the need for a similar exercise amongst teacher educators in the participating countries to advance the digital education agenda locally. This is perhaps the greatest outcome for us as teacher educators from this sharing of practice.

Further reflection on the shared good practice examples

Reflection on good practices from the University of Valencia (UV)

When reflecting on the examples of good practices proposed by the different partners and analysing their capacity to adapt to our university (University of Valencia), some previous parameters must be considered.

Firstly, the very structure of the different curricula is an element that facilitates the implementation of these practices in their contexts and, at the same time, can make it difficult to adapt them in others. Secondly, environmental conditions are fundamental to understanding the applicability or otherwise of a proposal. We are referring, fundamentally, to determining factors such as the *ratio* of students per classroom, the versatility of the work spaces and, of course, the technological capacities of both study centres and students themselves.

One of the main problems at the University of Valencia is the high number of students per classroom, which together with somewhat obsolete technological facilities (old computers, some problems with the Wi-Fi network, outdated software) creates problems for working in the classroom and in many cases BYOD solutions are chosen. However, we would like to emphasise that many of the proposals do not require large technical implementations and are very useful both in the digital teacher training of our students and in the training of their skills as digital citizens.

It is useful to divide the proposals into two groups: those of a more general nature and related to attitudes in which elements such as cyberethics and cyber-security are fundamental, with all the elements related to these two major blocks: cyber-bullying, data protection, protection of children on the Internet, etc. Many of these elements are already being worked on in the Spanish environment, especially those related to harassment on Internet and cyber-bullying, although much remains to be done in the field of digital responsibility and the correct use of the Internet as a source of safe and reliable information, both in the personal and professional arenas.

Others are more instrumental in nature and are sometimes related to national preferences for a particular software (such as Minecraft) or platform (Canvas). However, any software that provides possibilities in the training of our students should be considered and whatever the platform chosen is very interesting the idea of teaching students to develop their own LMS. More general concepts such as Digital Storytelling or Game based Learning have been working very well for a long time in Spanish educational environments and we have outstanding examples in almost all educational levels.

Finally, proposals such as Flipped learning in teacher education have become more necessary than ever in the current context, and everything indicates that the future of teaching lies there, at least in the short term. In short, a set of very interesting proposals and most of them with possibilities of application in our educational context, even if they have to be modified and adapted to our educational reality and our teaching needs.

Reflection of good practices from the University of Limerick

On reflecting on the sharing of good practices there are a number of issues that have emerged from our perspective. The first relates to the variety of strategies employed and the range of interpretations of digital practices. While it could be argued that the diversity could be seen as unhelpful, instead it highlights the diversity of affordances provided by digital technologies in teaching and learning and the many different ways in which it has been harnessed.

The depth of treatment of cyber-ethics by some of the other project partners (chiefly OsloMet) has helped us to reconceptualise how we address this issue in our teacher education programme and has helped to initiate wider conversations about what it means to be a 'competent' teacher in the 21st century. The evolving nature of cyber-ethics means that this is not a topic that can be pinned down and tightly defined but rather an ongoing evolving practice that teacher educators must constantly interrogate.

Another reflection that emerged from our reading of the other practices was the extent to which technology in teacher education in Ireland lacks a strategic and guiding framework. In Ireland teacher education providers are given a significant level of autonomy in relation to how digital practices are integrated into teacher education. Digital practices are therefore determined by the level of expertise of the institution, their level of resources and their level of interest and commitment to the issue. While there are moves to provide greater specificity for teacher educators in Ireland in relation to digital technologies, there remains a lack of guidance that would ensure that all qualifying teachers have addressed the range of competencies outlined in the PEAT framework devised by this project. The UL team have ensured that the PEAT framework has informed more recent national guidelines to teacher educators issued by the Department of Education and Skills but the extent to which these will result in a shared understanding of the different dimensions of teachers' professional digital competence amongst teacher educators in Ireland remains unknown.

This project, and specifically the sharing of practice, has highlighted the need for a similar exercise amongst teacher educators in Ireland to advance the digital education agenda. This is perhaps the greatest outcome for us as teacher educators from this sharing of practice.

Reflection on good practices from the University of Malta

When reflecting on the practices utilised by the other Universities, we at the University of Malta believe that from the examples of the other partners there are always new milestones that can be achieved. Yet within the contextual limitations found in the curriculum not all are applicable at least in the short term. With this in mind and again from what this study is revealing for Malta, an important aspect on which we feel that we should do more is that of Cyberethics as expressed at OsloMet.

Admittedly cybernetics is a very intriguing, evolving and multifaceted concept that as already expressed has surfaced as being quite absent from our students' conscious

knowledge. In this case I think that it is appropriate if awareness towards this aspect is raised within our student teacher cohort. Again, there are diverse aspects which can be tackled starting from the meaning underlying cyberbullying that may start from a seemingly inconspicuous unwanted tag on social media to conscious and persevering pressures on vulnerable individuals. Likewise, to what Oslomet is doing, we at the University of Malta can outsource ourselves and similar to what we did in our multiplier event include other professionals from NGOs and other related governmental to explain the true meaning of and enhance awareness of the implications underlying cyberbullying

Cyberethics should also play an important aspect on how teachers should exemplify the identification, processing and eventual reproduction of material which has been accessed online. In our lectures a considered aspect in the discipline of digital mediated learning is the way a teacher changes his/her role from the source of information to mentoring to facilitating the learning process and similar to a flipped classroom situation the students themselves become the promoters and consumers of new knowledge. Yet in the process like we do in Digital Storytelling where the learners are creatively becoming their own creators and administrators of content it is very important in enhancing awareness towards privacy, who should be in the photographs taken and also the importance of consent. An important aspect in this case is directed towards issues of creative commons, the implications of OERs, what cannot be reproduced and what can be reproduced for educational purposes.

Another important aspect which in this case is more subject specific is the employed practice of VR in geolocation by the University of Valencia. At the Faculty of Education, the integration of ICT within our courses transcends from a generic to a more specific approach in the subjects. An example is that of initial teacher training in the teaching of geography. In this case it is very interesting on how we can employ geolocation principles and make better use of Google maps. Research shows that teachers and students segregate between the use of digital tools in personal and professional life. There is also the tendency that comparatively, aptitudes towards the employment of digital tools and applications in private spheres are not that fluently transferable within formal educational contexts. It is therefore believed that by what is being done at the University of Valencia, students following initial teacher education can benefit from the familiarity of their mobile phone and avail themselves of its ability to read and also generate QR codes which can then be employed in the teaching and learning of Geography. Incidentally an important yet ignored 'C' in 21st century skills is 'Convergence'. In this case students will familiarize themselves with a technology that besides converging personal and professional aptitudes in one device they will also realise the potential underlying this device including the ability to take and edit photos and videos, do podcasts, employ AR and QR coding, creatively integrating digital storytelling in the teaching and learning of geography.

Reflection of good practices from the University of Oslo and Oslo Metropolitan University ICT in Norwegian education has been on the curricular agenda for decades. When reflecting on the practices shared by the other partners, there are a number of issues that have emerged that have acted as inspiration for our own practice.

While digital competence is a central element of course descriptions in teacher education in Norway, it is also included as an integral part of the different subject areas in teacher education programmes. To directly import “good practices” from other teacher education programmes at an institutional level is however challenging. Such processes demand adaptation to existing course description and learning activities and it takes time. We also experienced in the DICTE project that implementation of practices across different subjects is highly dependent on personal relationships between faculty staff in the different institutions. Nevertheless, the good practice examples have directly inspired our teaching practices in different subjects where we, the project participants, were directly involved.

One example of importing practices is of the presentations and discussions and perspectives on critical literacy in the different institutions. This has resulted in incorporating these examples, reflections and discussions in Cyberethics teaching at OsloMet and the University of Oslo. Moreover, rather than highlighting one example, it is important to underline the effect that the practices have had overall. While personal practice is an immediate change, institutional changes is something that takes longer time and will gradually affect professional development and professional digital competence of the faculty staff.

During a project meeting in Limerick, we were introduced to an ongoing project at the Faculty of Education that aimed at developing and training student teachers’ skills in classroom management. The activities were organised in a blended and virtual environment: student teachers, physically present in a classroom, was interacting with avatars representing pupils in a virtual classroom setting. The student teachers interacted with the virtual environment through a large display. The avatars, controlled by an actor displayed various forms of pupil behaviour, which presented challenging situations for the student teachers regarding classroom management. This meeting inspired OsloMet to make better use of the possibilities that a 3D simulation environment has to offer in their programme. Teacher education at OsloMet has long experience in using 3D environments (Second Life) in online courses. This has resulted in two teaching activities, one in a Master’s course and one at Bachelor’s level making use of an Open Simulator. Together with Master students OsloMet is developing 3D-based teaching arrangements and learning resources in an Open Simulator aimed at training and preparing student teachers at bachelor level for teaching during school placement. The course has also included literature published by the researchers from the University of Limerick as well as having a guest lecturer from Limerick.

Teachers from the different institutions have also contributed as guest lecturers in each other’s teaching, either through direct exchange or through participating online. With the current situation of increased online teaching we see this as a great opportunity for the continuation of DICTE after the project period in December 2020.

Conclusion

Viewing the examples and the experiences in the project we can clearly claim that *developing ICT in teacher education* (DICTE) is complex and involves many different dimensions. These dimensions have been synthesised in the PEAT model as the pedagogical,

ethical, attitudinal and the technical dimension. Whereas the good examples in this report (04) represent all of the dimension, some of the examples include all of the dimensions and some of the practice examples are concerning several of them and often they are overlapping (for example pedagogical and ethical dimensions, ethical and attitudinal etc.)

While we see clear differences across institutions, the low 'status' of technology in the educational programmes (compared to other areas) are obvious. This appears both as the limited time afforded to technology in the teacher education programmes, the level of 'buy-in' from other faculty members in our institutions and the general lack of commitment and engagement by some faculty staff in digital competence.

Due to the COVID-19 outbreak the majority of teaching activities both in practice schools as well as in higher education (including teacher education programmes) were conducted online in the spring 2020. One may assume that this will influence the emphasis on digital competence and use of ICT in teacher education in the years to come. Also, the importance of replicating or re-interpreting good examples may become a more common practice in teacher education. The levels of applicability and/or transferability to different contexts varies, but the least we hope that these examples can serve as an inspiration to other teacher educators not only in Europe but also in other parts of the world.

The realisation and presentation of the good practices to colleagues of other universities of the project, together with the reflection about their own proposals further stimulates some general reflections. First of all, the differences in methodological approaches and structures of education plans in each partner country are evident, but the problems we face in teaching digital competence to student teachers are common and cross borders. Beyond nationality and some specific characteristics, our students face a fast-changing environment in which it is not a matter of learning certain programmes but of acquiring skills that will enable them to successfully face significant structural changes in educational practices.

Secondly, it is clear that public policies to invest in and support educational programmes vary across the countries. However, we consider them as more necessary than ever, because of digital divides and other structural differences in use, access and competencies. This includes not only differences determined by age but by more often than not the economic resources of families. This can quickly lead to educational models at different levels depending on the economic capacity and technological training of students and their immediate environments. We have already seen the first signs of such divides caused by the COVID-19 pandemic and its impact on education.

Thirdly, the development of PEAT Model has provided a deeper understanding and a more specific vision of what digital competence for student teachers and teachers in general includes, making it an easily applicable model that addresses many of the gaps we have seen in previous models (McGarr & McDonagh, 2019).

Finally, it is important to highlight how DiCTE Project has contributed to having a greater perspective of what is done in other parts of Europe, to strengthen academic ties with other institutions from which we can learn many methodologies and ways of working and, of course, to improve our teaching practice by trying to implement examples from other

institutions in our own teaching. Open cooperation and communication with other universities, work in multinational teams and the possibility of exchanging experiences and ways of work contribute to improving the teacher education and training of our student teachers and offers them a broader and more complete view of their academic and teaching profession.

The majority of the examples show connections to all the four PEAT dimensions. This not only validates the use of good practices in the participating teacher education institutions, but also strengthens the fact that from a pedagogical perspective, practices involving most or all the four PEAT dimensions are actively integrating ICT in classroom practices within a broad perspective of skills.

We gain a greater understanding of our own situation through these comparisons and are motivated to learn from practices prevalent in other institutions. As the examples are shared first-hand by the project-members, the issue of quality assurance of the information increases. These are tried examples and can be integrated with ease. Furthermore, the researchers in the DiCTE project who were involved in framing the PEAT model have identified the examples in their corresponding dimensions.

By comparing policies regarding practices for ICT integration between and across countries—we also get an overview of what works towards enhancing student teachers' understanding of the four different PEAT dimensions. This process of review provides us with two notable agendas. The first is ongoing work to develop meaningful 'practices' in terms of their duration, usability and mode of teaching. The second is the aspiration to promote internationally tried examples to fulfil an ever-growing demand for new ICT policies and accommodating new technologies.

By widening our perspectives and providing new inputs for better technology integration and use, we can work on recreating and reinventing practices for ICT integration in teacher education. We sincerely hope that the presented examples in this report will prove to be useful to our colleagues in other teacher education institutions.

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Appendix I

Good practice University of Valencia – Geolocation and QR codes

1. University, institution/level/group/subject/cross-disciplinary
University of Valencia / Faculty of Teacher Training / Bachelor
2. Technology used in the practice example
With this practice, students acquire geolocation knowledge by locating the referenced points on a map and learning how to enter information about them (Google Maps). In addition, they become familiar with the use of QR codes and their possibilities (QR Code Generator) and, finally, they learn the basics of editing pages and blogs on the Internet (Wix / Wordpress / Blogspot / Blogger).
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)
a) Pedagogical: using and knowing different tools
b) Ethical: learning about privacy and copyright on Internet.
c) Attitudinal: using Internet resources for learning
d) Technical: Familiarisation with different tools
4. Experience when using the practice example:
The students feel really involved in that kind of practices, because they felt not only acquiring knowledge, but useful skills for their academic and personal life.

Good practice University of Valencia – Scratch tutorials

1. University, institution/level/group/subject/cross-disciplinary
University of Valencia / Faculty of Teacher Training / Bachelor
2. Technology used in the practice example
With this practice, students create short tutorials for Primary students using Scratch.
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)
a) Pedagogical: using coding for teaching
b) Ethical:
c) Attitudinal: create a willingness towards coding and ICT as a learning tool
d) Technical: Familiarisation with coding and programming
4. Experience when using the practice example:
At first students are a little worried about the idea of coding and programming, but gradually, through the development of the creative part, they become familiar with the software program and enjoy working in a team.

Good practice University of Valencia – Documentaries

1. University, institution/level/group/subject/cross-disciplinary
University of Valencia / Faculty of Teacher Training / Bachelor
2. Technology used in the practice example
<p>With this practice, students acquire knowledge in image, video and audio editing by creating short documentaries based on interviews and reports on different problems related to the Spanish educational system. In addition, they are approaching to the basics of audiovisual communication, which is so important today.</p> <ul style="list-style-type: none"> - Video editing software as iMovie/Final Cut/Adobe Premiere/Vegas Pro,... - Audacity or similar sound editor
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)
a) Pedagogical: using audiovisual narratives as a way to learning and do a didactical transposition of a content using the cinematographic language.
b) Ethical: the practice also serves to reflect on the use of the image in the making of the message and development of citizens' skills based on the development of a comprehensive audiovisual resource.
c) Attitudinal: other forms of storytelling are explored and the importance of audiovisual products in education is reflected.
d) Technical: using and knowing different video and sound editor tools for elaboration of a complex audiovisual discourse.
4. Experience when using the practice example:
Students initially feel somewhat overwhelmed by the complexity of the process in its three phases: pre-production, production and post-production, but as they advance in the project they turn it into something personal that connects them to their most immediate professional and personal reality, which generates great satisfaction and emotions when they experience the final result.

Good practice University of Valencia – Historypin and photographic resources

1. University, institution/level/group/subject/cross-disciplinary
University of Valencia / Faculty of Teacher Training / Bachelor.
2. Technology used in the practice example
Historypin for the work with photographic resources for the comparison between the past and present. Students use documents from the family past (pictures, videos...) to make comparisons between the past and the present using the Historypin app.
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)
a) Pedagogical: the tool allows you to compare images and resources from the past and the present, inserting a complex description of each record.
b) Ethical: use of documents from the past allows the development of skills that have to do with valuing the historical environment and family heritage, as well as respect for autochthonous traditions and culture.
c) Attitudinal: the description of complex elements of photographs and elements of the past, allows the development of fundamental descriptive and analytical capabilities.
d) Technical: work with cartography and insertion of elements on a map.
4. Experience when using the practice example:
This practice helps students to connect present and past and to recover the memory of spaces and places, which makes historical and literary learning accessible and close and gives it an important emotional component, especially when working on the closest and most familiar spaces.

Good practice University of Limerick – Statistics and record keeping

1. University, institution/level/group/subject/cross-disciplinary
University of Limerick/Teacher Education/
2. Technology used in the practice example
Laptops/desktop PCs and Microsoft Office Excel or equivalent spreadsheet software. Developing student teachers' abilities to use technology for statistics and record keeping
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
While there is a belief that young people have a wide range of skills in technology, in reality they often possess a very narrow range of skills and knowledge of specific software applications. As teacher educators we have been surprised by our students lack of skills in the area of spreadsheet design and manipulation, which we believe is an important technical skill needed by teachers to handle student data such as test scores, attendance etc. which can then be subsequently analysed to see if there are issues that the teacher needs to address. To that end we introduced an activity for our student teachers where they were provided with a sample data set from students that included tests scores and other numerical data. From this, the students were required to explore and complete various tasks in order to develop their skills in manipulating data of this sort and gaining information on it.
a) Pedagogical: Helps develop a student teachers understanding of how software such as Microsoft Excel can be integrated into the classroom
b) Ethical:
c) Attitudinal: Can help improve teachers understanding and help position ICT as part of teaching
d) Technical: Helps improve teachers understanding of spreadsheet software and its potential use in their classrooms.
4. Experience when using the practice example:
The students individually are asked using formulas to calculate the average mark for each student in a class, calculate the average mark for both male and females in the class and to then calculate the average mark for the entire class. The final part of this workshop gets the student teachers to create their own formula that will convert percentages in the class into grades from A to F.
6. Tags/keywords

Good practice University of Limerick – Critical digital citizenship

1. University, institution/level/group/subject/cross-disciplinary
University of Limerick/Teacher Education
2. Technology used in the practice example
Delivered as a lecture to students, technology used include display technology and PC. Developing critical digital citizenship
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
<p>In a recent paper by Emejulu and McGregor (2019) they put forward the idea of <i>radical digital citizenship</i>. They define this as, 'a process by which individuals and groups committed to social justice critically analyse the social, political and economic consequences of digital technologies in everyday life and collectively deliberate and take action to build alternative and emancipatory technologies and technological practices' (p. 140).</p> <p>To respond to this need we have introduced a project into the student teachers' digital technology module that aims to teach the student teachers about the social, environmental and economic effects of unsustainable practices in the digital technology industry. The unit consist of one large face-to face lecture, a two-hour tutorial and an online web-based tutorial completed by the students individually. The unit teaches the students about the exploitation of natural resources in developing countries to source materials for technology products, the exploitation of workers involved in the manufacturing of digital technologies and the unstainable practices of developing and marketing new technology innovations to maintain a constant demand for products. On completion of the lecture, tutorial and web-based material the students then create a video to show what they have learned themselves on the subject and the overarching aim of the video is to inform younger pupils when on school placement and further into their careers. In this way the task not only revises the content for them, but it also gets them to consider their roles as educators.</p> <p>At its heart, this learning unit aims to challenge the simple and naïve notion that technological development can progress unchecked and that any issues related to sustainability and environmental impacts can be addressed through technological and scientific advancements (Knutsson, 2018). As Hornborg (2009) notes, the high level of technological consumption enjoyed in the wealthy areas of the globe results in negative impacts of the environment and society in poorer areas. In essence, environmental destruction is outsourced to poorer areas – where so called 'technological solutions' will not address this fundamental inequality. By highlighting this fallacy, this learning unit challenges the techno-utopian myth that students have been exposed to throughout their lives in relation to digital technologies.</p>
a) Pedagogical -

b) Ethical – This develops the student teachers ethical understanding in the area of critical digital citizenship.

c) Attitudinal – This can challenge the student teachers’ current beliefs and knowledge in the area of critical digital literacy.

d) Technical

4. Experience when using the practice example:

Students enjoy the lecture. They feel more aware of current issues and begin to question where items that they take for granted have come from. They are more aware of the origin of the resources of items they use in their everyday lives.

Good practice University of Limerick – Unpacking online privacy

1. University, institution/level/group/subject/cross-disciplinary
University of Limerick/Teacher Education
2. Technology used in the practice example
Delivered as a lecture to students, technology used include display technology and PC. Unpacking the complexity of privacy in an online age
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
<p>With access to mobile phones and cameras, students often use their cameras and recording devices to capture everyday events, however many are not aware of the issue of privacy and how this needs to be considered in a media-rich age. In order to raise the students' awareness of privacy and the issues it raises when using mobile devices, this example details how using a form of Socratic dialogue in large lecture settings can problematise everyday experiences of students and raise issues of privacy for the students to consider.</p> <p>This activity begins with showing a picture of a famous national celebrity that the students can relate to (and one that they would be likely to photograph) in a large lecture setting or classroom. When this image is shown on the screen the students are asked the question, 'if you saw this person walking down the street what would you do'. Options can be provided to the students, such as 'say hello', 'take a picture and send to my friend', 'ask for a selfie', or 'ignore them', but these are not necessary as the students are likely to mention these. Most students are likely to indicate that they would take a picture and send it to a friend. Having identified this as the typical response then the conversation shifts to 'do they not have a right to privacy?' This discussion can be led to enable both sides of the argument to be sustained. Some will argue they are a public figure and hence can be photographed, others will oppose this. Issues of 'being in the public eye', are likely to emerge and from this but when it is related back to the students own experiences they may also recognise the need for privacy for all people. This debate will untangle the complex issues surrounding privacy. For example, when is a person in the public eye and when are they not? Is it ok to picture a president at government building but not at the gym when they are working out? What if they were engaged in illegal or unethical behaviour? Is it permissible to take photos sometimes and not at other times? In this way the 'black and white' nature of privacy can be interrogated. The ultimate goal of this exercise is to problematise our day-to-day actions with our mobile devices and highlight the complexity of this issue. It should result in students considering their use of mobile devices in capturing images of others and the implications it has for their privacy.</p>
a) Pedagogical -

b) Ethical – This lecture problematises our day-to-day actions and challenges student teachers to reflect on issues such as privacy and also challenges many students to reflect on their current use of social media.

c) Attitudinal – This lecture challenges student teachers attitudes and perceptions around the use of technology in their teaching.

d) Technical

Good practice University of Limerick – Critical media literacy

1. University, institution/level/group/subject/cross-disciplinary
University of Limerick/Teacher Education
2. Technology used in the practice example
Delivered as a lecture to students, technology used include display technology and PC. Developing critical media literacy by interrogating alcohol advertisements
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
<p>Our ability to deconstruct the complex mix of multimedia presented in websites and understanding the message presented to us can be a challenge. This ability to deconstruct these complex media messages is a skill that must be taught to novice users as they may not necessarily understand the way they are being manipulated by the message. Websites are complex messages using a wide range of media and we must educate people to understand the complex way in which websites communicate information and values. This form of literacy is critical media literacy. It is a literacy that can deconstruct the complex media messages so that we can see the true intention of the message presented and the hidden assumptions and values embedded in it. This activity involves the teacher taking a well-known website advertising a product and critically analysing it using 5 key questions, namely:</p> <ol style="list-style-type: none"> 1. Who created the message? 2. What creative techniques are used to attract my attention? 3. How might different people understand this message differently? 4. What values, lifestyles and points of view are represented in, or omitted from, this message? 5. Why is this message being sent? <p>Having understood this process, the students then select a website of their choice and analyse it using these questions. Their analysis is subsequently presented to their peers so that all learners can benefit from the exercise. This experience then aims to develop their ability to critically, rather than passively, consume digital media.</p>
a) Pedagogical – Allows student teachers an opportunity to challenge media with a new set of lenses.
b) Ethical – Introduces student teachers to concepts around advertising that they may not have thought of or understood before
c) Attitudinal –
d) Technical -

Good practice Oslo Metropolitan University – Digital competence for teacher educators

1. University, institution/level/group/subject/cross-disciplinary

Oslo Metropolitan University/Teacher Education/Employees

2. Technology used in the practice example

Canvas is the LMS used for developing and gathering learning resources for the employees. Different types of technology are used, depending on the content of each module.

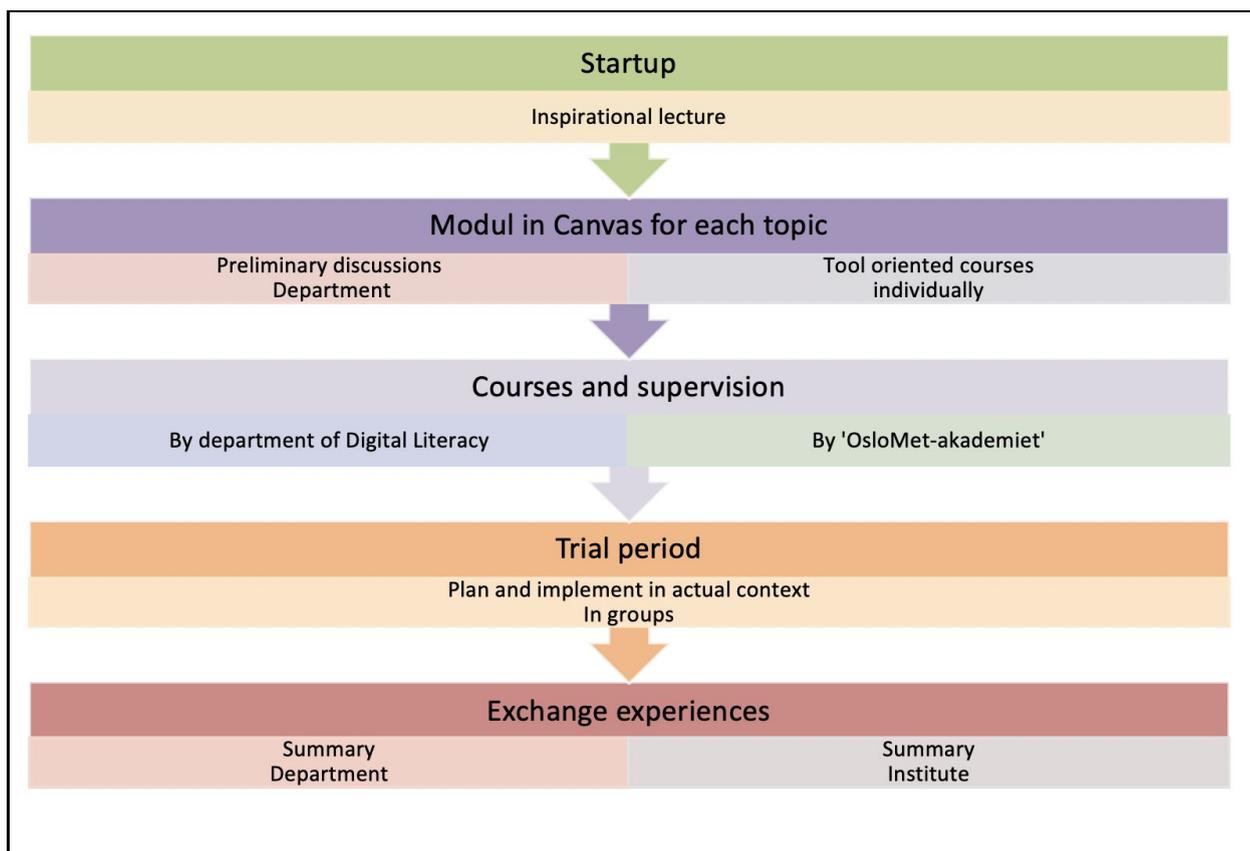
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model

The rationale behind this CPD is that to educate student teachers who are able to fulfill the Norwegian curriculum requirements in integrating digital skills in subjects in school, teacher educators should have a certain insight and skills in using digital tools for learning. The Unit of Digital Competence has developed a 3.5 years plan for developing digital competence for teacher educators. The Faculty of Teacher Education, Department of Primary and Secondary Teacher Education, is organised in units related to different subjects, such as Unit of Social Studies.

One of the challenges is that the employees, as a group, have a very diverse digital competence. Therefore the topics chosen for the program are based on educational topics that all teacher educators are expected to find relevant. The themes and topics selected are based on national curriculum for schools, policy and strategies for higher education and local guidelines and strategies for OsloMet.

Semester	Modules - for all	Modules - optional
Spring 2018	Introduction to Canvas	
Autumn 2018	Collaboration	Flipped classroom
Spring 2019	Assessment and guidance	Programming/coding
Autumn 2019	Digital learning resources	Teaching individual and special needs
Spring 2020	Digital judgment/ethics	Student response systems
Autumn 2020	Research and dissemination	Simulation
Spring 2021	Teaching online	Internationalisation

The organisation of the program is based on already established organisational structures and meeting points such as a monthly staff meeting and meetings for each unit. The idea is that all topics start with an initial lecture that is followed up through the discussions in each unit where the competence and the competence needs are identified. Different types of courses, like general courses, customised courses, and workshops are offered to follow up the individual needs, or the needs of the different units. In addition, an online module that covers the topic and links to technologies, resources and relevant research.



a) Pedagogical: The idea is that each of the modules relates technology to a pedagogical topic. The inspirational lecture aims to provide insight into and examples on educational use of technology.

b) Ethical: One of the modules deals specifically with ethics and legal topics such as privacy and copyright.

c) Attitudinal: The initiative from the management and their commitment to the program itself, signals an attitude towards technology in teacher education. The program aims to give teacher educators insight into different digital resources for teaching and learning. In turn, this might influence teacher educators' attitudes towards the use of digital technologies for teaching and learning.

d) Technical: Relevant digital tools related to each module is presented in Canvas along with instructional videos on practical ways to use them.

4. Experience when using the practice example:

The importance of leadership's role and follow-up.

Good practice Oslo Metropolitan University – Cyber ethics

1. University, institution/level/group/subject/cross-disciplinary
Oslo Metropolitan University/Teacher Education/ 4th-year students
2. Technology used in the practice example
Lectures, guest lecturers and relevant cases and student response systems
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
<p>Two mandatory lectures, one on privacy and netiquette and one on copyright and source awareness.</p> <p>Guest lecturers from:</p> <ul style="list-style-type: none"> • The police, who focus especially on internet crimes, and are used by schools and youth in general to give advice on internet criminality, • The Norwegian Directorate for education and training, presenting resources for schools (You Decide). https://www.dubestemmer.no/en • Independent media organisation that focuses on checking facts (for example related to fake news, current news and debates).
a) Pedagogical: Give student teachers a grounding in how to teach and tackle the legal and ethical sides of behaviour on the internet, as well as an overview of some of the resources that can be used with pupils.
b) Ethical: Copyright and privacy issues as well as netiquette and source awareness
c) Attitudinal: Insight in the legal and ethical aspects of cyber ethics, of using different technologies in teaching and learning, and develop student teachers' awareness of these aspects
d) Technical: different resources (websites)
4. Experience when using the practice example:
Students are active during these sessions.

Good practice Oslo Metropolitan University – Minecraft in social studies

1. University, institution/level/group/subject/cross-disciplinary

OsloMet/ Teacher Education/Bachelor/Social Studies

2. Technology used in the practice example

The use of Minecraft Educational Edition (MEE) in Social Studies for generic and knowledge specific (Social Studies) skills. Student teachers build historical buildings and create a script and a role play where the aim is to contribute to the students (and ultimately pupil's) understanding on how people lived in the past, or political decision processes etc. The role play is filmed (screencast) and presented in class. Student teachers then try out MEE in a school (6th- 7th grade) where pupils recreate historical buildings, create a roleplay that is filmed and discuss this in class. The student teachers are responsible for this session.



3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)

a) Pedagogical: Using MEE as a tool for building historical sites and simulating micro-histories in a specific time period. Problem solving and finding different ways to both create buildings, using different information sources.

b) Ethical: Behaving ethically online, such as not destroying others's buildings,

c) Attitudinal: Towards using games for learning, creative use of technology

d) Technical: Minecraft Education Edition, screencasting tools (screencast-o-matic; quicktime), editing videos, using projector for presenting.

4. Experience when using the practice example:

Student teachers were initially sceptical, especially those who had not previous gaming experience. However, evaluation of the sessions indicated that all students managed to use MEE. The evaluations also indicated that MEE was engaging as a tool for learning history as well as giving them the opportunity for collaborating, problem solving and being creative. To be extended with MakeCode (programming/coding).

<https://www.youtube.com/watch?v=oUpdKCnROig&feature=youtu.be>

Students took over 3 classes. They experienced that the pupils used fewer hours building than they did themselves, and the experience was somewhat chaotic when pupils were finished building.

Good practice Oslo Metropolitan University – Tablets and multimodal texts

1. University, institution/level/group/subject/cross-disciplinary
Oslo Metropolitan University/Teacher Education/Norwegian language
2. Technology used in the practice example
Tablets and the app Book Creator.
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model
<p>The use of tablets in Norwegian schools has often focused on the use of apps to process and present content and to stimulate creativity. A case study exploring pupils' creation of fairytales combined with observations of pupils production of various multimodal texts in school, initiated the idea of designing a teaching experience for student teachers similar to what pupils do at school.</p> <p>These sessions also aim to give the student teachers an example on how to integrate digital tools in different subjects. The teaching session consists of a lecture on the use of tablets in school with some practical examples, a lecture to plan the multimodal book, one day to develop the book. Finally a lecture at the end to present the book to getting feedback from fellow students and the teachers and reflecting on the use of tablets and production of multimodal texts in learning.</p>
a) Pedagogical: Multimodal texts in learning Norwegian (mother tongue)
b) Ethical: Copyright and privacy issues
c) Attitudinal: Integrating 1:1 as a group tool
d) Technical: Book creator
4. Experience when using the practice example:
Student teachers see the value of creating a multimodal text in Book Creator.

Good practice University of Malta - Digital story-telling

1. University, institution/level/group/subject/cross-disciplinary
University of Malta
2. Technology used in the practice example:
<p>Powerpoint (as the most common application found on students' machines) and other online presentation tools are employed. Digital Story-Telling that employs visual and auditory applications are used. In this case, students are instructed to avail themselves of their mobile phones and/or other handheld devices such as tablets as tools for convergence through which they can access various Internet applications, access music, videoclips and take photos and videos that can be used to build up stories including serious stories telling that employs the use of LEGO.</p> <p>Other examples include learning about screen design including Physical and Online Presentations used to build presentation and Web design to enhance student understanding and participation such as the use of Blogs and online polling.</p> <p>Making effective use of Moodle for online courses and applying Fora for student discussions.</p> <p>Programming with LEGO. Understanding the implications of simple coding and sequencing through programming in making a built robot work remotely</p> <p>The eTwinning platform as windows of opportunities and sharing of good practices between students and between students and teachers in different countries are discussed.</p>
3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)
<p>a) Pedagogical: In my courses, I work on various aspects of Digitally mediated Learning. More than the actual technology we try to ensure that students realise the importance of technology to elicit specific traits that are usually taken for granted and rarely assessed. Thus, looking beyond the hardware and/or software employed, the focus is placed on the process whereas students develop the 'other' qualities such as critical thinking, reflection and transforming facts into meaningful knowledge. In the process, technology is employed so that student teachers gain insights into the creation of authentic learning experiences both for themselves in the reality of the school and classroom they are visiting, and, for their pupils in the context of curricular needs and the time constraints of the syllabus.</p>

b) Ethical: Student teachers are made aware of privacy and ethical issues when they come to make use of material developed in the class. Subsequently, real-life situations of employing social media to keep parents and guardians updated on the work kids are doing are discussed. In the process, legal issues are discussed so that the students become aware of what they can record and project for specifically chosen audiences to see.

c) Attitudinal:

d) Technical:

Good practice University of Malta –Digitally Mediated Learning

In my courses I work on various aspects on Digitally Mediated Learning where learning does not only place 'with' technology but 'through' technology. Technology and applications change rapidly but attitudes remain. Subsequently while student teachers on campus are exposed to new digital tools, we can neither hope to stay updated with newly introduced apps nor can schools afford to constantly update to whatever is being introduced. Rather, focus tends to be towards adaptation and enactment principles whereas students are trained to develop pedagogical skills and contextual insights that will enable them to creatively make best use of what they, the school and their pupils have readily available to enhance the teaching and learning processes and also subjectively employ what is best according to the classroom realities that they have to work in.

Thus, more than the actual technology we try to ensure that students realise the importance of technology to elicit specific traits that are usually taken for granted and are rarely assessed. Looking beyond the hardware and/or software employed, focus is placed on the process whereas student teachers develop those 'other' qualities such as critical thinking, reflection and transforming facts into meaningful knowledge which they can relate to. In the process technology is employed so that as part of their initial teacher training education, student teachers gain insights to the creation of authentic learning experiences both for themselves in the reality of the school and classroom they are visiting during their teaching practices, and, for their pupils in context of curricular needs and the mandated time constraints of the syllabus.

Examples to achieve this include thematic approaches to digital story-telling we refer to as Smart-Story Telling whereas students are encouraged to develop teaching and learning resources through the merger of various technologies such as digital photography, extraction of music and sounds and the merger of various media from readily available freeware and modelling such as use of LEGO and Meccano and the presentation in different modalities that enhances logical and computational thinking ultimately giving the opportunity for the students to realise that they learn better when they create and present their own work and products. Student teachers are also taught aspects of screen design and on how to set up various presentations and also given other presentation, developing communication skills on how to explicitly express themselves to get their message through.

In the meantime as the students develop and foster digital literacy skills they are also encouraged to develop their own originality. This is achieved by critically reflecting on how to work together, achieve equilibrium as a group as they work on their final products to present and think out of the box, embracing 21st century skills and facilitating elements of entrepreneurship, specifically those qualities that make us human (Aoun, 2018) preparing our audience for a future AI permeated reality.

Other examples of good practice when it comes on the use of technology students are encouraged to use readily available tools to construct web pages as windows of opportunities for involving their own students. Again they are taught on how to make use of various aspects of webdesign including what to add to it to enhance students participation like the employment of blogs, use of twitter and other social media to empower everyone even those who tend to stay back and talk less during lessons.

We also place focus of gamification and game based learning through the application of LEGO whereas students are shown how they can LEGO to build up logical sequencing in open ended stories. In this case LEGO such as Mindstorms and WeDO finds its use in the teaching of science where scenarios such as programming of robots and how they can be employed for humanity to live on the Moon and Mars are employed.

Other activities include the introduction of students to the eTwinning platform whereas they learn to communicate and share experiences with other fellow teachers and students in other European countries.



Aoun, J (2018). *Robot-Proof: Higher Education in the Age of Artificial Intelligence*. MIT Press, Cambridge US.

Good practice University of Oslo – Professional digital competence on Canvas

1. University, institution/level/group/subject/cross-disciplinary

UiO/ Teacher Education/Bachelor and Master studies

2. Technology used in the practice example

At UiO online modules of PDC have been developed and published on Canvas. These modules are used parallel to campus teaching. The modules are primarily on generic digital competence and addressing issues such as ICT competence in the subjects, digital learning resources, ICT and class leadership, ICT and learning – findings from research. The modules are not obligatory for the student teachers to complete but they are designated to support student teachers' PDC development. They are placed and integrated to match certain weeks of their campus courses and activities. After these weeks the student teachers have open access to the modules and can use the content of the modules as supporting materials during their studies. The structure of the modules is first a short introduction of a theme, then online discussions, reflection questions and group activities.



Figure: Front page of the Canvas PDC modules for Bachelor students

3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)

a) Pedagogical: Making sure all the student teachers get a basic PDC and use of various technological tools in a pedagogical manner as well as PDC as a cross-disciplinary competence.

Example of pedagogical take on PDC is the module on how to teach in a technology rich classroom and hinder pupils' online activities not related to the class or other types of distracting surfing.

b) Ethical: modules on digital responsibility, copyright and privacy rights

c) Attitudinal: Preparing teachers in making PDC an natural part of student teachers' teaching and learning in all subject fields (in accordance with the national curriculum in Norway)

d) Technical: Various educational tools are introduced in the different modules

4. Experience when using the practice example:

The student teachers find the modules useful, but it depends on their prior digital competence to what extent they use the modules. The modules do however support the student teachers to go beyond and expand their current competence and educational repertoires with ICTs. There is a however a need for constant editing the content to fit the latest educational technology and trends. There is also a great need to integrate the modules even better with the campus teaching and use the content in the modules more actively in campus seminars.

In a study targeting the use of the modules we found that the modules develop student teachers' *Transformative digital competence* which captures student teachers' competence in **taking initiatives and transforming their practices** by selecting and using relevant digital tools in the relevant educational setting. Their transformative digital competence arises as a necessity when student teachers are placed in **demanding situations** involving for example a conflict of motives, thus creating a wish or **need to break out** of the current situation.

Further reading: Brevik, Lisbeth M.; Gudmundsdottir, Greta Björk; Lund, Andreas & Strømme Aanesland, Torunn (2019). [Transformative Agency in Teacher Education: Fostering Professional Digital Competence. *Teaching and Teacher Education : An International Journal of Research and Studies*. ISSN 0742-051X. 86 . doi: \[10.1016/j.tate.2019.07.005\]\(#\)](#)

Good practice University of Oslo – Digital responsibility

1. University, institution/level/group/subject/cross-disciplinary

UiO/ Teacher Education/Teachers' part-time certificate programme post Master studies

2. Technology used in the practice example

Digital responsibility or digital citizenship is a concept which is a part of student teachers PDC and is emphasized in the Norwegian curriculum for grades 1-13 as a cross-disciplinary competence necessary for all teachers. At UiO the student teachers work with digital responsibility in several ways during their part time teacher education programme. They get a two hours lecture on the topic and then they get an assignment related to their practice placement. First part of this assignment is that they get a case on online bullying and they are supposed to interview staff within their practice school regarding digital responsibility and how they handle digital bullying. The second part of the assignment is group work. In groups they are supposed to decide what aspect of digital responsibility they would like to address (for example online bullying, copyright, privacy, plagiarism and so forth). Together they make a lesson plan for 2-5 lessons for a targeted student group with a clear plan on how they can approach the issue of digital responsibility in the classroom. These group assignments are also delivered into the Canvas platform and the final part of this assignment is that they need to peer review an assignment from their classmates that have written another assignment on digital responsibility. The peer review has some predetermined elements they need to assess.



Figure: One of the aspects of digital responsibility the student teachers address in their lesson plans is use of digital resources and plagiarism

3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)

a) Pedagogical: Making your own lesson plan on digital responsibility related to your subject of teaching. Use of various technological tools in a pedagogical manner and in ethical ways.

b) Ethical: The assignment is on digital responsibility and thus touches on various ethical issues student teachers address in their subject teaching.

c) Attitudinal: The assignment is designed to raise the awareness of the student teachers on the topic of digital responsibility being a part of pupils/teachers PDC.

d) Technical: The student teachers involve various educational tools in their lesson plans depending on which activities they include in their plan

4. Experience when using the practice example:

Student teachers at UiO find digital responsibility an important theme and they like working with it in different ways. They also claim they learn a lot from working in cross disciplinary groups and how digital responsibility can be addressed in various ways. Furthermore, the assignment is directly related to their experiences in practice which makes it practice related and meaningful for the student teachers' learning process and development of their professional identity.

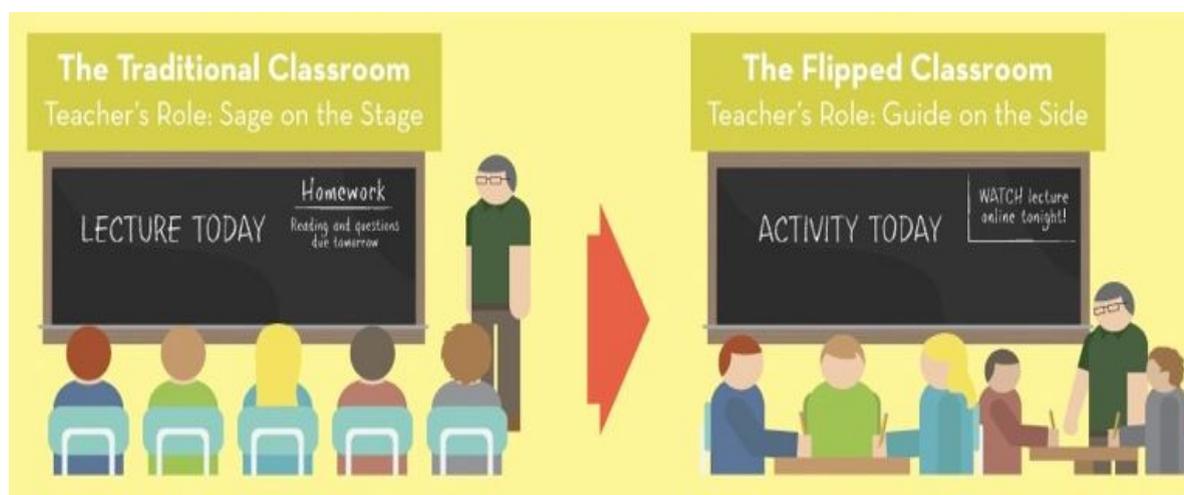
Good practice University of Oslo – Modelling flipped learning

1. University, institution/level/group/subject/cross-disciplinary

UiO/ Teacher Education/Teachers' part-time certificate programme post Master studies

2. Technology used in the practice example

Flipped learning has been used in the part-time certificate programme for four years. Online Canvas modules are developed prior to each campus seminar in pedagogy. The flipped learning model is based on a coherent-constructive alignment (Biggs, 2011) with step 1 being online home assignments and step 2 (group)work on campus. We produce videos with thematic focus and introduction of the topic relevant to the campus seminars. There are questions and assignments accompanying the videos as well as tailored readings and questions/assignments. These are followed up with hands-on activities on campus



Further reading: **Gudmundsdottir, G.B. & Vasbø, K.B. (2017)** Toward Improved Professional Digital Competence: The Use of Blended Learning in Teacher Education in Norway, In Paul Resta & Shaunna Smith (ed.), *SITE 2017. Society for Information Technology and Teacher Education*. Association for the Advancement of Computing in Education. ISBN 978-1-939797-27-8. s 499 - 509

3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)

a) Pedagogical: This is a particular pedagogical design and all the lessons are designed according to a certain pedagogical approach

b) Ethical: NA

c) Attitudinal: The flipped learning design is used to model student teachers use of technology in their own classroom and as such influences their attitudes on various teaching methods and the methodological variety and potential of ICT use in teaching

d) Technical: Videos – various tools to record film sequences and make the preparatory part of the introduction to the seminars (the flipped part)

4. Experience when using the practice example:

The teacher educators like the design as it gives them opportunity to model the use of flipped learning in the classroom. Furthermore, we have through follow-up research found out that such a design motivates the student teachers to read the syllabus, it strengthens the quality and outcomes of dialogue during groupwork, it allows connecting theoretical knowledge with knowledge and experiences from practice, it requires that the student teachers take more responsibility, and it supports use of technology and generates better coherence in the teacher education program components. The students themselves claim that they like the design as it disciplines them and guides them to a greater extent through the syllabus and the studies in general. One of the issues they repeatedly reported is that they experience it as uncomfortable to come unprepared to the seminars (something which was quite frequent earlier).

Good practice University of Oslo – Authentic videos in micro-teaching

1. University, institution/level/group/subject/cross-disciplinary

UiO/ Teacher Education/Student teachers' Master studies

2. Technology used in the practice example

UiO has developed an application for student teachers to record sequences of their teaching practice in schools. The application is in accordance with the European GDPR and is therefore following strict rules and regulations on privacy when it comes to saving content and processing data.



Publisert 4. jun. 2015 20:58 - Sist endret 8. jul. 2015 09:50

Figure 1: student teacher filming a fellow student in practice.

3. Short description of how the practice example is a part of developing student teachers' digital competence according to the four dimensions in the PEAT-model (where applicable)

a) Pedagogical: the student teachers are using authentic videos of own teaching practice to reflect on pedagogical issues in their teaching together with a teacher educator on campus and their supervisor at the practice school.

b) Ethical: use of videos and filming students involves strict ethical privacy rules and before the student teachers are allowed to use the VIVA-application they need to attend a course in ethics and the use of the app.

c) Attitudinal: N/A.

d) Technical: The student teachers use the VIVA app to record their teaching during placements in schools. The recordings are sent to a secure server on campus.

4. Experience when using the practice example:

We are running the beta version of the app (autumn 2019) and piloting its use with student teachers. We have met several technological hick-ups during the piloting phase which are now taken care of by the technological development team. Pedagogically the student teachers as well as the teacher educators see a great potential of using authentic video clips from the student teachers' own practice and their own teaching. They are positive and report that the learning outcomes of the micro-teaching and being able to film and use their own teaching for reflection and get mentored on is increasing their learning, their professional development and their own awareness of issues that are important and less important during their placement.

OSLOMET



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L-Università
ta' Malta



UiO : University of Oslo



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