



Teacher education is a deeply pedagogical process rooted in values, ethics, and the social purpose of schooling. Globally, it sits at the core of educational quality and fairness, as research in comparative and international education demonstrates: the training of teachers directly influences students' learning chances, social inclusion, and the democratic aims of schools. Teachers are not simply transmitters of curricula, but active professionals whose convictions, reflective skills, and ability to manage the complexities of classroom life give shape and substance to the educational experience itself.

The pedagogical dimension of teacher education frames teaching as a relational, context-aware, and ethically grounded profession rather than just a set of procedural skills. From a research perspective, this demands robust research methodologies that can critically examine the complex realities of schools and inform evidence-based policies. Equally important is the connection between theory and practice, which helps to bridge the persistent gap between universities and schools.

The contributions gathered in this volume reflect the richness and diversity of experiences showcased during the ATEE Spring Conference 2024, held at the University of Bergamo from May 29 to June 1, 2024. The volume presents 70 selected papers out of more than 300 presented by researchers representing over 40 countries.

This broad spectrum of studies highlights promising directions that can inspire renewed inquiry and concrete proposals aimed at improving contemporary educational systems.

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ATEE Spring Conference 2024

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Teacher education research in Europe: trends, challenges, practices and perspectives

May 29th – June 1st, 2024
S. Agostino, Bergamo



Edited by Nicole Bianquin and Francesco Magni





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BOOK OF PROCEEDINGS

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Università degli studi di Bergamo

2025

BOOK OF PROCEEDINGS ATEE Spring Conference 2024. Teacher education research in Europe: trends, challenges, practices and perspectives / Nicole Bianquin, Francesco Magni (edited by) - Bergamo: Università degli studi di Bergamo, 2025

ISBN: **978-88-97253-27-3**

DOI: [10.62336/unibg.978-88-97253-27-3](https://doi.org/10.62336/unibg.978-88-97253-27-3)

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<https://aisberg.unibg.it/handle/10446/309209>

An event organised by:

Dipartimento di Scienze Umane e Sociali, **University of Bergamo** // www.dsus.unibg.it

CQIIA – Centro per la Qualità dell’Insegnamento, dell’Innovazione didattica e dell’Apprendimento, **University of Bergamo** // www.cqia.unibg.it

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The contributions published in this book of proceedings have been evaluated through a double-blind peer review process. We would like to thank the members of the Scientific Committee, as well as the many other professors, researchers and experts who agreed to act as reviewers.

A learning design to promote reflection and digital media skills for the professionalisation of student teachers

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Abstract

Reflection skills are seen as a crucial factor for teacher professionalisation. They serve to combine theoretical and practical knowledge and are, therefore, relevant for solving challenging situations in school practice. Furthermore, digital media skills are important for teacher professionalisation because contemporary teaching requires the integration of digital media resources into learning processes as well as the promotion of media skills among pupils. The development of professional reflection and media skills are therefore an important aspect in the context of teacher education and corresponding learning opportunities should be offered. In this paper, I present a learning design that aims to promote both reflection and digital media skills for student teachers.

Keywords: reflection skills; digital literacy; teacher education; learning design; professionalisation.

1. Introduction

To enable deep learning processes and therefore the professionalisation of student teachers, didactic conceptions of learning designs should focus on active, constructive and interactive learning behaviours of the students (Chi & Wylie, 2014). These learning designs are characterised by methods and tasks, that promote cognitive activation, for example through target group orientation, feedback, opportunities of self-directed learning and reflection on real-world practices (Ellaway, 2020).

In the context of teacher education, reflection is understood as thinking back to one's own actions and experiences with the aim of intentionally and purposefully changing a problem (Häcker, 2017). Reflection processes enable in-depth learning and the development of flexibly applicable knowledge (Pedaste et al., 2012). Furthermore, reflection enables the successful linking of theory and practice (Leonhardt & Rihm, 2011; Reintjes & Kunze, 2022). The ALACT reflection model offers the possibility of structuring and an in-depth examination of theory and practice by the students (Korthagen & Nuijten, 2022): First, a situation is described (Action), viewed from different perspectives (Looking back on the action), and then analysed with regard to the levels of environment, behaviour, competence, attitude, role and mission using literature (Awareness of essential aspects). Building on this, alternative methods of action are developed (Creating alternative methods of action), which can be tested in practical situations (Trial) (Korthagen, 2014). By integrating this model into university learning opportunities, students can develop reflective skills and enhance their professional development, based on theory (Häcker, 2017).

In the digital age, active learning can also take place in the digital space and be supported using technology. The digital space offers the opportunity to support active, constructive and interactive learning processes, for example, by the integration of individualised consolidation and feedback options that learners can select and use themselves (Lehberger, 2025; Thurnes & Schübler, 2005). The inverted classroom concept can be used to structure a learning design for the professionalisation of student teachers (Spannagel & Freisleben-Teutscher, 2016). This model includes analogue and digital spaces as well as self-directed and collaborative learning phases for a university seminar design (Lehberger, 2023). Digital learning materials are used by the students for independent content development to prepare for the university attendance phases. In the seminar time, the individually acquired knowledge is applied and deepened in collaborative practice situations (Handke, 2023). Traditionally, digital self-study materials in the inverted classroom consist of video tutorials or recordings of lectures (Lovisach, 2019), but they can include all kinds of formats, such as podcasts, texts or interactive tasks (Zickwolf & Kauffeld, 2019). All these formats mentioned and other interactive elements can be generated using the free H5P software, which is a plugin that enables the Moodle system to create interactive content like videos, quizzes and presentations (Magro, 2021). Because digital skills are important not only for learning processes but also for successfully mastering many everyday and professional tasks, the preparation for active and critical participation in the digital world should be emphasised at school and in all subjects (Frailon, 2024). In addition, digital technologies offer numerous opportunities to promote teaching and learning processes in the classroom. In order to fulfil this task professionally, teachers must have extensive technological, pedagogical and content-related expertise (Koehler et al., 2013). Teacher education programmes should therefore offer learning opportunities for student teachers to be able to integrate digital technology in the classroom and discuss digital topics in subject lessons (Tondeur et al., 2017).

A learning design can contribute to the development of these skills if it enables and encourages students to actively engage with the phenomena of the digital world and critically reflect on their own skills in this area (Herzig, 2019). Therefore, topics relevant to media education should be addressed as a content, like artificial intelligence (Aufenanger et al., 2024), cyberbullying (Mishna et al., 2012), or social media use (Korkmaz & Colak Kilic, 2024).

One didactic method for realising this aim in the context of an inverted classroom learning design is artifact-generated learning. With this method, the students produce learning artefacts by using digital technology (Jahnke et al., 2022).

2. Learning design

The learning design described below is intended to promote the professionalisation of student teachers in reflection and digital media skills. It is based on the inverted classroom concept, where digital learning materials in H5P format are used to realise students' individual content preparation and reflection processes. In the attendance phase, learning artifacts are produced collaboratively on topics related to the digital world and reflection opportunities are provided.

2.1 Organisational conditions

The learning design is integrated into the master's degree programme of educational sciences at Paderborn University in Germany (4 ECTS). In this module the student teachers can choose from various subject areas to set an individual focus, so the seminar described 'Digital media in schools and lessons' is not compulsory. The attendance phase takes place weekly and lasts 90 minutes. The aim of the seminar concept is to promote the skill 'Select, modify and create digital resources and materials for teaching and learning in a purposeful manner', which is part of the digital competence framework for teachers in North Rhine-Westphalia, Germany (Eickelmann, 2020). That corresponds to Area 2 of the European Framework for the Digital Competence of Educators (DigCompEdu): 'Digital Resources - sourcing, creating and sharing digital resources' (Redecker, 2017).

2.2 Didactic concept

The seminar is based on the inverted classroom concept where the individual preparation is self-guided and supported by formative assessments at the end of the themes. Exercise and application take place during the attendance phase and include the creation and reflection of digital learning artefacts. To specify the term 'digital resources' from the competence framework, 'visualisation', 'podcast' and 'video' were chosen. The topics for the content of the learning products can be chosen by the students at the beginning of the semester and should focus on digitalisation-related topics from the school context. The learning products consist of a combination of a digital tool with a topic from the digital world. For example, students individually created a visualisation related to the topic of cybercrime, worked in pairs to produce podcasts on the use of social media in schools, and developed explanatory videos in small groups on the topic of artificial intelligence. This approach offers the opportunity to gain a deeper understanding of quality criteria for the use of individual forms of representation to promote learning.

2.3 Digital learning materials

The Moodle course with H5P learning materials contains subject-specific and organisational content (see Figure 1). The starting page was organised with the H5P-content type 'image hotspots' and the lessons can be accessed by clicking on the arrows. The 'interactive book' element was used for the technical realisation of the navigation in the lessons. The headings of the 'book' pages are clearly displayed as a table of contents in a selection menu on the left-hand side. A click on the headline takes the students to the contents of the page. The pages can be designed by various forms of representation can be combined on the pages of the interactive book, such as texts, illustrations, videos or interaction formats (Jacob & Centofanti, 2024). To support the learning process, not all content is presented as continuous text; some is visually also visually reduced using the H5P element 'accordion'(Schneider et al., 2022). For example, various tools to produce digital visualisations were described in this format or different aspects of cybercrime. For the learning process, diverse formats have the advantage that different sensory channels are addressed. In addition, the simultaneous presentation of illustrations and text promotes retention (modality effect) (Chandler & Sweller, 1991).

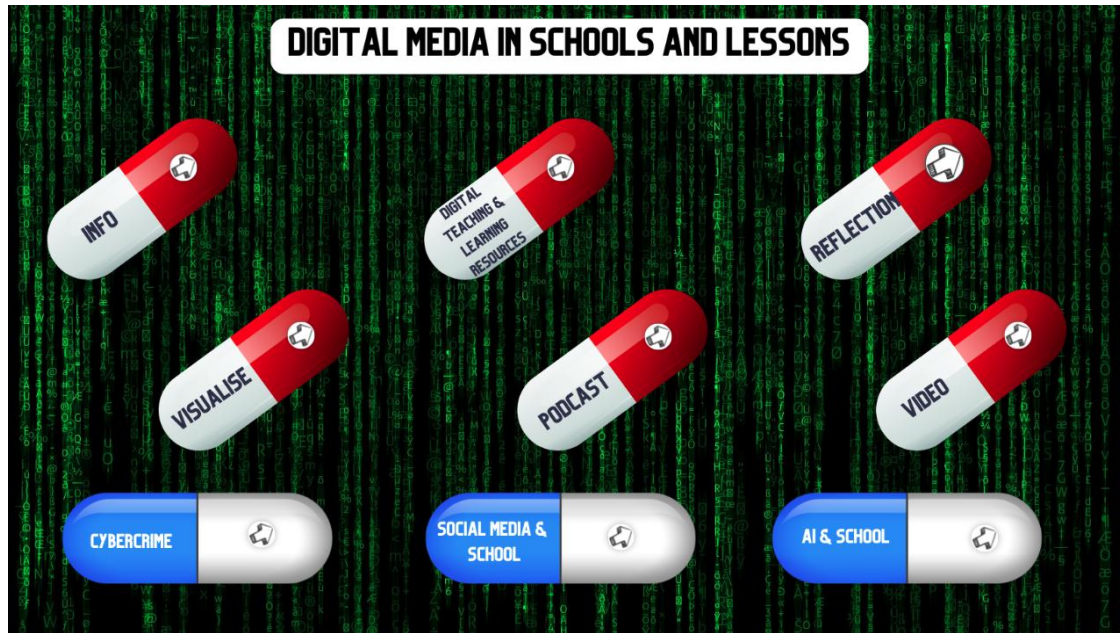


Figure 1: Starting page and table of contents of the Moodle course as H5P element 'image hotspots'. Click on the arrows to access the different lessons (own representation).

2.4 Reflection opportunities in the learning design

Because reflection skills are important for learning and teacher professionalisation, they are also to be promoted as part of the seminar work. This topic is integrated into the learning design at several points. Firstly, the importance of reflection processes for professionalisation and also the ALACT reflection model are discussed as part of an introductory seminar unit. Later in the course, students can reflect on their level of media-related professionalisation using the ALACT reflection model. Therefore, reflection prompts are integrated into the H5P materials (see Figure 2) and time is provided during the seminar to work on them.

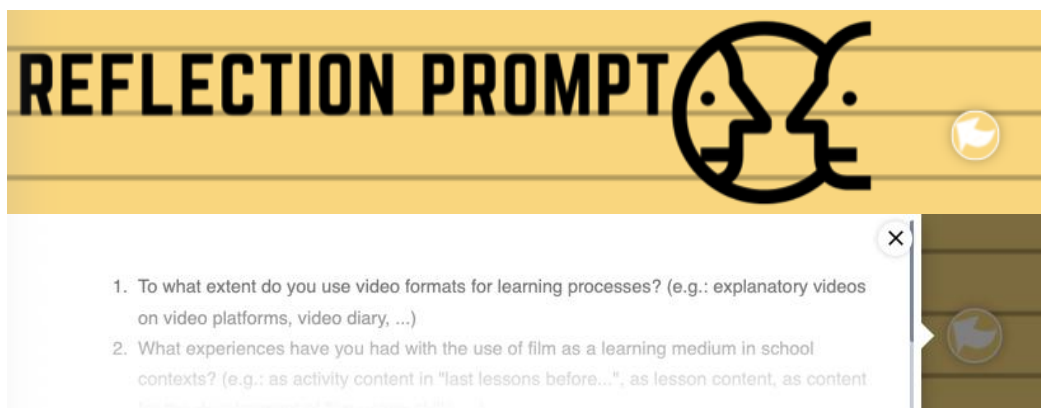


Figure 2: Reflection task as H5P element 'image hotspots' (top). Clicking on the arrows opens the text-based prompts (bottom) (own representation).

The ALACT reflection model was used to structure the reflection processes in the seminar. To develop a deeper understanding of the model, the ALACT phases are discussed using the example of cybercrime:

- Action: students should report on their own experiences related to cybercrime in the school context.

- Looking back: the students perspective and the perspective of other people who attended the situation are described by the dimensions of wanting, feeling, thinking and doing.
- Awareness of essential aspects: students should refer to pedagogical theory at levels that can influence teacher functioning. Those levels are environment, behaviour, competencies, beliefs, identity and mission.
- Create alternative methods for action: students create a plan for an alternative action in the same situation described at the beginning
- Trial: to enable practical application of the knowledge reflected in the seminar, the students create a visualisation, which should form the basis for the discussion of the individual situation in the teaching staff.

2.5 Schedule

The following table shows an example of the seminar programme. The students have already received access to the Moodle course before the first in-person session and should orient themselves in it, as well as work on the first test with organisational questions.

1	<ul style="list-style-type: none"> - get to know each other - enquire about wishes and clarify questions about the course - information on the research project - information about aspects of the digital world as content knowledge and possible topics for the learning artefacts, voting on topic choices
<i>Preparation task: complete the lesson 'digital teaching and learning resources' and solve the test</i>	
2	<ul style="list-style-type: none"> - brief information on reflection and its importance in teacher education - explanation of the exemplary practical situation for using the video about internet research as a first written reflection - time for writing the reflection
<i>Preparation task: complete the lesson 'reflection' and solve the test</i>	
3	<ul style="list-style-type: none"> - brief information on cybercrime - discussion of personal experiences with forms of cybercrime (out of the school context) (Action) - the students own perspective and the perspective of other people who attended the situation are described by the dimensions of wanting, feeling, thinking and doing (Looking back on the action) - the students research the framework conditions of cybercrime in school programmes or on school websites, such as study groups, house rules, thematisation in subject lessons (Awareness of essential aspects / environment)
4	<ul style="list-style-type: none"> - reflection on possible behaviour when cyber violence occurs at school (Awareness of essential aspects / behavior) - information on competences from teacher competence frameworks that can be helpful in the context of cybercrime, like education or counselling (Awareness of essential aspects / competence) - reflection on students' attitudes towards cybercrime at school (Awareness of essential aspects / attitudes) - reflection on their own role in the context of cybercrime at school (Awareness of essential aspects / identity)
<i>Preparation task: complete the lesson 'visualisation' and solve the test</i>	
5	<ul style="list-style-type: none"> - the students inform themselves about quality criteria for visualisations (cognitive load, text-image integration and graphic design) on the basis of literature in the learning material and create a visualisation about their topic (technique: sketchnote).
6	<ul style="list-style-type: none"> - completion of the visualisation - sharing content in teams with the help of visualisation - creation and discussion of a catalogue of criteria for digital visualisations via Etherpad
<i>Preparation task: create a visualisation to explain cybercrime and possible courses of action in chools for a teachers' conference</i>	
7	<ul style="list-style-type: none"> - peer-feedback on the visualisations based on the quality criteria discussed in the previous lesson - reflection on actual visualisation-skills based on the ALACT model (Awareness of essential aspects)
<i>Preparation task: complete the lesson 'podcast' and solve the test</i>	
8	<ul style="list-style-type: none"> - insights into sample podcasts from the education sector with social media topics

	- discussion about possible goals and formats of podcasts and quality criteria for podcasts as learning material
	<i>Preparation task: information on a topic from the field of social media and school</i>
9	- creation of a podcast-storyboard for the chosen topic in pairs and preparation of the recording
10	- recording of the podcast
11	- reflection on actual podcast skills based on the ALACT-model (Awareness of essential aspects) - discussion of ideas for possible meaningful integration of audios / podcasts in subject lessons at school
	<i>Preparation task: complete the lesson 'video' and solve the test</i>
12	- brief information about AI and its significance in school contexts and about the video usage behaviour of pupils and potential for learning - selection of quality criteria for videos that promote learning based on information from the learning material and the criteria for visualisations and audios - information on a topic from the field of artificial intelligence and school (for example: AI for teachers, AI in learning processes)
	- <i>Preparation task: creation of a storyboard for the chosen topic in teams and preparation of the video-recording</i>
13	- recording of the video
	<i>Preparation task: viewing the videos of the other groups and noting feedback</i>
14	- reflection on actual video-skills based on the ALACT model (Awareness of essential aspects) - discussion about the quality of the videos and of ideas for possible meaningful integration of videos in subject lessons at school
15	- explanation of the exemplary practical situation for using the video about personal rights and copyright as a second written reflection - time for writing the reflection

Table 1: Example schedule of the learning design

3. Conclusion and future work

The aim of the learning design is the professionalisation of student teachers in the ability to 'Select, modify and create digital resources and materials for teaching and learning in a purposeful manner'. To evaluate the students skills development and the seminar concept, the students are provided with a video as a practical example at the beginning and end of the seminar. One video is about information research and the other about personal rights and copyright. The students should consider whether they would use the video in their lessons as a learning material for the pupils at school, and they were asked to reflect in writing. It is intended to analyse the students' reflections using qualitative content analysis (Kuckartz & Rädiker, 2023). The analysis will focus on the range and depth of reflection. The range of reflection becomes clear in references to digital skills (e.g. technology-based learning processes and criteria for video quality) and the depth of reflection in references to reflection skills (e.g. learning taxonomy levels or reflection levels (Anderson & Krathwohl, 2001; Hatton & Smith, 1995; Korthagen & Nuijten, 2022)).

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