

## **Thematic Seminar Report**

Exploring how  
teachers learn





**Publisher:**

European Schoolnet® (EUN Partnership AIBSL)  
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1040 Brussels, Belgium

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Special thanks go to the following educators for their invaluable contribution of the Case Studies:  
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**Please cite this publication as:**

Kay Livingston (2025) *Exploring How Teachers Learn*, European Schoolnet, Brussels, Belgium.

**Published in February 2025**, this report is based on the 5th European Schoolnet Academy Thematic Seminar organised in February 2025.

**Photos:** Studio Romantic, SeventyFour, Fizkes, Syda Productions / stock.adobe.com

# 1. Contents

1 Introduction:  
Why understanding teacher learning matters

2 Understanding the complexity of how teachers learn

3 Key influences on teacher learning.

**3.1.** The teacher as learner: beliefs, motivations and attitudes about learning.

**3.2.** School and wider education system and societal influences on teacher learning.

**3.3.** The role of technology: influencing teacher learning.

**3.4.** Learning through community, reflection, and technology.

**Case study 1.** Leveraging teacher design teams.

**Case study 2.** Encouraging reflective practice through digital portfolios.

**Case study 3.** Combining situated learning elements with social learning practices

4 Designing effective professional learning development opportunities

Suggested points for teacher educators to consider and discuss when designing professional development for teachers

Suggested for points for teacher educators to consider in developing their own professional learning.

5 Reference list

# 1. Introduction: why understanding teacher learning matters



**Kay Livingston** is Professor of Educational Research, Policy and Practice at the School of Education, University of Glasgow. She has worked in the field of teacher education for 35 years. She works closely with and advises policymakers, teachers and key educational stakeholders at international, national and local levels. She was a member of the European Commission's Education and Training Strategic Working Group on Schools and she continues to work as an expert on European Commission and European Schoolnet projects. She has been a Chair and member of International Scientific Advisory Boards and International Educational Sciences Evaluation Panels. She was a member of the Association for Teacher Education in Europe's Administrative Council, Chair of their Research and Development Community on the Professional Development of Teachers and Editor of the European Journal of Teacher Education. Her areas of research include: teacher education, professional development, leadership and mentoring; teacher and school leader career frameworks; innovation in teaching and learning; and digital literacies.

The changing and challenging global context, alongside rapid technological change, has created the need for new knowledge, skills and values and different patterns of living and working (Livingston, 2012). In response, policy reforms in education, particularly over the last two decades, have increased the emphasis on improving schools, which has led to greater attention on teacher quality, with the aim of improving student learning. What is evident is the constant pressures for teachers to adapt, develop and change their learning and teaching approaches.

*Since change depends on teachers, and effective teacher learning leads to improved knowledge and skills, then it becomes imperative to develop sustained teacher learning as the portal through which change and reforms can be realized across national and cultural boundaries. (Kooy and van Veen, 2012, p.xviii)*

Thinking about how teachers learn and how they can best be supported in learning how to teach in complex and diverse settings is also changing and

developing (Livingston, 2017). Internationally, it has been recognised that, no matter how good initial teacher education is, it cannot provide teachers with the knowledge and skills they require for a lifetime of teaching (OECD, 2011). It is acknowledged that **initial teacher education is only the start of teacher learning and that teachers need to engage in career-long learning to continually update and develop new knowledge and skills**. This has changed previous notions of the concept of teacher education as something that takes place only at the start of a teacher's careers. This requires new understandings of 'teachers as learners', who recognise themselves as learners not only during their initial teacher education programme but throughout their entire career. It also means that the multiple identities of 'teacher educators' that support teacher professional learning in a wide range of contexts at different stages of teachers' career need to be recognised (Livingston, 2014). In this report, teacher educators are understood as all those who support teacher learning in teacher education institutions, schools and professional development centres and agencies, for example.

Despite the growing awareness of the need for career-long professional development, questions remain about how best to support it to meet the diverse learning needs of teachers. Over the last thirty years, a huge amount of research has investigated different aspects of teacher professional development from various perspectives. Within the research literature many possibilities regarding what is identified as professional development are suggested. In recent research studies, definitions suggest a broad understanding of professional development, which is indicative of a shift from the emphasis mainly on provision of training activities and events 'delivered to' teachers, towards more varied opportunities and more participatory approaches involving teachers actively in their own professional learning. This means professional development can be understood to include externally organised activities, school-based activities and diverse other opportunities for teacher learning. Such broad definitions suggest,

*Teachers experience a vast range of activities and interactions that may increase their knowledge and skills and improve their teaching practice, as well as contribute to their personal, social, and emotional growth as teachers. These experiences can range from formal, structured topic-specific seminars given on in-service days, to everyday, informal 'hallway' discussions with other teachers ... (Desimone, 2009, p.182).*

This broad characterisation indicates that **teacher learning can occur in many different ways and contexts**. The increasing emphasis and use of the concept of 'teacher professional learning' coincides with an increasing understanding of the complexity of teacher learning and that the different learning needs of teachers require different forms of professional development. This focus on teacher learning also signals greater understanding of teachers' own role and responsibility in developing and changing their practice and the growing recognition of the diversity of possibilities for teacher learning. This is in line with knowledge being constructed by the learner through social interactions. For example, this can include teachers collaborating with their colleagues to share, co-construct and extend learning, engaging in joint reflection of, on and in practice (Schön, 1987, 1992), and participating in action research and enquiry (Noffke and Somekh, 2013) with their students or other

teachers to investigate and test out various aspects of education in their own classrooms and schools. However, the outcomes of professional development are not always deemed to be successful by policymakers, researchers or practitioners, particularly when teacher learning is measured only by improvement in student learning outcomes. Research has also shown that even when short-term successes have been identified, professional development has often been ineffectual in sustaining teacher learning that leads to change in practice (Guskey, 2002; Desimone, 2009; Opfer and Pedder, 2011, Mockler, 2024).



Some consensus regarding core characteristics of effective professional development that are needed to enable teacher learning and change have been suggested by researchers (e.g., Wilson and Berne, 1999; Borko, 2004; Desimone, 2009), however, challenges in understanding *how* teachers learn based on these characteristics remain. For example, Opfer and Pedder (2011) question why some research studies report teachers attending professional development activities and opportunities based on the characteristics identified but learning and change does not occur. They also question why some research studies report, "*some teachers learn and change via activities that do not have the identified characteristics of effectiveness*" (Opfer & Pedder, 2011, p.377). This suggests that multiple influences impact on teacher learning and that not every form of professional development is relevant or helpful to all teachers (Avalos, 2011). This means teacher educators planning and/or supporting teachers' professional development need to give greater consideration to the individuality of teachers and their context. Teachers bring different knowledge, experiences, values and beliefs to their learning and teaching approaches and they work in different local and school contexts. How one teacher learns is unlikely to be the same as another teacher.

The individuality of every teacher and the many interacting factors that influence their learning in different combinations of ways, at different times, in a wide variety of contexts needs to be better understood. This indicates that there is not a straightforward or universal answer to the question of *how teachers learn*. In summary, **how a teacher learns depends on individual teacher characteristics, their personal histories, values, beliefs and motivations; the contexts in which they learn and teach; and influences from the wider education system and societal contexts. How a teacher learns in one circumstance or on a particular day, individually or collaboratively, will not necessarily be the same in different circumstances or on a different day.** As Opfer and Pedder, (2011, p.386) point out,

*Change can occur in one area of influence but may not lead to change in another. That is, teachers may change their beliefs but not their practices, may change their practices but not their beliefs, and ultimately may change their practice but not the learning outcomes of their students.*

Without understanding more about how teachers learn and the dynamic influences on their learning, professional development could result in little to no benefit to teachers (Kennedy, 2019). Also, it is necessary for teacher educators to understand more about the different types and purposes of learning and what forms of teacher professional development support teachers best in different contexts and circumstances.

Advances in learning sciences and in understanding about how people learn (e.g., Dumont, Istance and Benavides, 2010), have shed more light on the many factors influencing learning. However, these advances need to be given greater attention in the design, planning and implementation of professional development opportunities for teachers and in the creation of conditions that support, enable and sustain teacher learning. Darling-Hammond et al. (2024, p.2) encourage teacher educators to take advantage of the growing knowledge about the science of learning and development to explore the *how* of learning – the strategies for teacher learning that can lead to deep knowledge, skills and understanding and social-emotional capacities that enable teachers to reflect, learn, and develop their individual and collective practice.

This report is framed by the following questions:

- What do teacher educators need to know about how teachers learn?
- How does research conceptualise the role of context, community and technology in shaping teacher learning and development and what implications does this have for designing effective professional learning and development programmes?

To address these questions, learning theories are reviewed briefly to better understand the nature and complexity of the learning process and the conditions that influence and are influenced by the process. The influences of individual teacher characteristics, values, beliefs and personal histories are explored in more detail, as well as the influence of their contexts on their learning. To understand more about how learning theories are applied to teacher learning in practice, research literature is drawn on to reflect critically on frameworks of common features of professional development that have been identified and how they may or may not interact and work together in a cumulative way. Practical examples of teacher professional learning are also outlined in three case studies to contribute to better understanding of the role of context, community and technology in shaping teacher learning and development. In addition, implications for teacher educators designing and implementing professional development and learning are explored and key points for teacher educators to consider for their own learning are suggested.

It should be noted that while it is accepted that there are differences in learning for teachers at different stages of their career, in this short report it is not possible to examine these specific differences in detail. A more general exploration is provided of how teachers learn and the influences on their learning.

## 2. Understanding the complexity of how teachers learn

*Learning is a complex individual process which happens through interactions between people and their environment. Researchers and practitioners have tried to understand what constitutes learning, how learning happens and how learning can be fostered, which, over time, has led to different theories to explain learning. (Ahsan and Smith, 2016, p.132)*

There are many different views about how people learn. Added to this, our knowledge and understanding of learning changes as new discoveries are made about neurological processes, the diversity of individual and contextual influences on learning, and about the possibilities offered by new technologies to enable and support learning.

As new theories of learning have emerged, conceptions of learning have developed (Shuell, 2001). Research studies utilise different theories and approaches to investigate teacher learning, such as behaviourist, cognitive, constructivist and sociocultural theories. These theories are underpinned by different views about knowing and how we come to know. Also, they place emphasis on and are used to investigate different types and aspects of learning, as well as the circumstances in which learning occurs. Mezirow (1978) identified a selection of different types of learning including: learning how to do something, learning about the way something works, learning what others expect of you, learning how to cope in relationships with others and anticipate their reactions, learning how to develop as a person and uphold certain values. For example, teachers learning about the technical functions of a new Smart Screen in their classroom, learn how to switch it on, what functions it has and how they upload material they want to use. This type of technical learning is different from learning how to make changes to their pedagogical approaches to utilise the device with their students in a way that improves their learning and is in line with the expectations of parents, school

leaders and local and national education systems. It may also require teachers to learn how to manage classroom behaviour differently to enable students to interact appropriately with the Smart Screen and sustain their motivation to learn.



Researchers may draw on one theory, to investigate a particular type or aspect of teacher learning, for example, from a cognitive perspective focusing on learning taking place when an individual is mentally stimulated in some way. Other researchers may take a more holistic approach to learning and utilise a multi-theory approach (Illeris, 2018). For example, emphasising that learning is cognitive, emotional and social, and that a holistic approach is needed to understand how teachers learn and the many influences and relationships that impact on their learning processes. In relation to the example above, when a teacher is learning about the technical details of a new Smart device, they may feel anxious because they believe they lack technology skills and may worry about how they will use it confidently with students. As Timperley (2008, p.15) reports, *“Expectations for change can touch raw nerves if teachers take them as reflections on their competence or challenges to their professional identity”*. These emotional factors impact on and mediate how teachers learn. Furthermore, teachers may not feel convinced that the use of a Smart Screen will enable students to learn more

effectively than the learning approaches that they already have in place. Such feelings may impact on their views about technology in general and their motivation and willingness to engage in professional development related to its use to enhance learning.

The development of constructivist and sociocultural theories of learning means that knowledge is no longer viewed as something only transmitted by teachers to students. The development of learning with other people within a social context is recognised as well as through interaction with various tools and artifacts (Shuill, 2001). The multiple examples in the research literature of teachers learning with colleagues in school face-to-face and through online communities of learners, demonstrates the rise in professional development opportunities that recognise the value of learning through collaboration, reflection and co-construction of new ideas and approaches with others. For example, Postholm (2012) reviewed research studies to explore how in-service teachers learn together by drawing on cognitive and constructivist theories. She explains,

*The social surroundings play a role in how a human develops within the cognitivist paradigm, but the individual is in the foreground from this perspective. Within the constructivist paradigm, the social surroundings are seen as decisive for how the individual learns and develops. Individuals construct knowledge and learn through mediated acts in the encounter with one or more persons and the surroundings in which they live and act (p.406).*

Different theories can assist us in understanding and developing different types of learning and different approaches. Shuill (2001) points out, *“to fully understand learning, one must realize that a particular theory may provide a good explanation of learning in one situation but a poor explanation of learning in a different situation”* (pp. 8614 – 8615). Teacher educators who enable and support teacher learning need to have a better understanding of the range of different theoretical perspectives and how different approaches are relevant at particular times for teachers depending on what has to be learned, why and in what circumstances. They also need to be aware of their own views and theories of learning and how they may influence the decisions they take about how best to enable and support teacher learning.

Illeris (2007) suggests an adequate learning theory must consider *“the human being as a whole, both the rational and the subject matter content and the incentive and emotional sides and, not least, all the interactions between them”* (p.76). He identifies three dimensions of learning (Illeris, 2007, 2018):

- *acquisition of content dimension* (what is being learned - e.g., knowledge, skills, opinions, meanings, values, behaviours), which he identifies as primarily a cognitive process;
- *incentive to learn dimension* (e.g., motivation, emotions, feelings, interest), which he identifies as an emotional process; and
- *an environment dimension* (influences of the immediate learning situation and more general cultural and societal conditions), which he identifies as social processes.

These three dimensions of learning and the multiple and dynamic interactions between them highlight the complexity of understanding how teachers learn and underline the challenges for teacher educators in knowing how best to support teachers in their learning. This complexity about how people learn explains why researchers draw on different theoretical perspectives on learning and why there has been a proliferation of research studies investigating the many ways teachers learn. These studies provide an illustration of a 'smorgasbord of possibilities' for various types of teacher learning for different purposes.

The next section explores further the influences of teacher beliefs, motivations and attitudes on their learning and the conditions that may enable or hinder their learning.



**Key points:**

*How teachers learn is complex. Different theories can assist teacher educators' in understanding different types of learning and different approaches for professional development.*

*A holistic approach to teacher learning offers teacher educators with a helpful frame to consider the what of learning (e.g. subject matter content), the incentives for learning (e.g., the why of learning/purpose of the professional development/teacher motivation for learning) and emotional aspects (e.g., how the teacher feels about learning and about engaging in professional learning) and all the interaction between them.*

**Reflective questions:**

*How does Illeris' three dimensions of learning assist you, as a teacher educator, to think about how you learn?*

*How might reflection on the three dimensions of learning help you, as a teacher educator, design and plan professional development opportunities for teachers?*

# 3. Key influences on teacher learning

## 3.1. The teacher as learner: beliefs, motivations and attitudes about learning

Teachers have different experiences and cannot be considered a homogenous group when it comes to personal characteristics and beliefs about knowledge, learning and teaching. Multiple studies (e.g., Brownlee et al., 1998; Brownlee, 2003; Chai et al., 2009; Cheng et al., 2009; Fives and Gil, 2015) concerning different influences on teachers' beliefs, demonstrate that it is far from straightforward to make sense of how beliefs and past and present experiences combine and influence teachers' learning and the effectiveness of professional development. Fives and Buehl (2016) provide an example of the changing influences of a teachers' beliefs.

*Teachers' beliefs about the nature of science as a domain of study are more likely salient when reading about climate change or developing a lesson plan on electrical circuits, than are their beliefs about poetry. However, when engaged in lesson planning, teachers must actively think about content, pedagogy, and students, so that these three core beliefs may be evoked and work in conjunction or conflict during task completion (p.115).*

While Fives and Gill (2015) agree that teachers' beliefs play a fundamental role in education, they are critical of researchers who only address teacher beliefs as part of their study of other subjects. For example, some studies explore questions concerning the extent to which teachers' beliefs about knowledge, learning and teaching in a specific area of the curriculum, such as mathematics, impacts on their classroom practice, but not specifically on how teachers themselves learn.

Teachers can hold beliefs about:

- what knowledge is necessary and important for students to learn, which can result in them being

selective in what subject content they prioritise and emphasise with their students;

- how students learn best, resulting in them favouring more teacher-centred or more student-centred pedagogical approaches;
- students' ability to learn, which may impact on how they interact with and include particular students in classroom activities.

These beliefs in different combinations may influence teachers' motivations and attitudes towards their own learning to greater or lesser extents at different times and circumstances. This makes it difficult for teacher educators supporting teachers' professional development to disentangle the impact of the influence of a teacher's particular belief on their learning and identify why certain forms of professional development appear to enable, hinder or block their learning. Furthermore, the interaction of a teacher's belief about something with *how* they came to hold that belief creates a powerful combination which may determine what teachers are willing to learn, (Opfer and Pedder, 2011) and the extent to which they are open to change. For example, if a teacher's belief about their own self-efficacy regarding their digital competency was negatively affected in a previous experience of attempting to use technology with students, this may then impact on their own willingness to learn about and use new technology in their classroom. Shulman and Shulman (2004) identified willingness and motivation as two important features of learning in their research exploring how teachers learn. They argue that teachers need to be ready, able, willing and motivated to learn and to change their practice.

As adult learners, teachers bring their own frame of reference to learning which influences and filters their views (Mezirow, 1997) and may support or hinder their professional learning.

*'Frames of reference' are structures of assumptions through which we understand our experiences. They selectively shape and delimit expectations, perceptions, cognitions and feelings. They set 'our line of action'. (Mezirow, 1997, p.5)*

The way teachers (including teacher educators) understand and use new information is likely to be shaped by the extent to which it is consistent with their existing understanding and assumptions. Buehl and Beck (2015) recognise that some beliefs that teachers possess may be deeply embedded and longstanding beliefs, while others may change with experience or through a particular catalyst for learning. This highlights the need for teacher educators to engage with teachers as individual learners and understand more about their beliefs and their starting point for learning. While it is increasingly common practice for teachers to utilise strategies to identify students' prior knowledge and motivations to learn, in order to plan next steps in learning and teaching, research shows that insufficient attention is given to understanding teachers as learners with their own individual and cultural histories, formed by their beliefs, assumptions and experiences (Livingston, 2016). **Support for teachers to uncover and confront their prior beliefs and reflect on the impact they may have on their practice is seldom an integral element of their professional development.** For example, predetermined formal professional development events, particularly for large numbers of teachers (e.g., about a policy change involving curriculum and/or assessment reforms or governance of digital data) which are often delivery-type sessions, typically do not take account of the beliefs, views and knowledge that teachers already hold or the implications of their beliefs and views on their interpretations and application of any new knowledge transmitted. As Korthagen (2010, p.99) argues, educational knowledge cannot simply be 'transmitted' to teachers in the hope it will improve their practice. For example, when information is transmitted about a new digital tool to teachers, they may know something new *about* the tool and be able to describe it to others, without knowing *how* to use it with their students in the context of their own classrooms to improve their learning.

**To understand teachers' beliefs about their own learning requires forms of learning that are designed to engage with and listen to individual teachers and support them in sharing their prior knowledge and**

**uncovering their personal beliefs.** One approach that has shown to be effective in enabling this is a professional learning conversation with a mentor (Livingston and Hutchinson, 2017; Livingston, 2022). **Mentoring is not only relevant to new teachers; it is relevant to teachers at all stages of their career and should be integral to initial teacher education programmes and professional development for in-service teachers in school.** It is acknowledged that informal conversations between teachers are likely to occur in schools every day, but focused structured dialogue is needed to develop their awareness of the implications of own beliefs, expectations and assumptions on their professional learning and development and to facilitate their thinking about how to confront their views.

Uncovering and exploring teachers' beliefs about their own learning in this way may be a challenging and emotional experience for many teachers. They may be unwilling to share any past influences on their beliefs or reveal any learning challenges they have for fear of being judged. Also, identifying themselves as learners may be uncomfortable for teachers, particularly for experienced teachers whose identity is based on their expertise in their subject area or stage of education. Support through a structured professional learning conversation requires a trusting relationship, with a mentor who listens actively, asks clarifying questions to enable the teacher to reflect on why they hold particular views, while keeping a developmental rather than judgemental focus. Opportunities to engage in dialogue and the provision of mentors in schools is not sufficient without training for mentors. The quality of learning conversations and the mentoring process matter in enabling teachers' learning and development (Livingston, 2022). This has implications for all teacher educators who take up the role of mentoring teachers. Training is necessary to develop their knowledge, skills and confidence in building trusting relationships with their mentee and facilitating meaningful teacher learning in a collaborative school environment. Livingston and Shiach (see Livingston, 2022 and Livingston and Hutchinson, 2017) conducted two separate studies where they researched and developed mentoring skills with groups of primary and secondary school teachers at various stages of their teaching career (including teachers and school leaders who had between 1 and 35-years teaching experience).

The overarching aim was to strengthen teachers' professional development through mentoring, with a particular focus on developing teachers' capacities to engage in learning conversations with their peers in school. The importance of training to enable them to engage in professional learning conversations was emphasised by teachers. For example, one secondary school teacher said, while he had conversations with his colleagues in school about teaching and learning prior to the mentor training, their conversations had not been focused and structured in a way that enabled them to identify specific learning needs or understand more about the interactions between different forms of knowledge and learning approaches and their own pedagogical choices. In both studies, peer mentoring enabled all the participants to actively experience being a mentor and a mentee, focus on specific aspects of their learning that were challenging, and explore together practical solutions and next steps relevant to their practice. The mentors and mentees also reported this required both to be willing and motivated to participate in a learning conversation.

In his critical analysis of traditional and new approaches to professional development, Korthagen (2017, p.391) recognises the role feelings and motivations have in teaching and learning. But in his view, until recently these aspects of learning have been omitted from approaches to teacher development and change. Taking a holistic approach to learning, Korthagen emphasises if the aim is to promote teacher learning, it cannot be achieved by professional development designed to influence only their thinking. **Individual teacher feelings also need to be considered.** He notes that both beginning and experienced teachers may be unaware of the influences on their learning and/or the source of their beliefs and feelings about their own learning. He suggests reflection is "*an indispensable element in professional learning*" (p.392). Yet, despite recognition in the extensive research literature about the value of reflective practice for professional development, it remains an obscure concept for some teachers. Understanding what reflection means in practice for them is challenging and consequently it is likely to remain a superficial experience for them. It cannot be assumed that new and/or experienced teachers know how to reflect in a way that is meaningful and relevant to their professional learning needs. Nor can it be assumed that teacher educators themselves know how to support and develop teacher reflection.

**Teacher educators need to develop their awareness and understanding of the beliefs that influence their own learning and their beliefs about how best to support teacher learning.** Clearly identified and ongoing structured opportunities for both teachers and teacher educators are needed to explore and share their own personal beliefs and experiences of learning and teaching.

Research studies have explored approaches to developing meaningful reflection as a form of professional development for teachers and teacher educators. For example, Korthagen et al. (2001) developed a five-phase model to guide teachers in how to go through a reflection process and make their reflections more explicit and concrete. Their model involves: i) taking action; ii) looking back on the action; iii) awareness of the essential aspects; iv) creating alternative methods of action; and v) trialling the alternative action. Korthagen (2017) underlines that this reflection process should not only focus on rational aspects, but also emotional and motivational aspects of learning and development. Korthagen et al.'s model and other models and tools, for example, a Framework for Reflective Practice (Zworzdiak, 2012); individual or group reflection of evidence-based teaching portfolios (Hamilton, 2020) or eportfolios ([see Case Study 2 in sub-section 3.4](#)) are designed to enable structured reflection which can support teacher learning. Groups of teachers engaging in peer-group mentoring is also identified as a helpful approach to stimulate and develop teacher reflection on their beliefs and experiences by listening to one another, encouraging one another and by learning together and from each other (Heikkinen, Jokinen and Tynjälä, 2012).

Despite the possibilities that professional learning conversations and reflection offer in enabling teachers to uncover and question their prior beliefs and views some researchers challenge whether it is possible to change teacher beliefs about learning (Cheng et al., 2009). For example, criticisms of a lack of change in practice following professional learning highlight the challenge of achieving transformation of teachers' deeply held beliefs and the influences of long-standing frames of reference for learning which may be central to the identity of the teacher. To provide effective support for teacher reflection, Loughran (2007) argues that teacher educators need to be able to reflect and enquire into their own practice of teaching.

He recognises that it is not easy work for teacher educators, but stresses, it is necessary in order to understand and value teacher education practices better.

*In teaching, there is a pressing need for teacher educators to be able to bring to the surface the reactions, responses, decisions and moves that influence and shape their teaching during teaching. On the one hand, this is important in order for teacher educators to be cognizant of their own skills, knowledge and expertise in teaching. On the other, it matters if students of teaching are to see beyond the superficial and to engage with practice in more nuanced and sophisticated ways (Loughran, 2007, p.2).*

Loughran (2014) suggests that teacher educators should be able to take responsibility for their own professional learning by reflecting on, enquiring into and responding to the needs and demands of teacher education. To enact this, he advocates for teacher educators to engage in self-study of their own practice. He argues there is an overwhelming need for teacher educators to be active and have agency in their own professional development. However, the extent to which teachers and teacher educators are confident and comfortable in exploring beliefs, feelings and motivations about learning also depends on the social and cultural context in which they work. In their comprehensive study of teacher's beliefs, Fives and Gill, (2015, p.7) emphasise,

*...teachers' beliefs exist within a complex, interconnected and multidimensional system with potentially contrasting beliefs that are or are not enacted in given moments of practice due to a variety of factors that are situated within the teacher and social context.*

They argue it is necessary to address the multidimensional nature of beliefs of individual teachers and the contexts that lead to differences in their influence on teachers' learning. Teachers' beliefs may be filtered by the values and beliefs about learning held by the school context in which they work and/or be influenced and shaped by the national education system or wider society. Mockler (2024, p.588) emphasises the need for professional learning and development to have a deep connection to individual teachers' learning needs but also stresses that it must also connect to collective problems and questions of practice in the school. Teacher educators need to understand more about the influencing contextual factors to make decisions about how best to support teachers as learners (Livingston, 2016). In addition, it is necessary to recognise that teacher educators are individual learners too and their learning and their beliefs about teaching are likely to be influenced by many factors. If the expectation is for teacher educators to support and enable teachers to reflect on their beliefs and influences on their learning, then teacher educators also need to be given time and support to reflect on their own beliefs and motivations and the implications for their practice with teachers.

### Key Points

*Teachers as adult learners bring beliefs about their own and their students' learning to any professional development activity. It is not only beliefs and feelings in the moment that influence how teachers learn, their past experiences as learners, as well as their motivations to learn, the purpose of learning, what they are learning and who they are learning with are all significant influences that need to be understood by teacher educators who aim to enable and support teachers' professional development and learning.*

*Reflection and discussion are needed with others to explore teachers' beliefs and assumptions and the influence they have on their professional learning and motivation and willingness to try out new approaches to learning and teaching.*

*Learning conversations with a mentor is one approach but mentors need training to develop the knowledge, skills and experience in facilitating such conversations and in building a trusting relationship with their mentee.*

*Similarly, teacher educators need to reflect on the beliefs they hold about learning and teaching and enquire into their own practice with teachers. To do this they need time and support to do so. Self-study is one approach proposed to develop teacher educator reflection.*

### Reflective questions

As a teacher educator, how have your own beliefs, assumptions and expectations about your own learning and teachers' learning shaped your teaching approaches?

What support do you, as a teacher educator, need to reflect on the influence your beliefs and assumptions have on designing and implementing professional development opportunities for teachers?

## 3.2. School and wider education system and societal influences on teacher learning

An important characteristic of the complexity of teacher learning is the multiple influences on their learning involving contextual factors. Opfer and Pedder (2011) argue, that misunderstanding the nature of teacher learning by not recognising this complexity leads to a focus on individual teachers or individual professional development activities to the exclusion of the influences of school and national education systems. Hamilton (2018) points out the importance of understanding the combination of micro (individual teacher), meso (school) and macro (wider societal and education system) factors that contribute to a teacher's willingness (or not) to engage in professional learning and change their practice. For example, **teacher learning can be influenced by school policies and routines, by school leaders and other teachers through their individual and collective beliefs, approaches, motivations and attitudes to learning, by the curriculum to be taught and by the pedagogical and assessment approaches that are valued and embraced within the school, the local community and the national education system. Teacher learning can also be influenced by a teacher's own students' responses to subject content, learning and assessment approaches, as well as, the questions they ask and their engagement, or lack of it, with class processes, tasks and activities.** The recent COVID19 pandemic provides an example of the influence societal challenges can have on teachers' learning, as it became a strong catalyst for teachers to learn about new online learning, teaching and assessment approaches. Similarly, the increased use of artificial intelligence (AI) across many sectors in society is influencing teacher learning as they grapple with challenges of ChatGPT and other generative technologies and their associated ethical and governance issues.

While many of these contextual influences have been studied individually, Opfer and Pedder (2011) once again draw attention to the need to understand how these different influences may interact with one another and impact on teacher

learning. Their research focus is on why and how teacher learning may or may not occur as a result of professional development activity, rather than identifying lists of professional development activities. They suggest, it is necessary to consider how a teacher's individual learning orientation system (e.g., their beliefs about learning, their prior knowledge, and how these are enacted in their classroom practice) interacts with their school's learning orientation system (the collective beliefs about learning, the collective practices or norms of practice that exist in the school, and the collective capacity to realise shared learning goals) and how these systems together affect teachers' professional development (Opfer and Pedder, 2011). Similarly, Hayes et al. (2024) suggest that the variability of success of professional development may be due to the interactions between a teacher's professional learning and the complex context in which such learning takes. Avalos (2011) in her review of studies concerning opportunities for teachers' professional learning found that schools in different geographical locations showed how beliefs, traditions and types of institutional arrangements affect the extent of teacher engagement in professional development.

**Collective beliefs, traditions, and ways of habitually doing things in school can create a school culture which either support or hinder teachers' professional learning.** As can the school and wider education system policies, reforms and implementation approaches influence teacher learning positively or negatively. Bucznyski and Hansen (2010) identified several barriers to teacher professional learning, suggesting, "...teachers that are willing to implement professional development practices in the classroom often face hurdles that are beyond their control" (p.606).

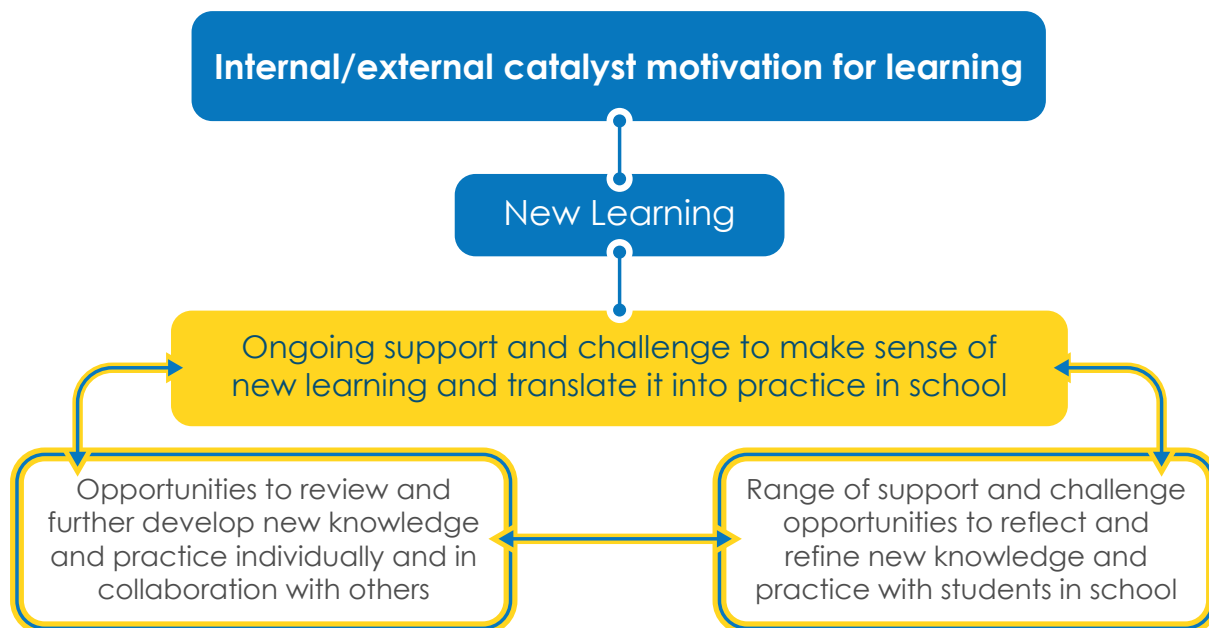
For example, insufficient time may be provided for new learning to be attempted and developed in their classrooms, there may be pressures of delivering a mandated curriculum, a lack of classroom resources, difficult classroom management issues or insufficient school leader support for teacher learning.

While many research studies have identified similar contextual influences on teachers' learning and development it is still unclear how these many dynamic and interacting contextual influences in combination impact on individual teachers. Some contextual influences may enable some teachers' learning, while the same influences may hinder other teachers (Livingston et al. 2024). For example, while some teachers welcome learning with others in a collaborative learning community in school, some may prefer learning individually from an external source, such as a formal course or a subject expert, for certain aspects of their learning. What is clear is the individualised nature of teacher learning and the importance of the provision of different types of professional learning to support a teacher's unique learning needs at particular times, balanced with meeting the needs of school and education system development priorities.

Much has been learned about the limited impact of learning at 'one-off' events, workshops or conferences and there is recognition that some teachers need more time than others to enable learning to be developed and applied in practice. Timperley (2008, p.15) argued, "for substantive learning to occur time in which to learn and change is needed". Too often teachers engage in interesting and informative professional development opportunities organised outside of school and are motivated to try to implement new ideas in their classrooms but find that other pressures of teaching and assessment prevent them from doing so. Even when new ideas and approaches are discussed in school, there may not be sufficient time available to enable teachers to take the next step towards implementation.



What is also clear is how teachers learn needs to be considered beyond the first step of acquiring new knowledge or skills. Telling teachers about curriculum or assessment reforms, new pedagogical approaches or new technological innovations is not enough to realise change to teachers' practice. **Regular and ongoing support in the application of professional learning in school is necessary to enable teachers to translate any new learning into practice by trying out, amending and reflecting on new and/or different ways of doing things with their own students.** Figure 1 below, which presents an adaption of Timperley et al.'s (2007) model by Livingston (2014), indicates that the identification of professional learning needs and the provision of professional development opportunities is only the start of a teacher's learning process. **Teachers have to be able to make sense of any new learning, understand its purpose and relevance and how it might be applied in their own classrooms with their students. They have to believe or come to believe that the change will have a positive impact on their own teaching and their students' learning.** To do this, teachers require dedicated time and support to think, plan, experiment and implement. The creation of supportive in-school learning environments is central to enabling teachers' ongoing professional learning across their career. A collaborative learning environment can support tailored professional learning which meets individual teacher needs in school, though, for example, ongoing structured professional dialogue with other teachers in school, and/or with external facilitation to enable teachers' learning.



**Figure 1: Model of Ongoing Professional Learning (adapted from Timperley et al, 2007 and Livingston, 2014)**

The model highlights the importance of extending the understanding of professional development beyond the provision of one type of professional development, such as courses, conferences and workshops. For teacher learning to occur and lead to change and impact on teaching and learning, it needs to include different types of learning and support, in line with specific learning needs, in contexts which value ongoing formal and informal day-to-day professional learning in schools. However, to provide professional learning opportunities that are more closely tailored to individual teacher's learning needs and the contexts in which they work, requires teacher educators with different knowledge, skills and expertise to support and challenge them at different times. **A better understanding is needed of who takes up the role of teacher educator and of the knowledge, skills and expertise that teacher educators working in different locations and educational sectors can offer teachers.** Teacher educators also need to understand their own learning needs, as well as increasing their knowledge of the purpose and features of different types of professional development and how they contribute to addressing various learning needs, in order to provide meaningful and relevant support to teachers.

Many research studies suggest features that appear to contribute to supporting teacher professional learning (e.g., Wilson and Berne, 1999, Desimone, 2009 and Darling-Hammond et al, 2017). Desimone (2009) claims that the extensive number of studies

investigating ways teachers can learn means there is sufficient evidence to support the identification of a core set of features of effective professional development. She emphasises that the focus should be on the *critical features* of professional learning opportunities - the features of an activity that make it effective for increasing teacher learning and changing practice, and ultimately for improving student learning - rather than on the *type* of activity (e.g., workshop or study group), (Desimone, 2009, p.183). From her review of professional learning and development studies, Desimone argues, there is a research consensus on at least five core features of effective professional development: content focus; active learning; coherence; duration; and collective participation. More recently, Darling-Hammond et al. (2017, p.4) identified similar features to Desimone, but added three additional features: use of models and modelling of effective practice; provision of coaching and expert support; and opportunities for feedback and reflection. These features indicate that professional development opportunities should focus on developing specific content, such as subject knowledge, combined with knowledge about learning and learners to develop pedagogical content knowledge (Shulman, 1986) to improve or expand learning and teaching approaches. Another feature identified emphasises the importance of engaging teachers actively in their own learning and encouraging them to have agency and take ownership of and responsibility for their own learning.



It is argued active involvement of teachers in their own learning is needed to raise their awareness of the influences of their embedded personal learning histories and frames of reference on developing their learning and enabling transformational change in their practices (Mezirow, 1996).

The social nature of learning, drawing from socio-cultural theories (e.g., Vygotsky 1978), is also viewed as fundamental, focusing on teachers learning with and from others in, for example, professional learning communities (Stoll and Louis, 2007), lesson study groups (Dudley, 2014), online networks (Trust, 2016) and teacher design teams ([see Case Study 1 in sub-section 3.4](#)). This situated view of learning, where learning relates more directly to the context of teachers' lived experiences (Lave and Wenger, 1991; Wenger, 2018) and work environment, offers a response to criticisms of professional development that teachers perceive as not relevant to their practice. Wenger (2010) emphasises that no matter how much external effort is made to shape practice, what matters is the meanings arrived at by those engaged in it, through active negotiation of meaning in their own context. A facilitated community of practice that continues to encourage and stimulate teachers' enquiry into learning and teaching in their own classrooms, taking account of the complex relationship between personal and social factors of learning (Wenger, 2010), is a key part of a system, culture and practice change process. Within schools there is a need to create the conditions to enable teachers to engage in a learning community, providing, for example, opportunities for joint reflection, analysis of student work, enquiry/research groups, experimentation of new approaches, peer observation and feedback that is directly relevant to the circumstances in which teachers learn and work ([see Case Study 3 in sub section 3.4](#)). In the examples suggested, teachers have opportunities to interact, share and discuss experiences and new ideas and find meaning that is relevant to their own and their students' learning.

Timperley et al. (2007) emphasise that teachers' current practice needs to be challenged as well as supported. Nevertheless, challenge and feedback have to be offered in a supportive learning environment. Teachers should be encouraged and supported in identifying the challenges they face through, for example, peer-coaching and mentoring opportunities rather than judgemental top-down approaches (Livingston, 2022). Feedback offered should be specific rather than general so that it assists

teachers in identifying concrete next steps in learning and is understood as developmental, rather than a judgement of their performance. As Timperley (2008, p.15) emphasises, all opportunities for teacher learning *"must occur in environments characterised by both trust and challenge, because change is as much about the emotions as it is about knowledge and skills"*. This again points to the importance of professional development for teacher educators, as they need to understand when to support a teacher and when it is appropriate to challenge practice. Challenging a teacher who lacks confidence may hinder further learning, while another teacher who is actively seeking new approaches may thrive on challenge. This means teacher educators need to consider the emotional aspect of a teacher's learning, as well as the development of their knowledge of learning and teaching and their ability to enact transformation in their practice.

Given the complexity of factors regarding how teachers learn and the changing context and circumstances in which they work, it is hardly surprising that despite the growing consensus about the list of core features identified, other research studies have critiqued them (Hill et al, 2013, Sims and Fletcher-Wood, 2021, Asterhan and Lefstein, 2024). The core characteristics have been criticised regarding the methodological approaches used to identify them and because there have been mixed results in professional development approaches that utilised the feature identified. Although it should be noted that success was typically measured by impact on development of student learning. Specific conditions may be more or less important for some teachers at a particular time or circumstance. For example, Shulman and Shulman (2004, p.269) analysing different features of teacher learning said they *"became more conscious of the complexity of learning to teach and understood while the 'subject matters' in professional development, there is much more going on simultaneously that at times the ever-important content differences can be swamped by other critical features of the context"*. This underlines the importance of teacher educators understanding the learning needs of individual teachers, the purpose and relevancy of learning for them, the context in which they are learning, and the importance of the dynamic combination of conditions that enable and support their learning. Asterhan and Lefstein (2024, p.17) sum this up, *"it is unrealistic to expect to find a one-size-fits-all answer to the question of what PD (professional development) approach is more or less effective"*.

Crucially, they emphasise that considering the core characteristics is not sufficient, it is *the way* the core design features are implemented that matters.

**Teacher educators need to consider not only the design features of professional learning but how they ‘tune into’ and connect to individual teacher needs and the context in which they work.**

Teacher educators then need to engage with the teacher through dialogue and discussion to jointly identify priorities and next steps, including relevant professional development to support and/or challenge the teacher. Discussions should give the teacher space and time to have agency and responsibility in the decisions taken regarding next steps and the type of professional development most suited to progressing their learning. Aims for learning should be clarified and agreed, as well as the approaches to be used to fulfil the aims and a time to meet to review and reflect on successes and any remaining challenges.



While the frameworks and core characteristics for effective professional development have been criticised, they do provide a helpful guide and starting point for teacher educator discussion about how to better understand the diverse and tailored learning opportunities that are offered to teachers and preferably developed with them. Finding an appropriate balance to support, challenge and

develop individual teachers' learning and address school, local and system development priorities, calls for further research to learn more about the complex assemblage of features and conditions for teacher professional learning.

*Research on effectiveness can usefully inform this work, but it needs to also take into account the aspects of teaching and learning targeted, the policy, professional and school environment in which teachers work, facilitators and teachers' professional knowledge, skill, judgement, and wisdom, and how all these factors interact to shape the professional development design's enactment (Asterhan and Lefstein (2024, p.18)*

In summary, there are multiple opportunities for teachers to learn and apply new learning through a variety of activities and approaches. What is important is to identify the features they have in shaping teacher learning and ensuring the “*activities are designed and aligned to meet the particular learning purpose*” (Timperley, 2008, p.15). The starting point is to understand and be responsive to the individual teacher's learning needs, however, to enable and support learning also requires understanding of the conditions that impact on the teacher within the school community and social system. Research shows for professional learning to be meaningful and have an impact on changing teacher practice and ultimately on student learning, it needs to be integrated into the daily work of teachers in their own classroom and school community. Ongoing collaboration and support from others in the school (e.g., school leaders, teachers, students and parents) is necessary for new learning to lead to change.

### Key points

*Teachers are individuals who have unique learning needs. How they learn can be influenced by their own characteristics, beliefs and motivations. It can also be influenced by multiple interacting and changing conditions in the school in which they work, the education system and the wider community.*

*Regular and ongoing support in the application of professional learning in school is necessary to enable teachers to translate any new learning into practice by trying out, amending and reflecting on new and/or different ways of doing things with their own students.*

*While each of the features identified in research studies for the design and implementation of effective professional development may be important in their own right, how they combine and interact with each other to provide effective opportunities for individual teacher learning in particular circumstances and in diverse contexts needs to be considered.*

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### Reflective questions

*In what ways do the conditions you work in support or hinder your learning as a teacher educator?*

*How do you take account of teachers individual learning needs when you are designing, planning and implementing professional development opportunities for them?*

### 3.3. The role of technology: influencing teacher learning

Effective use of technology is now a central element for learning, for schools and for society in general. The technological possibilities are changing and advancing almost daily and there are few doubts they will continue to do so. Technology not only needs to be recognised as a core feature of career-long professional development but also as an important factor that can shape and develop teacher learning. Technology is already enabling and supporting teachers to learn through the use of many different approaches, platforms and tools. For example, technology offers the potential for more tailored resources and materials allowing for learners to learn at their own pace, video analysis of pre-service and experienced teachers' practice to support reflective practice and online local, national and international professional learning communities and networks to enable teacher exchange and peer collaboration and learning. Artificial intelligence and other generative technologies are beginning to be recognised and used for teacher professional development, but there is much to learn, not only about the technical capabilities, but also how they can be used to support teacher and student learning.

Artificial intelligence can be understood in many ways. Salas-Pilco et al. (2022) define it as "*computing systems that are able to engage in human-like processes such as learning, adapting, synthesising, self-correction and use of data for complex processing tasks*". Pre-service and in-service teacher education is gradually developing the use of advanced technology in their programmes (Salas-Pilco et al. 2022) and while it is recognised that teacher educators have an important role in preparing future teachers to integrate technology in their educational practice (Tondeur et al, 2019), it is equally important to understand how teacher educators can effectively use technology to shape teacher learning. However, Tondeur et al. point out undertaking this task is a challenge for many teacher educators. Their research highlights that research has often focused on studying the digital competencies of teachers and that less is known about teacher

educators' knowledge and use of technology to enable and support teacher learning. They argue that teacher educators need to support and guide teachers' understanding of use of technology to develop both content knowledge and pedagogical content knowledge. Shulman (1986, p.9) describes pedagogical content knowledge as "pedagogical knowledge, which goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*" (emphasis in the original). But if teacher educators themselves lack confidence and ability in using technology this creates barriers to integrating it into teacher education programmes (Tondeur et al, 2019). Teacher educators are individual learners, and it is expected that there will be differences in their digital literacy, their beliefs about the benefits of its use to support teachers, in their access to technological resources and in their views about the value to technology-related professional development opportunities. Just as one size professional development does not fit every teacher's learning needs, teacher educators also require tailored approaches to meet their specific learning needs. More attention needs to be given to research that identifies the opportunities and barriers to using technology to enable teacher and teacher educator learning.

While this report cannot provide comprehensive insights into the multi-faceted ways technology can shape teachers' and teacher educators' professional learning or the challenges associated with the use of technology in different circumstances and contexts, it offers a brief selection of technology approaches and strategies for consideration and reflection that can be integrated into and shape professional development for teachers and teacher educators.

The use of technology in society has increased communication exponentially between people locally and internationally. The communication possibilities technology offers have enabled teachers to connect with teachers with diverse perspectives across geographical regions and support and collaborate with one another through social media

platforms and by engaging in online professional learning communities and networks. Trust et al (2016, p.16) define a professional learning network (PLN) as a “system of interpersonal connections and resources that support informal learning”. They collected data from 732 teachers about their understanding of PLNs and the possibilities they offer for formal and informal teacher learning. Their findings suggest that PLNs have potential to provide flexible access to professional learning, can respond to teachers' diverse interests and needs, and offer possibilities for supporting holistic professional growth of teachers. In their study they identified affective, social and cognitive benefits of PLNs for teachers professional learning. For example, many of the participating teachers reported that PLNs had influenced “their emotions, interests, and attitudes to teaching and learning” and the participatory learning with other teachers had made them feel 'energized,' 'engaged,' 'inspired,' and 'invigorated' (Trust et al, 2016, p.23). The participants did not describe the PLN as something done to them rather, they felt they had ownership of their learning and agency in the learning choices and decisions they made. Other teachers described the potential of PLNs to provide emotional support to overcome feelings of isolation through collaboration with others to find solutions to classroom and learning challenges. Trust et al., (2016) also reported that the teachers shared opportunities to develop ideas, resources, subject knowledge and teaching and learning strategies from their engagement with other teachers in the PLN. In summary, these informal online learning opportunities enabled the teachers to co-construct knowledge for their practice and learn in collaboration with peers, colleagues, and other individuals who are situated locally, nationally or internationally. The teachers reported participation in one or more PLN and they made use of different tools to access and share resources. Trust et al. (2016, p.28) agree with Liu, Miller, and Jahng's view (2016) that digital “tools that work in one case may fail in another and tools that support community at one stage may hamper it at another”. This comment has striking resemblance to the point that some forms of face-to-face professional learning may have a positive impact on some teachers' learning, but not on other teachers' learning or may work in particular circumstances and times, but not in others. The same is the case for the use of technology to support professional learning. It is also a reminder of the individualised nature of teacher learning and that teacher educators must take care not to generalise the benefits or the challenges of types of professional

learning, rather to be mindful of the purpose of the professional learning and the features that appear to be effective in addressing particular learning needs.

Salas-Pilco et al. (2022) undertook a systematic review of artificial intelligence and learning analytics in teacher education and identified the opportunities and barriers to their use to support learning. They found that the use of learning analytics, which they define as “measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs”, is increasing in schools. They reported that increasingly data are gathered in schools to analyse student engagement and learning tracked through digital platforms. Data analysis can, for example, identify student learning patterns in terms of both learning progress and challenges that learners encounter. In this way, learning analytics can provide helpful evidence to signal to teachers aspects for their own professional development, facilitate more individualised feedback and support for their students' learning, as well as aid decision-making about next steps in teaching. Learning analytics has potential to provide teacher educators with similar opportunities to understand more about teacher learning and enable them to provide more relevant and timely feedback tailored to support the specific needs of teachers. However, to be effective, teacher educators need to understand not only what data to collect for what purpose, but how to collect it and how to use it to better support teacher learning. Beyond requiring support to develop the necessary data analysis skills and understanding what the evidence means for teachers learning and their own practice, teacher educators also need support to understand the ethical implications of gathering, storing, analysing and using data about students' and teachers' learning. Research shows that teachers have concerns not only about data governance within schools and their local and national context but also about the control of the algorithms and data generated by private technology companies. Such concerns need to be addressed as they have potential to reduce teachers' and teacher educators' confidence in using data to better support learning.

Copur-Gencturk et al.'s study (2024) examined asynchronous online professional development opportunities. They recognised that personalised and widely accessible professional development is necessary for teachers.

However, they highlight “a long-standing tension between customizing support and increasing access to such support has hindered the scale-up of high-quality PD for individual teachers” (Copur-Gencturk et al., 2024, p.1). In their view, asynchronous online professional development can provide more teachers with access to high-quality professional learning opportunities by overcoming some of the barriers teachers and teacher educators may face such as time conflicts, geographic locations (e.g., rural areas), and financial and human resources (e.g., in under-resourced schools and regions). Yet they recognised that “many existing asynchronous OPD [online professional development] programs struggle to offer individualized, real-time, interactive feedback to participating teachers” (Copur-Gencturk et al., 2024, p.2). They explain that this challenge does not only occur in asynchronous programmes but can also apply to online learning environments in general. However, research (e.g., Cavalcanti et al. 2021; Copur-Gencturk et al., 2024) has provided evidence of potential advances that have been made in the use of artificial intelligence (AI) to generate feedback and offer individualised interaction with a virtual facilitator in online programmes. For example, Copur-Gencturk et al., (2024) used AI to design an active learning environment for teachers, engaging them in activities relevant to their teaching supported by adaptive natural language tutoring which responded to teacher responses (or lack of them). They developed “a set of expectations (i.e., learning goals) and misconceptions (e.g., common struggles identified in prior literature), and corresponding hints and prompts ... stored as scripts for the virtual facilitator in the system” (Copur-Gencturk et al., 2024, p.3). While their design enabled the teachers to receive timely feedback and their findings showed the programme has potential to facilitate teacher learning to some extent, their study involved a relatively small number of teachers (n

= 70 teachers divided into treatment and control groups in a randomised control trial). Further, it was not designed to identify the aspects of the programme (e.g., design of activities, automated feedback) that contributed to the positive impact of the programme. Copur-Gencturk et al., recognise that further research is needed to investigate the contribution that the different design features have on the teachers' learning and that more attention needs to be given to the professional development of teacher educators to better prepare them to enable teacher learning using AI. This provides an example, where blended approaches to professional learning may be needed involving both face-to-face opportunities for teacher learning as well as online learning. In other words, face-to-face and online professional development approaches both have an important role depending on the purpose of the learning, the individual teacher's beliefs, characteristics and learning needs and their context. A blended approach of both face-to-face and online professional learning in different combinations over time may be required to provide opportunities to access new knowledge and ongoing support for teachers to translate and apply new learning in practice in school.

The above examples show opportunities but also highlight the complexities of using technology in the context of teacher learning. In particular, **the role of teacher educators in facilitating effective use of technology for teacher learning requires further investigation.** Teacher education institutions and professional development agencies should provide opportunities for teacher educators to participate in professional development opportunities that focus on technology integration and provide them with the resources and support that they need to implement new technologies in their own learning and teaching.

### Key Points

*Research is needed to find out more about teacher educators' knowledge and use of technology to enable and support teacher learning.*

*Asynchronous online professional development has potential to provide more teachers with access to high-quality professional learning opportunities by overcoming some of the barriers teachers and teacher educators may face, but currently there are still challenges in offering individualised, real-time, interactive feedback to participating teachers. Blended learning approaches may be required to meet the purpose of the learning, the individual teacher's beliefs, characteristics and learning needs and their context.*

*Learning analytics has potential to provide teacher educators with opportunities to understand more about teacher learning and enable them to provide more relevant and timely feedback tailored to support the specific needs of teachers.*

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However, to be effective, teacher educators need to understand not only what data to collect for what purpose, but how to collect it and how to use it to better support teacher learning.

Professional learning networks have potential to provide flexible access to professional learning, respond to teachers' diverse interests and needs, and offer possibilities for supporting holistic professional growth of teachers. However, this may work in particular circumstances and times, but not in others.

### Reflective Questions

What are your own beliefs about the role of technology in education and how does this shape how you integrate technology into professional development opportunities for teachers?

## 3.4. Learning through community, reflection, and technology

In this section, three examples are selected to demonstrate the important role of context, community and technology in shaping teacher learning and development. The examples were gathered from the reflections of three teacher educators from Belgium, Italy, and Estonia and aim to show how key research findings have been applied in the field of teacher education. While the effectiveness of these approaches may vary depending on context and implementation, sharing the challenges faced and the impacts observed through the eyes of practitioners aims to stimulate reflection, spark new ideas, and encourage further research and experimentation among teacher educators in their own contexts.

### Case Study 1: Leveraging teacher design teams

A key finding in teacher education research highlights that professional development which is aligned closely with teachers' own classroom practices significantly enhances learning and application. Specifically, professional development should connect directly with the real needs of teachers, focusing on what is immediately relevant to their day-to-day work. This research insight underscores the importance of basing professional development on teacher practice, thus bridging the gap between teacher education and actual classroom implementation.



**Jo Tondeur** is Professor at the Vrije Universiteit Brussel. His research is situated within the field of instructional design, professional development and educational innovation.

Most of his research focuses on the integrated use of digital technologies in compulsory education and online and blended learning in Higher education.

To apply this insight, Jo Tondeur, Assistant Professor at the Vrije Universiteit Brussel, has incorporated *Teacher Design Teams (TDTs)* into professional development offerings. A TDT is a collaborative group of educators who co-design lesson plans, educational materials, and resources directly applicable to their classrooms. By working within TDTs, teachers collaborate with peers to develop practical solutions tailored to their teaching contexts, fostering both ownership and relevance. Supported by a mentor or facilitator, TDTs follow structured design phases—such as analysis, development, and iteration—typically over several months. This model has proven effective in both building teachers' instructional design skills and strengthening professional communities within schools.

One significant challenge with TDTs is the high resource demand and the need for a collaborative school culture, which can be challenging in contexts where such a culture is underdeveloped. Scaling these practices is also difficult, as effective TDTs often rely on intensive guidance and support, typically provided by experienced teacher educators through dedicated mentoring sessions. This hands-on mentoring is essential to ensure that TDT members develop the skills and confidence needed to collaborate effectively. Additionally, the involvement of school leaders is crucial, as their support in fostering a collaborative culture and providing the necessary resources directly impacts the success of TDTs.

The impact of TDTs has been most evident in enhanced teacher collaboration. Working together to design lessons has encouraged teachers to co-

teach, develop stronger professional relationships, and see themselves as both educators and designers. This shift, akin to musicians who perform and compose, has led to a deeper understanding of instructional design among teachers. While TDTs may not always produce resources suitable for wider dissemination, the process itself has fostered peer learning, open collaboration, and a positive change in school culture. Teachers are now better equipped to design learning environments that reflect their students' needs and integrate relevant technology, demonstrating a shift in beliefs about effective teaching and learning.

For more information see: [Tondeur, J. \(2018\). Enhancing future teachers' competencies for technology integration in education: Turning theory into practice. Seminar.net. 14. 10.7577/seminar.2981](#)

## Case Study 2: Encouraging reflective practice through digital portfolios

Research shows that teachers learn most effectively through structured opportunities for reflection. Reflective practices—especially when facilitated through tools like digital portfolios (also known as e-portfolios)—allow teachers to engage in deeper self-assessment, make sense of their experiences, and identify areas for improvement. Digital portfolios are particularly beneficial because they offer a continuous, accessible platform where teachers can document their experiences, track their growth, and revisit previous reflections, which enhances self-awareness and encourages lifelong learning. By fostering a habit of reflection, digital portfolios not only support teachers during the induction phase but also empower them to independently continue developing their practice throughout their careers. This reflective process promotes sustained professional growth, as teachers become more adaptable and responsive to the needs of their students and their own teaching contexts (Pettenati et al., 2024).



**Maria Chiara Pettenati** is a distinguished expert in teacher training and sustainability education. Throughout her career, Maria Chiara has demonstrated a deep

commitment to advancing teacher education and promoting sustainable development principles in education.

As Research Director at Indire, the National Institute for Documentation, Innovation, and Educational Research in Florence, she leads national projects focused on supporting induction and continuous professional development of teachers across Italy. Maria Chiara also serves as co-coordinator of the working groups for Goal 4 and Target 4.7 at ASviS (Italian Alliance for Sustainable Development), where she actively contributes to national strategies for achieving the United Nations' Sustainable Development Goals.

Maria Chiara Pettenati, Research Director at INDIRE in Italy, has developed and followed the introduction of digital portfolios in teacher training initiatives. The portfolio has been used on a national scale in Italy since 2015, with a growing perception of its effectiveness. In 2023/24, it was completely redesigned and updated to be adaptable for both initial and continuous professional development – meaning it can be used before and after the probation year of newly appointed teachers and within a lifelong learning perspective.

The portfolio is anchored in a set of minimum professional standards and promotes self-evaluation across various teaching competencies. The competency framework used as part of the portfolio uses five levels of mastery, ranging from "the competence has never been tested" to "the competence is mature and accredited." The portfolio is organised around four essential functions: *Documentation*, involving the collection of curated materials that demonstrate professional development; *Reflection and Narrative*, where teachers link selected materials to articulate their skills and growth; *Projection*, enabling teachers to assess their abilities against a professional competence profile; and *Publication*, allowing teachers to share parts of their professional journey with others. The portfolio is grounded in two fundamental constructs – *Teacher Standards and Documentation of Experience* – and culminates in a series of online activities that mirror and integrate in-person and school-based practices, fostering a well-rounded approach to teacher professional development.

The digital portfolio holds promise as a valuable tool for supporting teachers in organising, reflecting on, and developing their skills during a teachers' induction period. Teachers see the portfolio as a resource for self-assessment and professional growth;

however, many find it challenging to sustain regular use and did not express strong interest in continuing its use beyond the probationary period. This hesitancy may stem from factors such as a lack of clearly defined purpose and focus for continued use. This difficulty often stems from the added administrative workload it introduces, which can be particularly burdensome for in-service teachers managing a busy schedule.

This challenge is largely cultural, as it reflects the broader issue of how professional development tasks are perceived and prioritised in the teaching profession. Addressing it may require changes driven by policy to foster a shift in attitudes and practices. In Italy, the National Recovery and Resilience Plan has led to the establishment of the School of Advanced Training, an institution tasked with overseeing continuous professional development for educators. The use of the digital portfolio as a tool for professional growth is envisaged and is included in the national guidelines for teacher development, which emphasise the portfolio's potential role in ongoing teacher support and accountability (<https://www.safi.istruzione.it/>).

A significant majority of newly qualified teachers in Italy found the portfolio to be an invaluable tool in navigating the stages of the probationary year, allowing them to complete tasks in a well-organised and structured manner. Many reported that the portfolio not only helped them track and document their probationary activities but also enabled them to build a coherent and comprehensive understanding of their professional journey during this critical period. Teachers highlighted the portfolio's substantial role in fostering critical reflection on their teaching practices, allowing them to evaluate and refine their approaches.

For more information see: [Pettenati, M. C., Tancredi, A., Martinelli, S., Miotti, B., Ferrini, A., Chiarantini, M., Bei, G., & Calistri, L. \(2024\). A new teacher portfolio towards lifelong learning. Proceedings of ISYDE 2024: Italian Symposium on Digital Education, Lifelong Digital Learning and Education: Promoting flexibility, inclusion, critical thinking, and international exchange, Pavia, Italy, 19–21 June, 2024. Pearson Ed. \[Preprint\]](#)

### Case Study 3: Combining situated learning elements with social learning practices

Research highlights that teachers' professional learning is most effective when it integrates situated and social learning experiences. This approach emphasises the importance of teachers directly applying new strategies in their classrooms, collaborating with peers, and receiving guidance from experienced teacher educators. Such practices help deepen teachers' understanding of new concepts while building their confidence to implement them effectively.



**Kairit Tammets** is a Professor of Technology-Enhanced Learning at Tallinn University whose research focuses on teacher professional learning in technology-enhanced learning

environments. With extensive experience in designing and implementing professional development programs, Kairit Tammets specialises in fostering social learning practices to promote the adoption of innovative teaching methods.

As the Scientific Coordinator of the EU-funded *EffectiVe* project, Kairit leads innovative research into how carefully designed training programs can enhance teachers' situation-specific skills and pedagogical digital competence. Her work emphasises the importance of scaffolding, reflection, and the situated nature of professional learning in professional learning settings. In addition to collaborating with schools and policymakers to shape sustainable professional learning models, Kairit is an experienced teacher trainer, guiding teachers, researchers, and trainers to bridge the gap between theory and practice.

Drawing on this evidence, Kairit Tammets, Professor of Technology-enhanced learning at Tallinn University, together with her team designed a teacher training approach (Ley et. al., 2022) to combine situated learning with social practices, fostering practical application, collaboration, and reflection. As a part of the [EffectiVe project](#), they emphasised the role of pedagogical digital competence development as part of this training method. Tasks were introduced with varying levels of complexity, beginning with simpler scenarios and gradually progressing to more



challenging ones. Teachers worked collaboratively to design lesson plans and activities that incorporated the concepts they were learning. These collaborative efforts were facilitated by experienced teacher educators who provided ongoing feedback and guidance. After designing the lesson plans, teachers implemented them in their classrooms and engaged in reflective observations to evaluate their effectiveness. The programme followed an iterative cycle where teachers documented and analysed classroom experiences, revisited their plans, and adapted them based on what worked and what did not. This process helped them develop practical, situation-specific skills and bridge the gap between theoretical knowledge and real-world practice.

However, two significant challenges emerged during the implementation of this approach. First, teachers often found it difficult to apply complex theoretical frameworks to practical classroom scenarios. While they understood the theory, translating it into actionable steps for lesson planning and implementation proved challenging. Second, many teachers approached the training with a mindset shaped by traditional professional development, expecting passive learning experiences. They were initially hesitant to actively engage in designing, implementing, and reflecting on their practices.

To address these challenges, the programme prioritised clear communication from the outset, ensuring that participants understood the purpose and structure of the training. The active nature of the learning was emphasised, and the programme was reframed as a 'professional learning programme' to highlight its focus on engagement and situated practice. Activities were introduced gradually, beginning with small, manageable tasks that encouraged active participation without being overwhelming. Additionally, the training environment was carefully designed to support experimentation and learning from mistakes. Trainers emphasised the importance of the process over immediate success, encouraging teachers to try new approaches and reflect on their experiences.

The integration of situated and social learning practices into the professional development programme resulted in positive changes in teachers' practices, knowledge, and beliefs, as well as their willingness to adopt innovative teaching strategies. Nonetheless, this approach is resource-intensive compared to traditional training methods. The iterative nature of the programme, with its focus on reflection, feedback, and practical application, requires more time, interdisciplinary expertise, and sustained support to ensure its effectiveness. Despite these demands, the programme's emphasis on continuous feedback and deep reflection has proven essential for fostering meaningful and lasting changes in teachers' professional practices.

For more information see: [Ley, T., Tammets, K., Sarmiento-Márquez, E. M., Leoste, J., Hallik, M., & Poom-Valickis, K. \(2022\). Adopting technology in schools: modelling, measuring and supporting knowledge appropriation. \*European Journal of Teacher Education\*, 45\(4\), 548-571](#)

# 4. Designing effective professional learning development opportunities

The key message in this report is that teachers learn in many ways, for different purposes, in different circumstances and contexts. Their learning is influenced by their own beliefs, motivations and attitudes and a diverse and dynamic myriad of contextual conditions. **For teacher educators seeking to design effective professional learning this means understanding more about the individual learning needs of teachers, as well as the influences impacting on why, how and what they learn.** As Kennedy, (2019, p. 140) says, “we don't see what they see, from their [teachers'] vantage point at the front of the classroom and from their vantage point of trying to lead the class in a particular direction”. Nor do teacher educators, know what teachers' goals, motivations, learning needs, concerns and frustrations are unless they are uncovered and made explicit. **To understand teachers as individual learners requires opportunities for dialogue between teachers and teacher educators.** Mentoring conversations are one way to enable this. They can take place face-to-face and/or online. In both cases the active involvement of the mentor and mentee in structured dialogue about specific topics that the mentee has identified either prior to the conversation or at the start is important. The mentor can use probing questions to support and deepen teachers' reflection and assist them in clarifying and identifying priorities in learning, as well as concrete next steps. A question such as “tell me more about ...” is an example of inviting a mentee to reflect further on their initial response. Supporting the teacher to identify and prioritise next steps in learning enables the mentor to offer relevant feedback and suggest or design appropriate follow-up professional development in collaboration with them. An effective mentoring conversation which is based on support and challenge of a teacher's learning requires the development of a trusting relationship. This can only be developed through careful listening, respecting the teacher's prior

knowledge and offering meaningful and relevant feedback that supports their development.

Theories of learning highlight the complexity of learning and teaching. **Taking a holistic approach to learning means that teacher educators designing and implementing professional development opportunities for teachers need to consider the learning content, the emotional effort associated with the teacher's learning and the learning environment influencing their learning.** Research shows how teachers learn has to be considered beyond the first step of acquiring new knowledge and skills. Teachers have to be able to make sense of any new learning and understand how it might be applied in their own classrooms with their students. Catalysts for a teacher's learning can come from a wide range of sources. For example, an external source such as reading a journal article or a book, attending a predetermined professional development course or a conference, joining a curriculum subject or a topic network, online or peer group research, or an activity organised by a school leader or teacher educator. Alternatively, the catalyst for learning may be, for example, a teacher's own motivation to extend their subject knowledge or learn more about innovations in learning and teaching, such as the use of new technology, or about how to support students with additional learning needs, or as a way to further their career development.

New learning then needs to be nurtured, enabled and supported in school and over time for professional learning to be effective. Research suggests that some teachers need more support than others, different sorts of support and different amounts of time to enable learning to be applied in practice. This means to realise the aim of nurturing teacher learning beyond an initial catalyst requires teachers' professional learning in their schools and in their own classrooms. This form of professional development has to be recognised by policymakers, school leaders and by teachers themselves as valued professional

learning. This implies that it has to be acknowledged as legitimate professional development. As pointed out by Desimone (2009, p.182), “*some of the most powerful learning can occur in teacher’s own classrooms ....*”. School leaders and the school community have an important role in creating supportive conditions in school for teachers to have the time and opportunity to try new approaches, extend and continue their learning. This involves them supporting individual teachers and enabling and facilitating collaborative learning for all teachers.

**Teacher educators should work with and include teachers and school leaders in designing meaningful professional learning for teachers.** This collaborative approach has the dual purpose of providing teacher educators with an opportunity to learn more about the school context and the priorities for teacher learning and to develop greater collaboration and coherence between external and school-led professional development.

**Making decisions about the most appropriate type of professional development support is dependent on the purpose of learning.** Research suggests that teacher educators need to understand more about the different *features* of professional development activities to make informed decisions about what form of professional development best suits the purpose of teachers’ learning at a particular time and/or specific context in which they learn. As suggested, the core features identified by research studies offer a framework for discussion between those involved in designing professional development opportunities for and in collaboration with teachers. **Teacher educators, when designing professional development, must also be mindful of the multiple and interacting factors influencing individual teacher’s learning.** For example, if the focus of professional development is supporting and extending an individual teacher’s development of subject knowledge content and pedagogical content knowledge, it is likely to require a subject specialist to support learning. This could involve observing/shadowing or co-teaching with a subject teacher in school, who can model practice and make explicit the content and pedagogical decisions made in their classroom and explain why certain choices were made. Such professional development should be designed to involve follow-up joint reflection and discussion as the teacher tries out, in their own classroom, some of the ideas that were modelled.

Alternatively, if it is professional development to implement a new curriculum reform, it could be designed for example, to include the active involvement of teachers in a lesson study group or practitioner enquiry in order to provide opportunities to investigate and try out new pedagogical approaches collaboratively with colleagues.

Involving individual and groups of teachers in discussion about possible professional development approaches at the design and planning stage promotes the development of teacher agency and a sense of ownership and responsibility in their learning. This highlights the important guiding and supporting role that teacher educators have in teacher learning, in contrast to a transfer of information role or a ‘telling what to do’ approach without offering an explanation or demonstration of how or why something works for them. Korthagen (2017) contends there is a need for teacher educator learning to realise the aim of adopting different roles, such as a guide and facilitator, when supporting teacher professional development.

Teachers are expected to offer differentiated approaches to meet the needs of diverse learners in their classrooms. Similarly, teacher educators need to design and offer differentiated professional development approaches to meet the complex and changing learning needs of individual teachers in uncertain and unpredictable times. It is only through engagement with teachers as learners that teacher educators will gain a better understanding of why some types and or features of professional development work for some teachers and not for others. Also, it is necessary to understand that providing teachers with new knowledge or information, new pedagogical approaches or new technology via courses, workshops, seminars or conferences is unlikely to be sufficient in changing teachers’ practice. How teachers interpret and make sense of the new information, so it is meaningful for them and can be applied in their own classrooms, requires ongoing support for their professional learning. Timperley et al. (2007) in their Best Evidence Synthesis of Studies of Professional Development reported that teachers need multiple opportunities to learn through a range of ways to promote in-depth learning. Achieving this requires closer collaboration and coherence between teacher educators and school leaders, including joint training, to make effective ongoing professional development a reality for teachers.

## Suggested points for **teacher educators** to consider and discuss when **designing professional development for teachers**:

Consider the three dimensions of teacher learning, cognitive, emotional and social when designing professional development for teachers.

Identify the purpose of the professional development for teachers.

Use the core features identified in research studies as a framework to consider the features of professional development that are relevant to teachers' particular learning needs.

Facilitate teachers to be explicit about their beliefs, assumptions and expectations about their own learning and knowing to understand them as learners and respond to their learning needs.

Facilitate dialogue with teachers through, for example, structured mentoring conversations and plan for opportunities to engage in joint reflection with teachers about their practice.

Through dialogue encourage teachers to identify their own learning needs, what they know, what they are they able to do now and what motivates them to continue their learning.

Plan for follow-up professional development beyond teachers' first step in gaining new knowledge in order to deepen and extend the professional learning so it can be applied in practice in schools.

Offer choices by planning for differentiated approaches to professional development that are tailored to teachers' individual learning needs, including options for face-to-face, online teacher learning and the use of advanced technology.

Explore use of new technology to provide opportunities for tailored professional development for teachers and innovative differentiated approaches.

Use technology in your own practice to model the use of technology to develop learning with teachers.

Encourage teacher collaboration and enquiry to develop their professional learning through, for example, professional learning communities, peer mentoring, practitioner enquiry/research, lesson studies, teacher design groups.

Engage with school leaders to support their learning and development to create supportive and collaborative learning environments in school to support and challenge teacher learning.

Suggested for points for **teacher educators** to consider in **developing their own professional learning**:

- | Identify professional development opportunities for teacher educators to develop your pedagogy for teacher education in collaboration with other teacher educators.
- | Identify professional development opportunities for teacher educators to develop your understanding of different platforms and digital tools and the use of technology to enable and support teacher learning.
- | Explore opportunities in your practice to use new technology to deepen and extend the possibilities for teacher learning and to develop your own learning and practice.
- | Engage in self-study to develop awareness of and make explicit your own beliefs, assumptions and expectations about learning, and to reflect on and enquire into your practice as a teacher educator.
- | Engage in researching the practice of teacher education, individually or collaboratively.
- | Identify opportunities for mentor training to develop knowledge, skills and expertise in professional learning conversations.
- | Develop your understanding of the ethical issues associated with the collection, analysis and use of data to support and develop learning.
- | Develop partnerships between your teacher education institution/agency/centre and schools and collaborate with school leaders to develop supportive learning environments in school.

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