

OECD Education Working Papers No. 174

What difference do standards make to educating teachers? A review with case studies on Australia, Estonia and Singapore

Nóra Révai

https://dx.doi.org/10.1787/f1cb24d5-en

OECD

Organisation for Economic Co-operation and Development

EDU/WKP(2018)10

Unclassified **English - Or. English**

12 June 2018

DIRECTORATE FOR EDUCATION AND SKILLS

Cancels & replaces the same document of 25 May 2018

WHAT DIFFERENCE DO STANDARDS MAKE TO EDUCATING TEACHERS?

A Review with Case Studies on Australia, Estonia and Singapore

OECD Education Working Paper No. 174

Nóra Révai, OECD

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

Nóra Révai, Analyst, Nora.Revai@oecd.org

JT03433378

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

OECD EDUCATION WORKING PAPERS SERIES

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed herein are those of the author(s).

Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on which the OECD works. Comments on Working Papers are welcome, and may be sent to the Directorate for Education and Skills, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgement of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org.

Comment on the series is welcome, and should be sent to edu.contact@oecd.org .

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

---

www.oecd.org/edu/workingpapers

© OECD 2018

ACKNOWLEDGEMENTS

The author would like to thank all informants of the teacher education institutions of the following three countries for providing invaluable insights into their teacher education programmes and procedures, and for their feedback on case study drafts: Äli Leijen, Margus Pedaste (Estonia), Larissa McLean Davies, Field Rickards (Australia), and Ee-Ling Low, Ng Wee Leng Janey and Siti Suhana Bte Roslan (Singapore). The author would also like to thank Carlijne Ceulemans and Deborah Nusche, who reviewed and provided valuable suggestions for the draft of the paper. A further thanks to colleagues in the OECD Secretariat who have contributed to the preparation of this paper: Matthew Gill for editing and Rachel Linden for providing support in the last phase of publication. Last but not least, the author expresses gratitude to Tracey Burns, who has supported the work and provided various comments and input throughout the different phases of this paper.

ABSTRACT

This paper reviews evidence on the interplay between professional standards for teachers, the content of teacher education and educational sciences, and provides three case studies to illustrate these interactions from Estonia, Australia and Singapore. In particular, it investigates what aligning teacher education programmes to standards really mean; and what conception of educational sciences is reflected in the standards and the curriculum. Analyses suggest that alignment, as an explicit, direct and consistent correspondence, is difficult to achieve, in part due to different conceptualisations of professional knowledge. However, this paper argues that the main value of standards as policy tools lies in their capacity to create mutual dialogue between different artefacts (standards' requirements, curriculum, course descriptions, accreditation standards, etc.), as well as among stakeholders. Regularly renegotiating the standards as a result of such dialogue and reflections should be a crucial part of the policy process.

RÉSUMÉ

Ce document de travail fait un état de la littérature sur l'interaction entre les normes professionnelles pour les enseignants, le contenu de leur formation et les sciences de l'éducation. Par ailleurs, il fournit trois études de cas pour illustrer ces interactions en Estonie, en Australie et à Singapour. En particulier, il étudie ce que signifie réellement l'alignement des programmes de formation des enseignants avec les normes; et quelle conception des sciences de l'éducation est reflétée dans les normes et le curriculum. Les analyses suggèrent qu'il est difficile d'obtenir un alignement, au sens de correspondance explicite, directe et cohérente, notamment en raison de conceptualisations différentes du savoir professionnel. Néanmoins, ce papier soutient que le potentiel des normes en tant qu'outils politiques réside dans leur capacité à créer un dialogue entre différents artefacts (les exigences formulées par les normes, le curriculum, les descriptions des cours de formation, les normes d'accréditation, etc.), ainsi qu'entre les différentes parties prenantes. La renégociation régulière des normes à la suite de ce dialogue et de ces réflexions devrait être un élément crucial du processus politique.

Table of contents

ACKNOWLEDGEMENTS **3**

ABSTRACT **4**

RÉSUMÉ **4**

1. Introduction and methodology **7**

2. Professional standards, educational sciences and teacher education curriculum **9**

2.1. What is at stake? 9
2.2. How is the topic approached? 10
2.3. What are standards? 12
2.4. How do standards work? 14

3. Case studies: introduction and methodology **21**

4. Estonia **24**

4.1. Teacher education 24
4.2. Teaching standards 25
4.3. Linking pedagogical curriculum, standards and educational sciences 29

5. Australia **32**

5.1. Teacher education 32
5.2. Teaching standards 33
5.3. Linking pedagogical curriculum, standards and educational sciences 40

6. Singapore **43**

6.1. Teacher education 43
6.2. Teaching standards 43
6.3. Linking pedagogical curriculum, standards and educational sciences 47

7. Discussion **49**

7.1. Standards, teacher education programmes and educational sciences 50
7.2. Standards as agents of change 53

8. Conclusions **55**

References **56**

Annex A. Estonia – Comparative analysis of professional standards and a selected pedagogical curriculum **63**

Annex B. Australia – Comparative analysis of professional standards and a selected pedagogical curriculum **66**

Annex C. Singapore – Comparative analysis of professional standards and pedagogical curriculum **69**

Tables

Table 2.1. Knowledge traditions in the study of education 19
Table 3.1. Initial teacher education and standards in Estonia, Australia and Singapore 22
Table 3.2. Description of the ITEL TKS assessment framework and selected topics 23
Table 4.1. Knowledge and competence areas in the Estonian teaching standards 27
Table 4.2. Examples for teacher tasks in the Estonian teaching standards 28
Table 5.1. Key documents supporting Australian teacher policies used in this case study 34
Table 5.2. Professional knowledge in the Australian graduate standards and core pedagogical areas . 38
Table 5.3. Examples for professional practice in the Australian teaching standards 39
Table 5.4. Sample full time course plan of the Melbourne Graduate School of Education 41
Table 6.1. Examples for professional practice in the Singapore Graduand Teacher Competences 46
Table 6.2. Curriculum structure of the PDGE (secondary, general) programme at NIE, Singapore 48
Table 7.1. Correspondence between standards and teacher education curriculum in the selected cases51

Table A.1. Course learning outcomes matched with professional teaching standards 65
Table B.1. Course learning outcomes matched with professional teaching standards 67
Table C.1. Course descriptions matched with Graduand Teaching Standards 69

Figures

Figure 2.1. Analytical approach: dynamic assemblage of three representations of professional knowledge 11
Figure 2.2. Potential stakeholders in education 15
Figure 4.1. Components of teacher education professional studies at the University of Tartu 30
Figure 5.1. Australian accreditation system 37
Figure 6.1. The V^3SK Model 45
Figure 7.1. Analytical approach revisited 50

Boxes

Box 2.1. Definition of standards 13
Box 2.2. Actor-network theory 17
Box 4.1. Application of standards in Estonia 26
Box 5.1. Recommendations on how initial teacher education should ensure classroom readiness of all candidates 36

1. Introduction and methodology

Establishing a quality teaching workforce capable of effectively developing the competences of students and helping them reach their potential has been a main underlying objective of education reforms in many countries recently (OECD, 2015[1]). Policy initiatives involved improving initial teacher education and professional development, developing teaching standards or competence framework and linking them to teacher appraisal, introducing career stages for teachers and so on (OECD, 2015[1]; 2013[2]). Increasingly more research studies look at the quality features of teacher education in high-performing systems (Darling-Hammond, Wei and Andree, 2010[3]; Hammerness and Klette, 2015[4]; Darling-Hammond, 2006[5]; Darling-Hammond et al., 2017[6]), and some investigate more specifically the content of teacher education (Jensen et al., 2016[7]; Schmidt et al., 2008[8]). Teaching standards have also been examined and compared (Toledo, Révai and Guerriero, 2017[9]; Kleinhenz and Ingvarson, 2007[10]), and the evidence on their impact on teacher education extends to a growing number of localised contexts (Chung and Kim, 2010[11]; Tummons, 2014[12]; Page, 2015[13]; Kriewaldt, 2012[14]; Ceulemans, Simons and Struyf, 2012[15]). A broader understanding of the interplay between professional standards and teacher education can usefully inform the direction of new policies. It is thus relevant to ask: How are professional standards and the teacher education curriculum linked?

In parallel, the debate around the nature of the teaching profession, the knowledge and skills teachers need, where and how this is produced and developed, has gained increasingly more attention both in research and policy communities (Guerriero, 2017[16]; Hargreaves, 1996[17]; Hiebert, Gallimore and Stigler, 2002[18]; Whitty and Furlong, 2017[19]). Most researchers argue that teachers' need a specialised knowledge base on which they base their professional judgement (Guerriero, 2017[16]; Hargreaves, 1996[17]), but the type and sources of this knowledge base is debated (Hiebert, Gallimore and Stigler, 2002[18]; Goldacre, 2013[20]). While these discourses have been influential in designing teacher education policies, they sometimes result in contradictory initiatives (Kuhlee and Winch, 2017[21]), hence the need to understand the role of educational sciences in policy design.

This paper seeks to contribute to better understanding the above questions by reviewing and synthesising the evidence on the complex interplay between professional standards, the content of teacher education, and educational sciences and research. It provides three case studies to illustrate these interactions from three countries with differing contexts, systems and approaches: Estonia, Australia and Singapore. While acknowledging the importance of lifelong professional learning, this paper focuses on initial teacher education. Besides specifying a feasible scope, this focus is also motivated by the somewhat more widespread use of standards in initial education than in professional development.

The following questions are explored (see also Figure 2.1):

- What does aligning teacher education programmes to standards really mean? To what extent is this achieved and what are the obstacles?
- What conception of educational sciences is reflected in the standards and the curriculum? How does that relate to the link between these two?

The analysis aims to support countries and policy-makers in their reflections on using professional standards as a means to improving education systems.

This paper seeks to investigate the questions through conducting a review of literature and a small set of case studies. The short review (Section 2) sets the frame for discussion, establishes an initial analytical model, defines standards for the purposes of the analysis, and discusses some of the processes through which standards are linked to teacher education curriculum and educational sciences.

The review of literature is neither comprehensive nor systematic. Nevertheless, it aims to summarise the most relevant research. Sources were identified through keyword searches using google scholar[1] and the snowball method starting from the primary sources. Relevant OECD work on the topic was also reviewed and included. It is important to underline that the scale of research was not part of selection criteria[2], in fact, often small-scale qualitative studies suited the purposes of the paper best by giving deeper insights into the way in which standards operate in practice. One of the limitations of the review stems precisely from the highly contextual nature of such small scale studies, which does not allow for drawing general conclusions. While literature on standards is vast, it seems to be lacking investigations of the particular topic of this paper. Studies on the implementation and impact of standards on teacher education were rare and overarching systematic reviews were identified as a research gap.

The review is followed by three case studies (Sections 4, 5 and 6) which analyse how standards are linked to teacher education curriculum, and how educational sciences are conceived and reflected in each of these. To allow for comparison, all three analyses build on the same analytical frameworks and follow the same steps. These are described in Section 3. Graduate level teacher education curriculum was selected in all cases for candidates preparing to be secondary teachers. A full analysis of the curriculum and the standards was beyond the scope of the paper, therefore linkages are only illustrated through a number of selected courses[3] and a focus on the professional knowledge part of the standards.

Finally, findings are discussed in Section 7 integrating the case studies and literature. The paper ends with general conclusions relevant both for policy and practice (Section 8).

[1] Professional standards, teacher education, teacher education curriculum, educational knowledge, educational sciences were the main key words used in different combinations.

[2] Selection criteria included the following: relevance for understanding the processes of implementing standards; relevance for understanding educational sciences in standards and in teacher education; focus on initial teacher education; quality of research (e.g. published in peer-reviewed journals); published in English and preferably within the last 10 years, although papers published earlier could be included if relevant.

[3] "Course" in this paper refers to an individual subject, i.e. a unit of teaching that typically lasts one academic term. "Programme" is used to describe the entire collection of courses required to attain a degree or certification.

2. Professional standards, educational sciences and teacher education curriculum

2.1. What is at stake?

The ultimate goal for many countries is to improve student outcomes, and make education efficient and equitable. When this strategic policy objective is then unfolded, one of the most prominent goals is often increasing the quality of teaching. Since the beginning of the 21st century, school effectiveness research has been increasingly dominating the evidence base informing education policies (Larsen, 2010[22]). This strand of research identifies teacher effectiveness as the key element of education systems (Barber and Mourshed, 2007[23]; Darling-Hammond, Wei and Andree, 2010[3]; Darling-Hammond, 2000[24]), a discourse which is spread through national policies and international organisations such as the OECD (OECD, 2005[25]). As a result, the selection, training and retention of high-quality teachers have become a major concern, and one of the operational solutions in many countries was introducing standards.

In parallel, raising the status of the teaching profession and professionalising teachers have also gained importance in policy. Reflection and debate around teaching as a profession, teacher professionalism and professionalisation has been present in educational, in particular sociological research for several decades. Many scholars argue that teaching does not yet have the status of a full profession (Howsam, Corrigan and Denemark, 1985[26]; Brante, 2010[27]). This has been a complex debate involving numerous arguments and approaches, some of which have been strongly determining the underlying ideology behind developing teaching standards and reconceptualising teacher education.

First, almost all attribute approaches include formal training in defining professions (Guerriero and Deligiannidi, 2017[28]). Training for becoming a professional usually takes place in a higher education institution and leads to a formal qualification (Howsam, Corrigan and Denemark, 1985[26]; Freidson, 2001[29]). This element of professionalisation led to university-based extensive teacher education programmes in many OECD countries (OECD, 2014[30]), although some policies such as "Teach for all[4]" and apprenticeship-based programmes are not conceptualised on the premise that professionalism requires extended education and substantial knowledge. Second, professions have standards that regulate admission and continuing career. Most theorists also agree that both the standards and training requirements are developed and agreed-upon by the profession itself (Howsam, Corrigan and Denemark, 1985[26]; Freidson, 2001[29]). Commonly cited examples for autonomous professions are the medical profession or engineering.

As such characteristics were commonly attributed to professions, increasingly more education policies were directed towards revisiting teacher education and introducing teaching standards. In parallel to the discourse of autonomous professionalism, policies often adopt an "audit" or "managerial" professionalism discourse that emphasises accountability and effectiveness, and considers standards and teacher education as part of state regulated accountability (Tummons, 2014[12]; Sachs, 2001[31]). The co-existence of

[4] https://teachforall.org/

these different discourses manifested in initiatives such as standards development by stakeholders (autonomous professionalism) and state controlled quality assurance processes (audit professionalism) (Tummons, 2014[12]). Education policies never adhere entirely to the autonomous discourse: the state continues to play an important role in determining the structure and content of teacher education, setting standards etc. (Beach and Bagley, 2013[32]). Some countries do however value profession-led policies. For example the General Teaching Council of Scotland, responsible for developing and revising the Scottish teacher and leadership standards, is an independent body (GTCS, 2018[33]).

A third and perhaps the most crucial requirement for an occupation to be a profession is a professional knowledge base. This is a common element of theoretical discourses on professions, regardless of whether they are attribution or epistemological approaches (Brante, 2010[27]; Hargreaves, 1996[17]; Howsam, Corrigan and Denemark, 1985[26]; Freidson, 2001[29]; Guerriero and Deligiannidi, 2017[28]). Yet, not all policies conceive teaching as a knowledge profession. Some tend to have a craft-based view, which places the emphasis on the practical and technical know-how of teaching, and where knowledge is always context-specific. Others see teachers as executive technicians, whose work can be and is controlled by prescribed protocols that derive from theoretical knowledge (Winch, Oancea and Orchard, 2015[34]; Kuhlee and Winch, 2017[21]). These views strongly influence the content of teacher education, but also raise questions about what educational research should involve (Révai and Guerriero, 2017[35]).

In sum, it is teacher professionalisation and the status of the teaching profession that are at stake for countries when developing standards and improving teacher education. In turn, these are believed to contribute to raising teacher quality and improving student learning.

2.2. How is the topic approached?

Policy documents and research papers emphasise that standards should be operational instruments that are used in coherent ways to ensure quality teacher education (OECD, 2013[2]; Kleinhenz and Ingvarson, 2007[10]). For example, in investigating the effectiveness of different elements of an evaluation system, the OECD points to the importance of linking the following in terms of teacher appraisal:

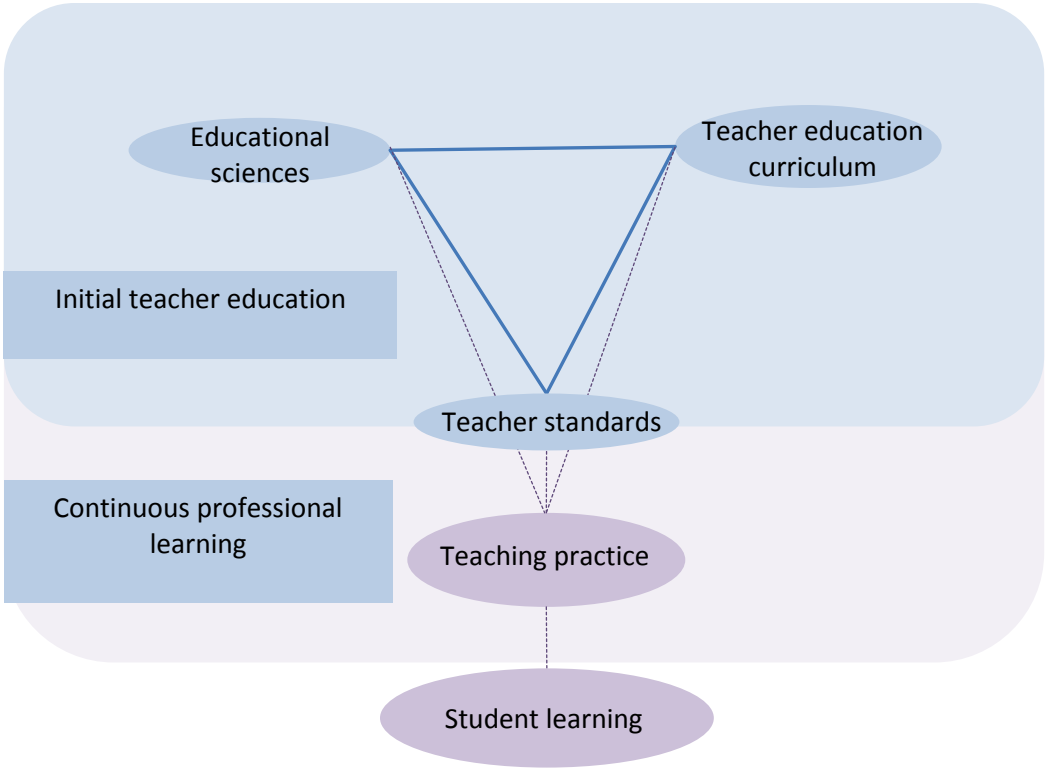
- "alignment between teaching standards and student learning objectives
- alignment between teaching standards and teacher appraisal
- systematic linkages between teacher appraisal and professional development
- alignment between teaching standards, registration processes and career structure
- articulation between school-based teacher appraisal and externally driven teacher appraisal
- linkages between formative teacher appraisal and high-stakes teacher appraisal
- alignment between skills taught in teacher education and teaching standards assessed in teacher appraisal" (OECD, 2013, p. 93[2]).

In particular, such documents stress that teaching standards need to be aligned to initial teacher education and – those that mark different career stages – to professional development (OECD, 2013[2]). In this sense, standards are conceived to bridge initial education and continuous development, and guide teachers through their lifelong professional learning.

The conceptual assumption of this paper is that the characteristics described in Section 2.1 – standards, teacher education and the professional knowledge base – cannot be understood separately. Rather it is through analysing their connections that we can gain a real insight into the nature of teaching as a professional practice. The analytical model (Figure 2.1) builds on three representations of teachers' professional knowledge, which, combined, exert an impact on teaching practice:

1. educational sciences, i.e. the academic source on which the knowledge is built
2. teacher standards, i.e. a description of what teachers as professionals are required to know and be able to do
3. teacher education curriculum, i.e. the blueprint of aspiring teachers' initiation into professional knowledge.

Figure 2.1. Analytical approach: dynamic assemblage of three representations of professional knowledge



The model depicts initial teacher education as the first stage of continuous professional learning. The three representations are embedded in continuous professional learning, although, after initial education, it does not necessarily have a formal curriculum, nor does it necessarily build on educational sciences (this depends on the nature of professional development). Similarly, standards, as pointed out above, can be seen as representations linking initial and continuing education, although again, only certain types of standards underpin this latter (see Section 2.3). Teaching practice is influenced by all these elements. It is important to stress however that actual practice is mediated by other factors (hence the dashed line). Most notably, while teachers' pedagogical decisions may be based on professional knowledge, teachers also analyse and evaluate specific

contextual and situational factors such as classroom episodes, school objectives, etc. Their teaching approaches are thus mediated by complex decision-making and professional judgement (Guerriero and Révai, 2017[36]). Teaching practice ultimately shapes student learning, although again, this latter is influenced by a multitude of factors. This paper focuses on initial teacher education in particular (i.e. the blue section of the figure).

While teacher standards and teacher education curriculum are most often written documents (the latter can in fact include a set of documents such as curriculum structure, module and course descriptions, learning outcomes), educational sciences are an abstract category. They manifest in research conducted and courses taught at universities and other institutions, in scientific debates and discourses, etc. It is therefore not possible to analyse and compare them in concrete terms to standards or curriculum. What this paper attempts to do is rather to elicit what conception of educational sciences is reflected in the standards and curriculum examined. This is done through a conceptual framework adapted from Furlong and Whitty (2017[19]), described in Section 2.4.3.

As demonstrated above, the analytical model is a much simplified representation of the complexity of the issue. Nevertheless, it is a useful starting point to look into the "black box" of the different ways in which standards can operate. More specifically, this paper seeks to demonstrate that the nodes of the analytical model are not distinct entities but elements that are dynamically assembled in unique ways in each context.

2.3. What are standards?

Studying the impact of teaching standards goes beyond classic surveys that map the perception of their use or uptake. Evidence is also accumulating through in-depth qualitative studies that allow having a deep understanding of the complexity of response to standards. These usually involve a deep reflection on the concept of standards of the concept of standards.

Standards are generally seen as the imprints of teachers' competences that describe what teachers should know and be able to do (Ingvarson, 2002[37]; Toledo, Révai and Guerriero, 2017[9]). Literature on standards most often distinguishes their function as either a flag, i.e. statements of an agreed value, and as a measure, i.e. a level of performance on a number of criteria (Ingvarson, 2002[37]) (see Box 2.1). The former can also be seen as a representation (knowledge statements), while the latter as performance (knowledge practices) (Mulcahy, 2011[38]).

Standards' view as performance naturally entails that they are not static objects or tools, but rather activities in which teachers and other actors participate (Mulcahy, 2011[38]). They are "knowledge (and identity) making processes performed in classroom and other localisable practices" (Mulcahy, 2011, p. 98[38]). For example, when teacher candidates are assessed on the basis of graduate standard, teacher educators and candidates themselves engage in an activity of reflecting on and interpreting the statements of standards as they relate to demonstrated knowledge and competences.

Box 2.1. Definition of standards

Ingvarson and Kleinhenz (2007[10]) describe the following understandings of standards:

1. Standards as professional values

In line with a view of standards as "flags", they represent shared ideas and values, i.e. standards are statements that reflect what is valued in the profession, what is quality teaching and, consequently, they carry an underlying assumption on what counts as quality learning. The statements themselves formulate what these values imply for what teachers should know, believe and be able to do.

2. Standards as measures

In order that standards can be used to define and measure quality teaching in a valid way, it is necessary to a) define good teaching, b) decide what evidence can demonstrate quality teaching and c) identify what meeting the standards means (Kleinhenz and Ingvarson, 2007[10]).

A general understanding of standards is thus *a description of what teachers should know and be able to do, including a desirable level of performance* (Toledo, Révai and Guerriero, 2017[9]). Accordingly, in terms of content, they may contain descriptions of teachers' knowledge, practice, responsibilities and levels of expected performance. A related term is "competence framework", which is sometimes used as equivalent to standards, but can also refer to broader frameworks that include elements such as sets of general and professional duties for teachers or school improvement plans (OECD, 2013[2]).

Professional standards can also be seen as policy tools, in that their purpose is to achieve certain policy objectives, in particular to regulate teachers' professional learning and practice throughout their career. In this sense, they can be characterised based on their coverage and purpose, i.e. how they establish pathways for professional learning (Toledo, Révai and Guerriero, 2017[9]). Thus, in terms of coverage standards can be:

- "generic (same professional standards for all the profession's branches) or
- specific (distinctions among the profession's branches, such as grade level or subject taught)" (Toledo, Révai and Guerriero, 2017, p. 81[9]).

In terms of purpose, they can be:

- "basic core (one set of competences for all career or proficiency stages)
- roadmap (distinction from most basic to most advanced career stages)
- semi-roadmap (covers some professional stages only: typically registration and continuous development)" (Toledo, Révai and Guerriero, 2017, p. 81[9]).

To understand the difference standards make to educating teachers, two facets of the standards are particularly important for this paper:

- representations of knowledge – to analyse how professional knowledge is conceived and what the implications are for educational studies
- policy tools – to examine how standards are implemented in initial teacher education and what the nature of changes they exert is.

2.4. How do standards work?

Standards viewed as policy tools are enacted through complex processes in varying contexts. Research on policy response – i.e. studies looking at how different actors engage with a certain policy, and investigating the policy trajectory (Trowler, 2003[39]) – analyse these processes to understand how policies take shape in practice. Policy enactment is described as a creative process involving interpretation and re-contextualisation, such as translating texts into action or abstract policy ideas into practice (Ball, Maguire and Braun, 2012[40]). Actors' influence on the policy processes is interactive in nature as it involves their negotiation of policy initiatives (Braun, Maguire and Ball, 2010[41]). Sheikh and Bagley (2017[42]) underline the role of relationships among actors in creating shared understandings, which then function as filters through which the relevance and meaning of new policies are interpreted or translated.

The professional context of actors, such as their institutional values, vision and various experiences, affect the ways in which they engage with a certain policy (Braun, Maguire and Ball, 2010[41]; Maguire, Braun and Ball, 2015[43]). For example, the vision that a teacher education institution has of teachers' knowledge will influence the way in which the institution incorporates professional standards into its programme. This vision is reflected in discourses embedded in institutional artefacts, such as the programme, curriculum or course descriptions, which will impact on how staff receives and interprets the discourse of standards.

It is equally important to note that standards do not act alone. Their impact needs to be considered within the wider context as they relate to and interact with other artefacts such as accompanying quality assurance tools and accreditation frameworks.

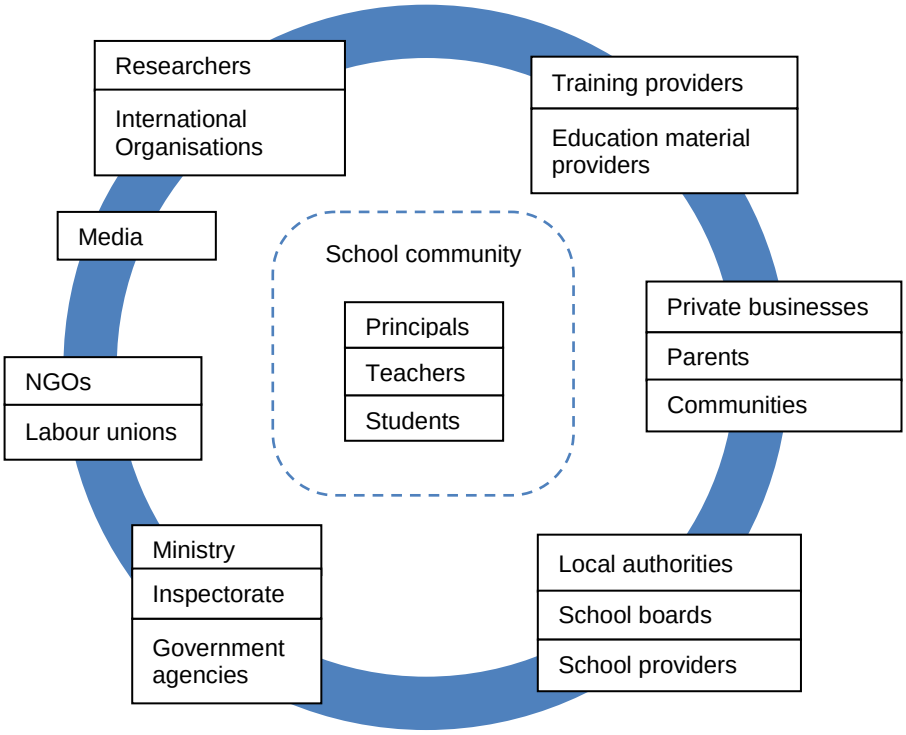
These considerations confirm the importance of investigating the processes through which standards operate. These include numerous areas, most notably appraising and assessing teachers' performances; shaping initial and continuing training programmes, and professional development plans in schools; and providing a basis for self-reflection. In line with the objectives of this paper, we focus on how they are enacted in initial teacher education and what they mean for educational sciences.

2.4.1. Developing and revising standards

The link between teaching standards and teacher education often starts with the development process of standards. A wide range of studies agree that involving stakeholders in the design of policies, such as the development of teaching standards, is a crucial element of effective governance (Burns and Köster, 2016[44]; OECD, 2013[2]). Inclusive stakeholder involvement was also identified as one of the four key elements of effective education policy implementation in a recent OECD working paper (Viennet and Pont, 2017[45]). Teachers taking ownership of the standards is also thought to contribute to recognising their professionalism (OECD, 2013[2]). But What is the appropriate and legitimate locus of authority to develop the standards; Who has the expertise; and How does the composition of stakeholders participating in the development influence the nature and impact of standards? – are all complex questions. Ingvarson's (2002[37]) framework divides the different areas of responsibilities for standards among public/state and professional (national) agencies. Sachs (2003[46]) argues that overly political and state influenced standards might result in a bureaucratic rather than professional control over teaching, which instead of building teachers' knowledge, focuses on standardising procedures.

While national and state governance often play a leading role in developing standards, the process usually involves professionals and other stakeholders. The composition of stakeholders can however be more complex than a dichotomy of public/professional (Figure 2.2).

Figure 2.2. Potential stakeholders in education



Source: Burns and Köster (2016[47]), "Modern governance challenges in education", http://dx.doi.org/10.1787/9789264255364-3-en, pp. 25.

The nature and extent of involvement of this diverse set of actors certainly varies across countries. Professional bodies lead the development process in a number of countries. For example, in Scotland the revision of national standards was led by the General Teaching Council of Scotland (GTCS) – a professional body that gained independence from the Scottish government in 2012 (GTCS, 2018[33]) – and involved extensive consultation with the profession and other stakeholders (Hamilton, 2014[48]). The process consisted of setting up a steering group with a range of stakeholders, including parents and students, and forming writing groups. It involved both face-to-face meetings and online consultation, in which engagement was encouraged in various ways such as through social media (ibid.). Similarly, in New-Zealand, the New Zealand Teaching Council (NZTC), the professional body of teachers, played a leading role in defining teaching standards, with the extensive involvement of the profession, employers and teacher unions (OECD, 2013[2]).

In South-East Asian countries the process seems more centralised: following a review of best practices in different countries, sometimes commissioning foreign consultants, a team is set up within the ministry that is designated to develop teaching competency

standards (Seameo Innotech, 2010[49]). The bases for the standards in these cases are national education laws, codes of professional practices, and experts' advice (ibid.).

In countries where development involves consultation processes or teams of mixed stakeholders, the process often also involves teacher educators and researchers teaching in initial teacher education institutions. This involvement establishes an inherent link between teacher education and standards, as these stakeholders transmit their values, experience and knowledge in formulating the standards. Actors involved in the production or use of educational sciences also mediate their conceptions of these. This Ican manifest in standards containing specific references to certain research domains (e.g. developmental psychology in the Estonian standards, see Section 4).

The participation of different groups in developing or revising standards often involves communication challenges. Sivell (2005[50]) argues that the exchange among individuals or groups with different backgrounds in the process of developing standards can be characterised by a highly uncomfortable level of cognitive dissonance – using Rogers' concept. The confronting values and knowledge lead to negotiations and require compromise, but Sivell also underlines the significant role that such heterophilous communication plays in defining and diffusing standards (ibid.).

Another example for the impact of involving stakeholders, teachers in this case, in developing standards, is described by the process of meaning-making. A study by Mulcahy (2012) conducted in Australian schools addressed the relationship between the development of professional standards for geography teachers and teachers' professional learning. The study reports that teacher learning happened through meaning-making, i.e. reflecting on, thinking and talking about what accomplished teaching means. A strong representational element of teacher learning was identified: teachers learnt about teaching, rather than directly about teaching practice. The interaction of existing understandings on the one hand, and new ideas and activities occurring during the development meetings on the other, extended existing knowledge and generated new knowledge) (Mulcahy, 2012[51]).

2.4.2. Developing and revising teacher education

One of the main purposes of teacher standards is quality control, which is why quality assurance tools accompany standards in many countries (Toledo, Révai and Guerriero, 2017[9]). These can involve assessing teacher candidates, teachers and teacher education programmes based on data collected through observations, interviews, student performance and feedback, or manifested in documents, portfolios, etc. Formal accreditation is a specific form of quality assurance, through which institutions need to demonstrate how they satisfy a number of set criteria. Accreditation may or may not directly rely on teaching standards. In some countries national teaching standards are at the heart of the accreditation standards, thus the link is explicit (e.g. Australia [see Section 5], Belgium). In others, such as France, accreditation is not formally and explicitly linked to standards.

Making sure that such instruments work effectively requires a shared understanding of the objective of standards and what meeting them exactly means (Toledo, Révai and Guerriero, 2017[9]). This can be facilitated through building the capacity of stakeholders (teachers, school leaders, teacher educators, programme leaders, inspectors, authorities, etc.), and developing guidelines and materials. An understanding of standards and their use will always be mediated through such documents, or through those who deliver training on them. As pointed out earlier, they will also depend on the receptor's own prior

knowledge, experience, values and institutional context. The enactment of standards in teacher education is illustrated in the two following qualitative studies.

First, the way in which quality assurance protocols make standards work is demonstrated in a study conducted in Belgium (Flanders) (Ceulemans, Simons and Struyf, 2012[15]). By investigating the way in which a university engages in a quality assurance procedure, the study traces the transformation of standards as they become part of the self-evaluation report, the relations or activities they entail, and the people who gradually get involved in the process. It describes the assemblage of procedures, instruments and agencies professional standards install and the way they are inscribed, i.e. materialise into a sign, an archive, a document, in specific practices (see Box 2.2 on the underlying methodology: actor-network theory). Through the drafting process:

- the original text of the standards transforms gradually in each new version of the chapter – as they are being inscribed into the programme's objectives and curriculum, the list of competences change and thus the standards become more "invisible, factual, and taken for granted".
- more and more people are mobilised to participate in various ways (e.g. reviewing the draft, prioritising future university policies) in the self-evaluation – the standards take effect through the exercise of self-evaluation as the staff gets involved, engages with and positions themselves with regards to the standards.

Box 2.2. Actor-network theory

Socio-material approaches are often used to study policy processes through the interactions among human actors and material entities (e.g. texts) (Fenwick, Edwards and Sawchuck, 2012[52]). One branch of these approaches, actor-network theory, is used in particular in a number of studies on professional standards (Tummons, 2014[12]; Ceulemans, Simons and Struyf, 2012[15]; Mulcahy, 2011[38]).

Actor-network theory was developed in the early 1980s by science and technology studies scholars and sociologists – Michel Callon, Bruno Latour, John Law and others – and has since been applied in many domains including education. It explores how things and people "act" in networks, i.e. how human and non-human elements are assembled and constantly reassembled in particular locations and contexts to act for a specific objective (Carroll, Richardson and Whelan, 2012[53]; Mulcahy, 2012[51]).

An illustrative example of an actor-network is given by Ceulemans, Simons and Struyf (2012[15]):

> *[…] the nodes constituting the network are actors or agents of human (e.g. the Executive Board) as well as of material nature (e.g. the chapters of the inspection protocol). By following the connections or relations between these nodes, one gets a picture of the kind of activities in which the practice of self-evaluation is being embodied (e.g. prioritising, checking, questioning, and addressing) (Ceulemans, Simons and Struyf, 2012, p. 39[15])*

Findings suggest that the self-evaluation report was primarily a process of profiling and presenting the programme and the university in a positive way, and less so about giving an authentic representation of the programme characteristics. This implied the formation of an identity/self-definition using the language of the Flemish standards. For example,

some elements of the competences that appeared as "opportunities" or "weaknesses" at one point in the drafting process transformed later into an action plan for future programme. This demonstrates how the professional competences become effective agents shaping the programme's future. Importantly, the paper argues that the transformation of the list of competences and the accompanying processes of identity formation indicate that the competences actually start to function as standards. They should certainly not be interpreted as a failure of standardisation (Ceulemans, Simons and Struyf, 2012[15]).

Second, another process through which the impact of professional standards can be traced is the change of teacher education curriculum. Tummons (2014[12]) analyses textbooks used in teachers' further education to examine the effect of lifelong learning standards introduced in 2006 in the UK. As writing textbooks is a process through which standards can be inscribed, comparing and contrasting different versions of textbooks pre- and post-introduction of new standards can reveal the impact of standards. While the analysis notes a small number of changes likely to be the impact of new standards (e.g. a new/stronger focus on subject specialism, mentoring and continuous professional development), these do not seem to be substantial in number. In parallel, the study identifies some changes that it attributes to a change in scholarship (integrating new research evidence) rather than to new standards. The author concludes that the reason for the relatively small impact of standards might be explained by the robust and well-defined nature of the curriculum that is "capable of absorbing subsequent sets of professional standards rather than being absorbed or distorted by them" (Tummons, 2014, p. 428[12]).

This investigation points to the possibility that an apparent lack of impact of standards is not necessarily a sign of a lack of professionalisation. Sometimes the existing curriculum already incorporates the competences required by the standards, or can even be broader and deeper. In such a case it is worth considering whether the inverse process, i.e. the curriculum influencing the standards, is not more desirable in an attempt to improve the quality of the profession. This could imply for example involving staff from universities, authors of textbooks, etc. in a revision of the standards.

While these two qualitative studies do not constitute robust evidence on the enactment of standards in teacher education, they do illustrate the complexity and breadth of this process. The case studies conducted in this paper (Sections 4, 5 and 6) aim to contribute to the paucity of research on this topic.

2.4.3. Constructing teachers' knowledge base

While there is an agreement that a profession needs an integrated knowledge base, there is still concern about what such a knowledge base involves for teaching (Révai and Guerriero, 2017[35]; Dumont, Istance and Benavides, 2010[54]; Goldacre, 2013[20]; Hargreaves, 1996[17]). Strengthening the link between research and practice is a generally perceived need in education. Numerous proposals have been made including more research produced in the classroom or starting from practice (e.g. action research, design-based research), as well as making research on education more relevant and accessible for practice and so on (Cordingley, 2008[55]; Hiebert, Gallimore and Stigler, 2002[18]; OECD, 2007[56]). The discussion also extends to how to make educational evidence cumulative (Goldacre, 2013[20]; Hargreaves, 1996[17]).

Research evidence that has the potential to inform teaching practice incorporates a number of fields: the so-called foundation disciplines – psychology, sociology, philosophy and history of education – economics, anthropology and more recently,

evidence is also emerging from the broad interdisciplinary field of learning sciences such as neurosciences. Nonetheless, what eventually constitutes the content of teacher education varies greatly across countries and institutions (Whitty and Furlong, 2017[19]). The content of educational studies is in fact built on different conceptions of educational knowledge, or as Furlong and Whitty (2017[19]) put it, different "knowledge traditions".

Furlong and Whitty (ibid.) draw on Bernstein's work to characterise education as a field of study in universities. They identify three knowledge traditions (Table 2.1) based on the following key concepts of Bernstein:

- *Singular*: "a body of specialised knowledge that has a discrete discourse with its own intellectual field of texts, practices, rules of entry, etc., and is protected by strong boundaries and hierarchies" (Whitty and Furlong, 2017, pp. 20-21[19]). Examples: physics, chemistry, history, economics, psychology, sociology.
- *Region*: "made up of a number of singulars that are re-contextualised into larger units; [they operate] both in the intellectual field of disciplines and in a field of practice" (Whitty and Furlong, 2017, p. 25[19]). Examples: medicine, engineering, architecture, cognitive science, management, business studies, communication and media.
- *Generic*: "a particular form of knowledge that is constructed and distributed outside, and independently of disciplinary traditions" (Whitty and Furlong, 2017, p. 30[19]). Generics draw on local, organisational and workplace discourses, and focus on performance. Typically they are produced by governments or employers through an analysis of tasks, skills and practice (Hordern, 2017[57]). Examples: competency or standards frameworks.

Table 2.1. Knowledge traditions in the study of education

	Examples
Academic knowledge tradition	"Singulars" within the field of education: 1. Disciplines of Education (composed of distinct disciplines with different epistemologies 2. German Educational Theory (normative approach to educational theory addressing philosophical and moral questions)
	Education as a "region": 3. Applied Educational Research and Scholarship (applied research focusing on a specific educational topic [e.g. education policy studies, early learning, leadership] originating from different methodologies and disciplines) 4. The "New Science" of Education (rigorous research to establish "what works", e.g. through randomised control trials)
Practical knowledge tradition	Education as a generic: 5. Education as a "generic" (competency or standards frameworks becoming the curriculum) 6. The "normal" college tradition of teacher education (moral approaches, field-based, action-oriented knowledge, craft view) 7. Liberal education + craft knowledge (a general culture and academic "mind" combined with the craft of teaching, i.e. contextual, implicit, embodied knowledge, e.g. "Teach for All" programmes) 8. Networked professional knowledge (context-specific knowledge [with academic elements] produced by practitioners in networks of schools and other institutions)
Integrated knowledge traditions	9. Pedagogija (Latvia) (pedagogical science: a multidisciplinary science with philosophical and normative views based on various influences such as Dewey's child-centred view and Vygotsky's social learning) 10. Practitioner enquiry/action research (situational research, collaborative and participatory involving practitioners, with a self-evaluative focus) 11. Research informed clinical practice (medical model for developing novice teachers, integrating research-based knowledge and practice) 12. Learning sciences (interdisciplinary "design science", a development of the New Science of Education model)

Source: Adapted from Whitty and Furlong (2017[19]), *Knowledge and the Study of Education: an International Exploration*, pp. 20.

This classification categorises standards in the practical knowledge tradition as a generic, while teacher education programmes can fall in any of the three traditions. This view raises a number of questions concerning how standards can be applied in teacher education.

First, standards can represent a different conception of knowledge than educational sciences taught in teacher education programmes in a given country. For example, how can teacher education institutions with an academic tradition implement standards that describe teachers' tasks and teaching skills in practical and functional terms? In such a case, educational questions are addressed in certain epistemological perspectives at the university, such as on psychological or sociological grounds. Furlong and Whitty (2017[19]) point to two tensions regarding the widespread model of foundation disciplines. One originates from the different epistemologies of each of the disciplines, which results in a diversified, multidisciplinary educational thinking rather than a unified or interdisciplinary one. The other arises from the very different nature of the disciplinary discourses and discourses of teaching practice.

The different traditions can manifest in what each of them actually considers as knowledge. For example, standards may require teachers to plan lessons, manage disruptive behaviour, diagnose and evaluate students' progress, formulating these as skills or activities. An integrated knowledge tradition would however consider these as key knowledge areas deriving from pedagogical sciences, and would consequently deliver courses on the learning process, classroom management, etc. See the Estonian case study in Section 4 for example.

Second, there is an inherent contradiction within the standards themselves. When they require teachers to draw on research evidence, engage in and with research, or build their decisions on theoretical knowledge, they (may) draw on different knowledge traditions. Kuhlee and Winch (2017[21]) point to this incoherence through the example of the UK. Since the white paper issued in 2010 (Department for Education, 2010[58]), the UK government clearly conceptualises teachers as craft workers, and teacher education has increasingly been shifted towards a largely apprentice-ship based model (Beach and Bagley, 2013[32]). Yet, research knowledge is gaining importance: theory-based knowledge is required in the teacher standards (Department for Education, 2011[59]), the Carter Review (Carter, 2015[60]), and the most recent white paper (Department for Education, 2016[61]). Thus, applying the standards would contradict to some extent the way in which teacher education is conceptualised.

As some of the case studies will demonstrate, while standards are indeed generally grounded in a practical tradition, they can also bear the signs of other traditions. For example, action research or practitioner enquiry can explicitly be required by some of the standards. In others (e.g. Estonian), developmental psychology appears as an explicit knowledge requirement, referring to an academic tradition.

The above then raises the question of what it means to implement standards in teacher education programmes, or aligning teacher education to standards. Can (and should) teaching standards influence knowledge traditions of universities? What would implementation/alignment involve in terms of university staff, department structures and knowledge production? A university's knowledge tradition also manifests in the way departments are structured. For example, besides the subject-specific disciplinary department (e.g. mathematics), teacher education might be delivered in the psychology, sociology, etc. departments if it follows a "disciplines of education" academic tradition. It can equally take place in the department of educational sciences if it is an applied

educational research model. The implementation of standards can then either be fragmented, potentially superficial and dependent on the engagement of each of these departments in the process, or could have a deeper influence on the structure.

Similarly, standards may have implications for knowledge production. If standards require teachers to be actively engaged in research (e.g. practitioner enquiry, action research), strong accreditation/accountability processes might result in a change of the kind of knowledge that is produced at universities. Public funding schemes also often play a key role in knowledge production (Révai and Guerriero, 2017[35]).

The concept of re-contextualisation, again borrowed from Bernstein, captures the process by which knowledge "travels" across different conceptual traditions (e.g. from singulars to regions; from a discipline to a professional knowledge base and then into curricula) (Hordern, 2017[57]). Tatto and Hordern (2017[62]) use quantitative data from the TEDS-M study to analyse re-contextualisation by looking at how knowledge described in standards, teacher education and school curriculum (curriculum sources) translates into teacher education syllabi (planned curriculum), the actual opportunities to learn teacher candidates have (enacted curriculum), and eventually to teacher candidates' knowledge (received and acquired curriculum). Their findings suggest that actors such as teacher education institutions and teacher educators have different degrees of agency over the actual content taught in different countries.

The above brief review of the connections of standards, teacher education, and educational sciences and knowledge demonstrated the complexity of the interplay among these elements. The next section offers a small contribution to the evidence on the nature of this complexity.

3. Case studies: introduction and methodology

This section presents three case studies – Estonian, Australian and Singapore – through which the relationship between standards and teacher education programmes are illustrated. All three selected countries are high-performing systems based on international standardised measures such as the Programme for International Student Assessment (PISA), both in terms of student scores and equity in education (OECD, 2013[63]; OECD, 2016[64]), as well as a set of historical and contextual reasons.

The three countries represent different geographical configurations, and consequently different schools systems. Singapore, a city-state of 720 km^2 with a population of approximately 5.6 million, has a total of 365 schools (Ministry of Education, Singapore, 2017[65]). Estonia has a territory of 45 227 km^2 and a population of 1.3 million, with 652 schools in 2013/14 (Santiago et al., 2016[66]). Australia is a federal system consisting of six states and two major mainland territories, overall 7.69 million km^2 and a population of approximately 23.5 million. The total number of schools was 9 414 in 2016 (Australian Bureau of Statistics, 2018[67]).

- Estonia was selected, because its education system, and in particular, its teacher education has been less studied than some other high-performing countries.

Moreover, Estonia recently introduced professional teaching standards, and there are a number of ongoing implementation mechanisms.

- The Australian education system on the other hand, including its teacher education, is characterised by an abundance of literature. A large amount of research related to the teaching profession in Australia is also available. Since the new national standards were introduced in 2013, there has been great interest to follow their implementation and impact. As a result, extensive evidence and reflection is available on the implementation, use and impact of standards carried out both by government institutions and research groups. Australia being a federal system, the impact of national standards is also influenced by state governance structures.
- Singapore was selected as a system with an exceptional education reform that played a key role in making the island a highly developed and unified nation in only half a century (NCEE, 2018[68]). This system is also particular in that there is only one initial teacher education provider; it is thus more straightforward and easy to observe impact mechanisms and processes.

The case studies build on document analysis (e.g. professional standards, selected teacher education programmes, policy documents), and a small set of interviews with key informants of the selected teacher education institutions. The initial teacher education systems and the types of professional standards of the three selected countries are summarised in Table 3.1.

Table 3.1. Initial teacher education and standards in Estonia, Australia and Singapore

	Number of ITE providers	Programme organisation	Field experience	Induction	Coverage and purpose** of professional standards
Estonia	2 (+ 2 specific areas)	Consecutive (secondary level) Concurrent (primary level)	Extensive and continuous (during the 2 year master's programme)	12 months	Specific, Roadmap
Australia	48*	Consecutive, concurrent or alternative route	Yes, exact duration and form regulated at the state and institutional levels	Regulated at the state level, exists almost everywhere	Generic, Roadmap
Singapore	1	Consecutive or concurrent	Extensive	Yes, through mentoring	Generic, Semi-roadmap

Notes: * Data from 2014, Craven et al. (2014[69]), *Action Now: Classroom Ready Teachers*, Teacher Education Ministerial Advisory Group, https://docs.education.gov.au/system/files/doc/other/action_now_classroom_ready_teachers_accessible.pdf (accessed on 29 December 2017).

** See definitions in Section 2.3.

To facilitate the comparison of the case studies, analyses draw on two frameworks across all cases. First, the Furlong-Whitty framework, introduced in the section above, is used to analyse how educational knowledge/sciences are conceptualised in the standards and teacher education programmes (see Section 2.4.3). Second, the case studies draw on the OECD framework of general pedagogical knowledge (Sonmark et al., 2017[70]), which is used as a reference in comparing teacher standards across the three case studies as well as the selected teacher education programmes.

The OECD framework recognises the complexity of teachers' professional competence and that it encompasses different types of knowledge, affective and motivational

competences, as well as competences to make decisions on teaching approaches based on professional judgement (Guerriero and Révai, 2017[36]; Biesta, 2015[71]; Shalem, 2014[72]). While these are all highly relevant for professional standards, this analysis focuses on teachers' specialised knowledge about pedagogy building on Shulman's taxonomy of teacher knowledge (Shulman, 1987[73]). Three categories are highlighted in particular:

- general pedagogical knowledge (principles and strategies of classroom management and organisation that are cross-curricular)
- content knowledge (knowledge of subject matter and its organising structures)
- pedagogical content knowledge (knowledge of content and pedagogy).

The OECD framework defines general pedagogical knowledge as the "specialised knowledge of teachers in creating and facilitating effective teaching and learning environments for all students, independent of subject matter" (Sonmark et al., 2017, p. 16[70]). The assessment framework (Table 3.2) itself is based on an extensive review of literature, which identified three main common components of general pedagogical knowledge, regardless of whether the content was derived from academic disciplines or typical teacher tasks: instructional process, student learning and assessment (König, 2014[74]).

Table 3.2. Description of the ITEL TKS assessment framework and selected topics

Dimension	Sub-dimension	Description
Instructional process	Teaching methods and lesson planning	Productively utilising instructional time through use of various teaching methods (e.g. direct instruction, discovery learning), knowing when and how to apply each method to promote students' conceptual understanding of learning tasks (Voss, Kunter and Baumert, 2011[75]), and structuring learning objectives, lessons, curricular units and assessment (König et al., 2011[76])
	Classroom management	Maximising instructional time through awareness of all classroom activity, handling multiple classroom events concurrently, pacing lessons appropriately to maintain momentum, providing clear directions and maintaining student attention (Voss, Kunter and Baumert, 2011[75])
Learning process	Learning and development	Fostering individual learning through knowledge of various cognitive learning processes, including learning strategies, impact of prior knowledge, memory and information processing, causal attributions, effects and quality characteristics of praise, and opportunities for increasing student engagement (Voss, Kunter and Baumert, 2011[75])
	Affective-motivational dispositions	Knowledge of motivational learning processes (e.g. achievement motivation) and strategies to motivate a single student or whole group (Voss, Kunter and Baumert, 2011[75]; König et al., 2011[76])
Assessment	Evaluation and diagnosis procedures	Knowledge of different forms and purposes of formative and summative classroom assessments, and how various frames of reference (e.g. social, individual, criterion-based) impact student motivation (Voss, Kunter and Baumert, 2011[75]), and quality of assessment
	Data and research literacy	Knowledge of interpreting, evaluating and using research and data to inform the teaching and learning process (e.g. relevance, validity, reliability)

Source: Adapted from Sonmark et al. (2017[70]), "Understanding teachers' pedagogical knowledge: report on an international pilot study", http://dx.doi.org/10.1787/43332ebd-en, pp 17.

The comparative analysis of teaching standards and teacher education curriculum in each case follows the same structure and steps:

1. General description of the policy context and teacher education
2. Description of teaching standards: its development process and its intended functions

3. Content analysis of teaching standards using the OECD framework of general pedagogical knowledge as a reference and focusing on the professional knowledge aspect of the standards
4. Analysis of the link between standards, teacher education curricula and educational sciences: an overview of the processes as described in the interviews, and a matching of teacher education courses and the standards. Matching[5] is a two-step process that consists of looking at how:
    - course content corresponds to what is described in the standards, and vice versa
    - requirements defined in the standards are covered in the curriculum.

    Educational sciences are captured in the analyses through the different conceptualisations of knowledge and the Furlong-Whitty framework.

4. Estonia

Estonia has launched a number of initiatives to increase the quality of its teaching workforce (Santiago et al., 2016[66]). Changing teachers' practice is on the policy agenda: contemporary teaching methods are being implemented on a large scale focusing in particular on student-centred approaches, personalised and collaborative learning (Ministry of Education and Research, Estonia, 2014[77]). In terms of implementing standards as a means to raise teacher quality, Estonia is engaged in the process, with much commitment to make it work.

4.1. Teacher education

There are two major initial teacher education providers in Estonia: Tartu and Tallinn University, along with two other institutions that only prepare teachers of certain areas (music, arts and theatre). Teacher education at the primary level is mostly concurrent, while at the lower or upper secondary level it generally consists of a consecutive programme (a disciplinary bachelor's followed by a pedagogy master's programme) (Santiago et al., 2016[66]).

Teacher candidates gain field experience throughout the two years of the master's programme, which introduces them gradually in the teaching job. This consists of observations to help teacher candidates relate their theoretical knowledge to practice, and teaching practice of 6-10 weeks in a school. Some teacher education programmes, for example the one at the University of Tartu, also organise pedagogical practice in university settings (simulated practice) as an introductory experience. Schools-based practicum is carried out through partnerships with schools (Pedaste et al., 2014[78];

[5] While a full matching is beyond the scope of the case studies, both directions are illustrated in all three cases and are detailed in the Annexes.

ET2020 Working Group on Schools Policy, 2015[79]; Leijen and Pedaste, in press, 2018[80]). Teacher candidates are supported by a university-based supervisor who oversees their field experience and supports them in reflecting on their teaching practice, and a school-based mentor teacher who guides school practice. The theory-practice link can also be reflected in the requirement of writing a master thesis.

New teachers participate in a 12-month voluntary induction programme, during which an experienced mentor teacher supervises their work. The programme is accompanied by seminars for participants to support their learning with reflection in groups. The mentor provides feedback to the teacher education institution from which the new teacher graduated (Santiago et al., 2016[66]).

4.2. Teaching standards

4.2.1. Processes and functions

New teacher standards were introduced in 2013 in Estonia. Although different levels mark the career stages in the standards, these do not translate into direct promotion opportunities for teachers (Santiago et al., 2016[66]). The Estonian standards for teachers were developed through an interactive process (ET2020 Working Group on Schools Policy, 2015[79]), in which the following stakeholder groups were represented:

- teacher educators from the two main teacher education institutions (University of Tallinn, University of Tartu)
- teachers through the Estonian Teachers' Association and Estonian Teacher Union
- kindergarten teachers through the Association of Kindergarten teachers
- special needs educators through the Association of Special needs education
- school leaders through the School Leaders' Association
- local decision makers through the School Owners' Association (municipalities)
- national decision makers through the Ministry of Education and Research.

The standards have multiple functions including an assessment and professional development framework for teachers' competences, and a basis for teacher education curriculum (see Box 4.1). The application of teaching standards is ensured through an accreditation process that awards the right to institutions to issue teaching licence. Teachers can obtain their licence in two ways: either through the Teachers' Association, or by graduating in an accredited initial teacher education institution. To obtain licensing rights, institutions need to demonstrate that their curriculum prepares teacher candidates for all the requirements stated in the professional standards. This process thus involves an explicit matching between the learning outcomes of the curriculum, the modules and the courses on the one hand, and the standards on the other.

Box 4.1. Application of standards in Estonia

Based on the website of the Estonian Qualifications Authority, occupational qualification standards are:

- basis for compiling curricula and training programmes which meet the requirements of the labour market
- basis for assessing competence
- a useful tool for employers when promoting and describing jobs, recruiting employees, writing job descriptions, defining staff's qualifications requirements, planning training
- a tool to help an employee understand their current skills levels and deficiencies, provides opportunities for planning their development and career, and is a basis for lifelong learning
- a tool for trainers, learners, parents, advisors and other stakeholders when gathering information and intelligence on labour market trends
- the basis for comparing occupational qualifications certificates internationally.

Source: Estonian Qualifications Authority (n.d.[81]), https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng/use_range (accessed on 15 December 2017).

4.2.2. Content analysis

This case study looks at the implementation of Teacher level 7 standards in developing curriculum and training programmes. The document describes primary and secondary level professional standards, and this paper focuses in particular on "Part B Competency Requirements". Each of the seven competence areas defines so called "activity parameters", i.e. teachers' tasks in the area, knowledge areas required to perform those activities and evaluation methods used to assess whether teachers satisfy the set competences.

The knowledge areas are particularly relevant to understand the triangle of standards, teacher education and educational research or sciences. The list of knowledge areas (Table 4.1), when extracted from the text and separated from the "activity parameters", seem to be rather strongly psychology-oriented, but also include research and reflective skills, as well as a system-level understanding of the education system (legislation, institutions) and the larger society. Interestingly, there are no explicit knowledge requirements in terms of the learning process, instruction, or evaluation and assessment.

Table 4.1. Knowledge and competence areas in the Estonian teaching standards

Knowledge area	Competence area
Physical, psychical, emotional, moral and social development of a child	B.2.1. Planning of learning and teaching activities B.2.2. Development of learning environment B.2.3 Supporting of learning and development
Age-related peculiarities (incl. development of speech, cognition, thinking, creativity and social skills)	B.2.1. Planning of learning and teaching activities B.2.2. Development of learning environment B.2.3 Supporting of learning and development
Impact of the environment on a group	B.2.2. Development of learning environment
Knowledge of first aid	B.2.2. Development of learning environment
Development psychology	B.2.3 Supporting of learning and development
Basics of research	B.2.4 Reflection and professional self-development
Basics of reflection	B.2.4 Reflection and professional self-development
Principles and methods of counselling	B.2.5 Counselling and mentorship
Protection of intellectual property	B.2.6 Development, creative and research activities
Legislation related to the field of education	B.2.7 Recurrent competency of the profession of teacher, level 7.
Operating principles of a society (Estonian, European and global cultural space, principles of public order and sustainable development etc.)	B.2.7 Recurrent competency of the profession of teacher, level 7.
Institutional order of the field of education, incl. umbrella organisations of the field of education	B.2.7 Recurrent competency of the profession of teacher, level 7.
Basics of communication, incl. public performing and communication with media	B.2.7 Recurrent competency of the profession of teacher, level 7.
Etiquette	B.2.7 Recurrent competency of the profession of teacher, level 7.

Note: All knowledge areas in the standards with the corresponding competence area in which each of them appear.
Source: Estonian Qualifications Authority (2013[81]), *Professional Standard - Teacher Level 7,* https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 19 December 2017).

Teachers' tasks ("activity parameters") as described in the standards, however, paint a very different picture of pedagogical requirements (Table 4.2). Performing these activities would require a much larger knowledge base, including knowledge of:

- structuring and planning lessons
- teaching methods
- classroom management
- learners and their cognitive and socio-emotional development
- diagnosis and evaluation procedures
- inquiry and reflection on teaching.

The list above mentions a few key areas, which are also identified in the literature of pedagogical knowledge (Sonmark et al., 2017[70]; Guerriero, 2017[16]). Of all this, the only area reflected in the knowledge items of the standards is child development (described by four different items, rows 1, 2, 3 and 5 in the left column of Table 4.1).

Table 4.2. Examples for teacher tasks in the Estonian teaching standards

Pedagogical area	Examples for teaching tasks ("activity parameters")	Implicit knowledge requirements
Learning processes	creates […] learning environment supporting development and creativity	Knowledge of learning environments, developing creativity (e.g. learning sciences)
	notices differences and special needs of the learners (e.g. learning styles, capabilities, learning problems, cultural peculiarities)	Knowledge of the diversity of learners and their needs
	supervises development of a group, taking account of development phases of the group	Knowledge of group dynamics
Instructional process	drafts work plan […], taking account of the curriculum […]; drafts lesson plan(s) on the basis of the work plan	Knowledge of curriculum, lesson planning
	selects suitable learning and teaching methods and evaluation model	Knowledge of teaching methods and lesson planning
	solves discipline problems	Knowledge of classroom management
	implements various methods and routine operations in teaching	Knowledge of different teaching methods
Assessment and inquiry	implements systematically various feedback and evaluation methods supporting learning	Knowledge of forms of feedback and evaluation and their use
	collects data about development and motivation of the learners with qualitative and quantitative methods, provides feedback	Knowledge of research methods
	analyses teaching and adapts activities flexibly	Knowledge of methods to analyse teaching, criteria for reflection
	reflects own teaching and professional competency, collects feedback of learning activities and results of the learners; plans changes in teaching and education process	Knowledge of methods to analyse teaching, criteria for reflection, assessment methods and their use

Source: Examples extracted from Estonian Qualifications Authority (2013[81]), *Professional Standard - Teacher Level 7*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 19 December 2017)

Somewhat contradictorily, some of the activity parameters explicitly refer to research and academic knowledge related to certain areas, yet these do not appear among the descriptions of knowledge. For example, the *Planning of learning and teaching activities* section requires teachers to use "thematic (research) literature upon planning of work of a teacher", which clearly entails a need to have theoretical knowledge about planning teaching (Estonian Qualifications Authority, 2013[81]). The *Reflection and professional self-development* section formulates a broad requirement of teachers to both use and conduct research in order to improve their practice (Estonian Qualifications Authority, 2013[81]). These elements indicate a broader conceptualisation of teacher knowledge than what is exemplified in the knowledge areas involving theories of learning and teaching going far beyond child development.

4.3. Linking pedagogical curriculum, standards and educational sciences

The link between standards and pedagogical curriculum is illustrated through the teacher education programme of one of the major initial teacher education institutions: the University of Tartu[6].

4.3.1. Processes

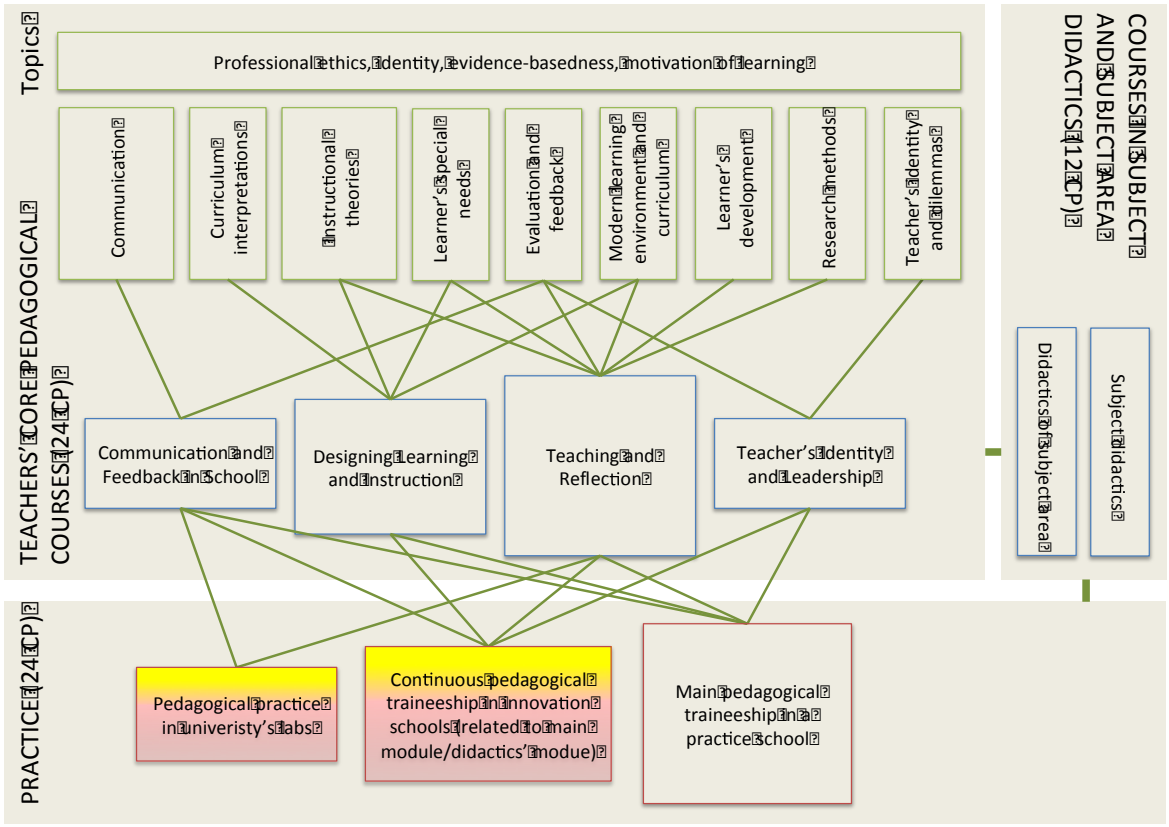
The University of Tartu revised its teacher education curriculum in 2012-13. This process was carried out in parallel with the development of the new professional standards (Pedaste et al., 2014[78]), and also built on a number of initiatives and projects run by the university (Leijen and Pedaste, in press, 2018[80]). The institution co-ordinated the design process of its programme in a collaborative way involving a number of different faculties including the Faculty of Social Sciences and Education (in particular, its Institute of Education), faculties responsible for teaching subject didactics, and colleagues participating in the organisation of teaching practicum. The development of the standards and the revision of the programme were also inherently linked through one person who participated in both processes.

The revision was motivated by the previous accreditation report that identified the lack of a general module of teachers' professional studies as a key concern. To respond to this, the institution developed a radically new programme, of which the core pedagogical and practicum modules are now common for teacher candidates of all subjects. The revision resulted in a shift of focus from a highly subject-oriented teacher education towards a more pedagogy-centred curriculum. Rather than organising pedagogical training in classical academic disciplines such as psychology and educational sociology, content is now grouped in four core pedagogical courses as shown in Figure 4.1.

Another central objective of programme revision was to strengthen the link between theory and practice. This was addressed not only through eliminating the divide between foundational disciplines and methodological courses, but also through reconceptualising school practicum (Leijen and Pedaste, in press, 2018[80]). This latter resulted in continuous teaching practicum throughout the master's programme, and strengthened collaboration between the university supervisor and the school-based mentor. Building teacher candidates' research capacity, for example through involvement in research projects, is also gaining importance in the programme of the University of Tartu.

[6] Data to describe the processes was collected through two semi-structured interviews with key informants from the University of Tartu. One was conducted in the framework of the Innovative Teaching for Effective Learning project, for the Teacher Knowledge Survey in May 2016. The second interview, with an interviewee who participated in both the development of the national standards and the revision of the university's curriculum, was conducted in January 2018 specifically for the case study reported in this paper. Further to the interviews, a part of the curriculum and the standards were analysed to compare their contents (see details in Annex A).

Figure 4.1. Components of teacher education professional studies at the University of Tartu



Source: Leijen and Pedaste (in press, 2018[80]), "Pedagogical beliefs, instructional practices, and opportunities for professional development of teachers in Estonia".
Notes: CP refers to Credit Points.

As reported by the institution, all learning outcomes of the curriculum were compared to the expectations of the standards' activity parameters one by one. If any of the activity parameters were not covered, the course contents were modified. The accreditation of the new programme was based on the evaluation of this specific correspondence.

4.3.2. Content analysis

The analysis is based on the programme structure and two selected modules of the 2017/2018 curriculum[7]: pedagogical subjects and obligatory courses of teaching practice. Unlike the standards, the curriculum clearly separates general pedagogical knowledge (i.e. the specialised knowledge of teachers in creating and facilitating effective teaching and learning environments for all students, independent of subject matter) and pedagogical content knowledge (i.e. subject-specific pedagogical knowledge) (Guerriero, 2017[16]). These latter are divided into subject didactics and didactics of subject areas that integrate traditional school subjects in larger domains (e.g. natural sciences or social sciences) in this curriculum (Pedaste et al., 2014[78]). In the standards on the other hand,

[7] The programme of Teachers of Estonian Language and Literature was used for the analysis specifically, however the core modules are the same for all candidates.

reference to pedagogical content knowledge only appears in the Counselling and mentorship competence area. General pedagogical knowledge features in the curriculum as "pedagogical subjects". These were developed through identifying core knowledge domains of teachers (represented as the thirteen underlying topics – four general and nine specific – of the four core courses in Figure 4.1) (Leijen and Pedaste, in press, 2018[80]).

The logic of the way teacher education curriculum is organised at this institution differs from the organisation of the standards in substantive ways. First, the core courses – Teaching and Reflection, Designing Learning and Instruction, Teacher's Identity and Leadership, and Communication and Feedback in School – and their learning outcomes do not directly map onto particular competence areas of the standards. Rather they reinterpret the standards and accommodate their content in a genuine structure. Second, while the standards distinguish activity parameters and knowledge areas, the courses of the curriculum integrate teaching theoretical knowledge and developing skills to apply these. Teaching practice modules also emphasise building candidates' capacity to link theories to practice.

In terms of content areas, there is a considerable overlap between the standards and the curriculum. All learning outcomes of the selected courses could be related to competence areas in the standards, mostly to the "activity parameters" and to a lesser extent to the knowledge areas (Annex A, Table A.1). The majority of knowledge areas described in the standards are covered, although some specific ones that are marginal to pedagogy (e.g. first aid, intellectual property) do not seem to be part of the pedagogical curriculum. The scope of the two documents also differs with regards to some elements. For example, leadership is considered as core knowledge in the curriculum, while it is not mentioned at all in the standards (only in the senior teacher and master teacher standards [Estonian Qualifications Authority, 2013[83]; 2013[84]]).

Perhaps the most substantial difference is the way in which knowledge is conceived. Standards conceptualise knowledge in a particular and restricted way. The term "pedagogical knowledge" is used in the section that summarises the Parts of work and duties, the term "subject-related knowledge" appears three times in the document. Despite the fact that the bulk of the standards is about general pedagogical knowledge, what is actually classified as such is restricted mostly to developmental psychology. All other areas (see p.27) are categorised as activities and are not captured as knowledge domains. This suggests that pedagogy is considered more as an activity, less as knowledge.

In contrast, knowledge is conceptualised more broadly in the curriculum. Course descriptions formulate many of their learning outcomes using the term knowledge and knowing. A considerable number of general pedagogical areas, captured as activities in the standards, are described as knowledge (e.g. "acquire new knowledge and skills related to approaches of learning, teaching, and reflection, and learning environment"). This conceptualisation is further underscored by the descriptions of the practice modules, which place a particular emphasis on linking theoretical knowledge and teachers' practical activities.

The clusters of knowledge traditions developed by Whitty and Furlong (2017[19]) (see Section 2.4.3), help understand the difference in conceptualising knowledge as described above. The Estonian teaching standards reflect a largely practical knowledge tradition, i.e. starting from an analysis of teachers' tasks with a stronger focus on practical skills than on disciplinary knowledge. It also bears the marks of an integrated tradition in that it requires teachers to use and conduct research, in particular action research and reflect on

their practice. Some features of an academic tradition can also be observed in the knowledge requirements (e.g. developmental psychology). The teacher education curriculum of the University of Tartu however reflects an integrated knowledge tradition. Its strong emphasis on linking theory and practice also manifests in a practice-based knowledge production. One example for this is a video-supported reflection method that was developed by university staff for supporting action-oriented knowledge construction (Leijen et al., 2014[82]; Allas, Leijen and Toom, 2017[83]).

In fact, the clearest link between the standards and the curriculum is found in the elements of the standards that reflect an integrated tradition. As highlighted above, while the knowledge areas reflect a narrow conceptualisation of teacher knowledge, this is not the case when we have a closer look at the activity parameters. According to these, teachers are also required to use and conduct research to improve their teaching, which suggests that knowledge production is in fact part of teaching activity. This is one of the main distinguishing features of integrated traditions (Whitty and Furlong, 2017[19]), and fits into the practitioner enquiry/action research version of integrated knowledge traditions.

In sum, the Estonian case suggests that even when the revision of teacher education curriculum is so intimately linked to professional standards, as was the case at the University of Tartu (Pedaste et al., 2014[78]), important differences in terms of structure, language and conceptualisations remain.

5. Australia

Australia has been engaged in various policy initiatives to increase teaching quality (OECD, 2015[1]). A main driver of these initiatives is the Australian Institute for Teaching and School Leadership (AITSL), established by the government in 2010 to develop and support national policies (OECD, 2015[1]). AITSL led the development of new professional standards for teachers that were introduced in 2013 and has also been responsible for the developing standards and procedures for the accreditation of initial teacher education programmes.

5.1. Teacher education

In 2014, teacher education in Australia involved around 450 courses across 48 institutions, preparing about 80,000 teachers (Craven et al., 2014[69]). To become a qualified teacher in Australia candidates must hold a four-year or longer full-time equivalent higher education qualification following one of the options:

- a consecutive programme consisting of a three-year undergraduate degree in any discipline and a two-year master's level professional qualification (e.g. Master of Teaching)
- a concurrent programme of at least four years comprising disciplinary and professional studies (Bachelor of Education)

- combined degrees of at least four years (e.g. a Bachelor of Education: Secondary and a Bachelor of Science)
- other combinations of qualifications identified by the provider and approved by the teacher regulatory authority in consultation with AITSL to be equivalent to the above (e.g. employment-based programmes) (AITSL, 2015[84]; Craven et al., 2014[69]).

All teacher education programmes include field experience for teacher candidates, with gradually increasing responsibilities: classroom observation, joint teaching, teaching a full class. Duration is at least 60 days in consecutive programmes at the master level and at least 80 days in concurrent programmes (NCEE, 2016[85]). While federal policies have increasing influence on field experience, states and institutions play a key role in designing teaching practicum (e.g. establishing partnerships with schools, building schools' capacity to provide quality experience for teacher candidates) (NCEE, 2016[85]).

Induction is regulated at the state and territory level in Australia. All states and territories have policies on induction, including for example, mentoring support, structured graduate programmes or release time for beginning teachers (Craven et al., 2014[69]). The Action Now report pointed out however that the quality of support for new teachers varies greatly and called for more consistence (Craven et al., 2014[69]). As a result, AITSL established guidelines for induction to facilitate creating a nationally consistent approach, while still leaving regional and local leaders the autonomy to design the most suitable policy (AITSL, 2016[86]).

5.2. Teaching standards

5.2.1. Processes and functions

The Australian government established the Teacher Education Ministerial Advisory Group in 2014 to provide them with advice on improving teacher education (Craven et al., 2014[69]). The Group's report "Action Now: Classroom Ready Teachers" contains 38 recommendations in five key areas:

- a strengthened national quality assurance process
- sophisticated and transparent selection for entry to teaching
- integration of theory and practice
- robust assurance of classroom readiness
- national research and capability.

The government responded to these and started the implementation of changes in 2015 with AITSL assuming a leadership role. The main documents related to these reform initiatives on which this case study builds are summarised in Table 5.1.

Table 5.1. Key documents supporting Australian teacher policies used in this case study

Date	Author	Title	Purpose
2011	AITSL	Australian Professional Standards for Teachers	Standards
December 2014	Teacher Education Ministerial Advisory Group (TEMAG)	Action Now: Classroom Ready Teachers	A report written by the TEMAG that was appointed by the Australian government in 2014 to make recommendations on how initial teacher education in Australia could be improved
September 2014	Ingvarson and colleagues	Best Practice Teacher Education Programs and Australia's Own Programs	A study on teacher education programmes commissioned by the Australian government to support the work of TEMAG
February 2015	Australian Government	The Australian government's response to the report Action Now: Classroom Ready Teachers	The government's intention to operationalise the recommendations of the TEMAG report
August 2015	AITSL	Classroom ready: Demonstrating the impact on student learning of initial teacher education programs	A position paper
December 2015	AITSL	Accreditation of initial teacher education programs in Australia: Standards and procedures	Guidelines for implementing standards for programme accreditation purposes

The Australian Professional Standards for Teachers were developed collaboratively led by AITSL, involving state governments, professional organisations and teacher unions, thus involving a close consultation with the teaching profession, employers and teacher educators (NCEE, 2016[85]; OECD, 2013[2]). The process started in 2009 under the auspices of a Ministerial Council, and AITSL took over leadership in 2010 (AITSL, 2011[87]). The final standards were published in 2011 and a national-level implementation started in 2013.

The standards describe what teachers are expected to know and be able to do at four career stages: graduate, proficient, highly accomplished and lead (AITSL, 2011[87]). They were developed through synthesising the descriptions of teachers' knowledge, practice and professional engagement used by teacher accreditation and registration authorities, employers and professional associations (AITSL, 2011[87]). The validation process of the descriptors involved almost 6,000 teachers (ibid.).

According to the official document, standards are intended to:

- contribute to the professionalisation of teaching and raise the status of the profession
- provide a common understanding and language for discourse between teachers, teacher educators, teacher organisations, professional associations and the public
- provide a framework that can inform the development of professional learning goals, and assist self-reflection and self-assessment
- guide the preparation, support and development of teachers through the different career stages
- underpin the accreditation of initial teacher education programmes: graduates from accredited programmes qualify for registration in each state and territory
- underpin processes for full registration as a teacher and support the requirements of nationally consistent teacher registration

- inform voluntary certification at the career stages of highly accomplished and lead teacher (AITSL, 2011[87]).

The evaluation report on the usefulness, effectiveness and impact of the standards between 2013 and 2015, found that the standards were used across Australia at the national, state and school levels. Their use generally involves mandatory requirements such as registration and certification, but examples for more extended use, such as professional development and teacher self-reflection, were also found in some cases (AITSL, 2016[88]). Initial teacher educators reported the highest levels of knowledge of the standards and had the highest implementation intentions (compared to teachers, teacher candidates and school leaders). The evaluation report suggests that this may be the result of the standards being incorporated into course accreditation processes (AITSL, 2016[88]).

In Australia, the implementation of teaching standards is centrally governed through the accreditation of initial teacher education programmes. The process is regulated by the "Accreditation of Initial Teacher Education Programs in Australia: Standards and Procedures" document issued by AITSL. While accreditation was compulsory already before 2014, the Teacher Education Ministerial Advisory Group found that the quality of programmes was not equally high in every institution (Craven et al., 2014[69]). The report states that national standards were not always applied effectively, for example, not all providers assessed their teacher candidates rigorously and consistently against the standards (Craven et al., 2014[69]).

Some 20% of the recommendations of the Action Now report are directly related to the professional standards (see Box 5.1). Based on these recommendations, the government decided to give more responsibility to AITSL. In particular, AITSL was tasked with developing "explicit instructions and supporting information that make clear exactly what universities need to provide to gain course accreditation" (Craven et al., 2014[69]). In this sense, central accreditation policy also includes justification of course design and evidence on how courses ensure that teacher candidates reach the graduate standards at graduation (Craven et al., 2014[69]). Such evidence was to focus specifically on impact on learning. The new policy was to be implemented as a collaborative effort led by AITSL and involving state and territory regulatory authorities such as state accreditation panels. Capacity building at the regional and local levels was also mandated to AITSL (Craven et al., 2014[69]).

Box 5.1. Recommendations on how initial teacher education should ensure classroom readiness of all candidates

The Teacher Education Ministerial Advisory Group expressed concern about the consistency, rigour and reliability of the assessment process of teacher candidates and made the following recommendations to ensure that all candidates meet the nationally agreed Professional Standards:

"23. Systems/schools required to use the Australian Professional Standards for Teachers in identifying highly skilled teachers to supervise professional experience, and work with higher education providers to ensure rigorous, iterative and agreed assessment of pre-service teachers. The Australian Institute for Teaching and School Leadership develop guidelines to ensure supervising teachers have the skills required to be effective in the role. […]

25. Higher education providers assess all pre-service teachers against the Graduate level of the Professional Standards.

26. The Australian Institute for Teaching and School Leadership develop a national assessment framework, including requirements for a Portfolio of Evidence, to support higher education providers and schools to consistently assess the classroom readiness of pre-service teachers throughout the duration of their program.

27. Pre-service teachers develop a Portfolio of Evidence to demonstrate their achievement of the Graduate level of the Professional Standards.

28. Higher education providers and schools work together to assist pre-service teachers to develop and collect sophisticated evidence of their teaching ability and their impact on student learning for their Portfolio of Evidence.

29. The Australian Institute for Teaching and School Leadership undertake a review of the Graduate level of the Professional Standards to ensure that the knowledge, skills and capabilities required of graduates align with the knowledge, skills and capabilities beginning teachers should have. […]

33. Beginning teachers build on their Portfolio of Evidence to reach full registration at the Proficient level of the Professional Standards."

Source: Craven et al. (2014[69]), *Action Now: Classroom Ready Teachers*, Teacher Education Ministerial Advisory Group, https://docs.education.gov.au/system/files/doc/other/action_now_classroom_ready_teachers_accessible.pdf (accessed on 29 December 2017) pp. 39.

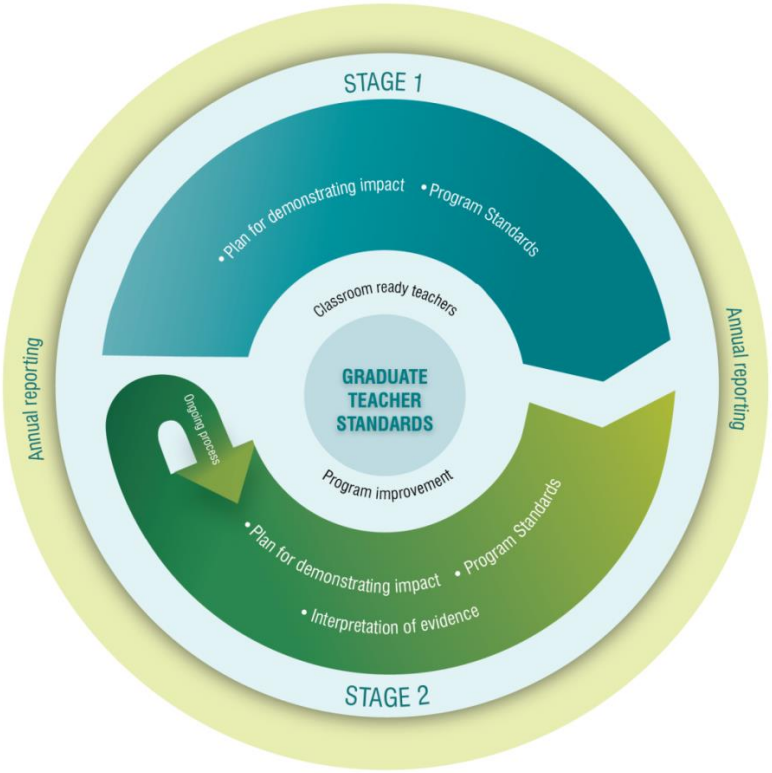
The revised accreditation standards and procedures build on the recommendations, and position the national teaching standards at the heart of the accreditation process (Figure 5.1). Accreditation takes place in two stages: stage one applies to new programmes. Providers at this stage need to submit:

- evidence against the programme standards
- mapping where in the programme the Graduate Teacher Standards are taught, practised and assessed
- a plan for demonstrating impact.

Stage two focuses on assessing the impact of the programme after a set period of time (maximum five years). Providers at this stage need to submit:

- an analysis and interpretation of their evidence as outlined in their plan for demonstrating impact in relation to pre-service teacher performance and graduate outcomes
- a description of programme changes and planned improvements and the evidence base for these
- evidence of adherence to the programme standards (AITSL, 2015[84]).

Figure 5.1. Australian accreditation system



Source: AITSL (2015[84]), *Accreditation of Initial Teacher Education Programs: Standards and Procedures*, https://www.aitsl.edu.au/docs/default-source/initial-teacher-education-resources/accreditation-of-ite-programs-in-australia.pdf (accessed on 30 December 2017), pp 6.

5.2.2. Content analysis

This paper focuses on graduate level standards to analyse how pedagogical knowledge is conceived, and to compare it to teacher education curriculum. The standards framework is composed of seven standards organised in three areas: Professional knowledge, Professional practice and Professional engagement. Professional knowledge incorporates two standards: 1) Know students and how they learn, and 2) Know the content and how to teach it. The majority of standards in this area are designated by the expression "demonstrate knowledge".

The specific knowledge areas (Table 5.2) mostly fall into the pedagogical knowledge domains of learning and instructional processes, and cover content and pedagogical content knowledge as well. There is a very strong emphasis on knowledge of diversity

both in terms of learning characteristics and their implications for teaching. Five of the twelve areas explicitly focus on teaching diverse classrooms. On the other hand, knowledge about assessment (e.g. diagnosis principles, evaluation forms and procedures) is mentioned in only one area, and knowledge of instructional processes is also mostly limited to teaching strategies for diverse classrooms. While there is no reference to any particular scientific discipline, meeting the standards would require knowledge of certain areas of psychology (e.g. child development), educational sociology (e.g. the impact of culture, cultural identity and linguistic background on education) and perhaps more broadly learning sciences (e.g. research into how students learn).

Table 5.2. Professional knowledge in the Australian graduate standards and core pedagogical areas

Focus area	Graduate standard	Pedagogical area
1.1 Physical, social and intellectual development and characteristics of students	Demonstrate knowledge and understanding of physical, social and intellectual development and characteristics of students and how these may affect learning.	Learning processes
1.2 Understand how students learn	Demonstrate knowledge and understanding of research into how students learn and the implications for teaching.	Learning processes
1.3 Students with diverse linguistic, cultural, religious and socioeconomic backgrounds	Demonstrate knowledge of teaching strategies that are responsive to the learning strengths and needs of students from diverse linguistic, cultural, religious and socioeconomic backgrounds.	Instructional processes Learning processes
1.4 Strategies for teaching Aboriginal and Torres Strait Islander students	Demonstrate broad knowledge and understanding of the impact of culture, cultural identity and linguistic background on the education of students from Aboriginal and Torres Strait Islander backgrounds.	Instructional processes Learning processes
1.5 Differentiate teaching to meet the specific learning needs of students across the full range of abilities	Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities.	Instructional processes Learning processes
1.6 Strategies to support full participation of students with disability	Demonstrate broad knowledge and understanding of legislative requirements and teaching strategies that support participation and learning of students with disability.	Instructional processes Other (legislation)
2.1 Content and teaching strategies of the teaching area	Demonstrate knowledge and understanding of the concepts, substance and structure of the content and teaching strategies of the teaching area.	Content knowledge
2.2 Content selection and organisation	Organise content into an effective learning and teaching sequence.	Pedagogical content knowledge Instructional processes
2.3 Curriculum, assessment and reporting	Use curriculum, assessment and reporting knowledge to design learning sequences and lesson plans.	Instructional processes Assessment
2.4 Understand and respect Aboriginal and Torres Strait Islander people to promote reconciliation between Indigenous and non-Indigenous Australians	Demonstrate broad knowledge of, understanding of and respect for Aboriginal and Torres Strait Islander histories, cultures and languages.	Other (history, culture, language)
2.5 Literacy and numeracy strategies	Know and understand literacy and numeracy teaching strategies and their application in teaching areas.	Pedagogical content knowledge
2.6 Information and Communication Technology (ICT)	Implement teaching strategies for using ICT to expand curriculum learning opportunities for students.	Instructional processes Pedagogical content knowledge

Source: Column 1 and 2 of this table are adapted from AITSL (2011[87]), *Australian Professional Standards for Teachers*, https://www.aitsl.edu.au/teach/standards (accessed on 30 December 2017).

Similarly to the Estonian case, standards described as professional practice suppose a large amount of knowledge that is not described as such in the document (see examples in Table 5.3). Descriptions in this area use active verbs such as plan, set, identify, describe, include, referring to teacher' actions rather than their knowledge. A certain number of standards however refer to knowledge either directly ("demonstrate knowledge") or indirectly "demonstrate understanding". Table 5.3 shows that descriptions of professional practice in fact contain an extensive knowledge of both instructional processes, for example classroom management, and assessment and inquiry, for example diagnosis and assessment principles and procedures, or data analysis and use. Contrary to knowledge of learning processes, which was extensively captured as professional knowledge, these are embedded in descriptions of practice rather than knowledge.

Table 5.3. Examples for professional practice in the Australian teaching standards

Pedagogical area	Examples for standards for professional practice	Implicit knowledge requirements
Learning process	3.1 Set learning goals that provide achievable challenges for students of varying abilities and characteristics.	Knowledge of learners, planning and sequencing lessons
Instructional process	3.2 Plan lesson sequences using knowledge of student learning, content and effective teaching strategies	Knowledge of lesson planning and sequencing
	3.3 Include a range of teaching strategies	Knowledge of teaching methods/strategies
	3.4 Demonstrate knowledge of a range of resources, including ICT, that engage students in their learning.	Explicit knowledge requirement
	4.2 Demonstrate the capacity to organise classroom activities and provide clear directions.	Knowledge of classroom management
	4.3 Demonstrate knowledge of practical approaches to manage challenging behaviour.	Explicit knowledge requirement (classroom management)
Assessment and inquiry	3.6 Demonstrate broad knowledge of strategies that can be used to evaluate teaching programs to improve student learning.	Explicit knowledge requirement
	5.1 Demonstrate understanding of assessment strategies, including informal and forma, diagnostic, formative and summative approaches to assess student learning.	Knowledge of diagnoses and assessment principles, forms and procedures
	5.2 Demonstrate an understanding of the purpose of providing timely and appropriate feedback to students about their learning.	
	5.3 Demonstrate understanding of assessment moderation and its application to support consistent and comparable judgements of student learning.	
	5.4 Demonstrate the capacity to interpret student assessment data to evaluate student learning and modify teaching practice.	Knowledge of data analysis and use
	5.5 Demonstrate understanding of a range of strategies for reporting to students and parents/carers and the purpose of keeping accurate and reliable records of student achievement.	Knowledge of assessment procedures and data use

Source: Examples extracted from AITSL (2011[87]), *Australian Professional Standards for Teachers*, https://www.aitsl.edu.au/teach/standards (accessed on 30 December 2017).

The third area of the standards – Professional engagement – requires teachers to have an understanding of various aspects of engagement in professional learning, and with colleagues, parents, carers and the community. This section implicitly requires teachers to have their own metacognitive strategies, and a range of specific knowledge that supports their pedagogical knowledge and practice (such as knowledge of legislation and policies, code of ethics and conduct). It also includes knowledge of strategies to work with parents, which is a more direct pedagogical area.

In sum, although a very wide range of pedagogical knowledge is required to meet the Australian graduate standards, what is actually conceived as professional knowledge in the document is restricted to mostly knowledge of learning, and to a lesser extent knowledge of instruction as it relates to teaching diverse classrooms.

5.3. Linking pedagogical curriculum, standards and educational sciences

The link between standards and pedagogical curriculum is illustrated through the teacher education programme of the University of Melbourne[8], in the state of Victoria, which features as a good practice example for integrating theory into teaching practice (Craven et al., 2014[69]; NCEE, 2016[85]).

5.3.1. Processes

The Master of Teaching programme at Melbourne Graduate School of Education (MGSE) was designed and first accredited in 2007 (McLean Davies et al., 2013[89]). The new programme's core feature was its focus on clinical thinking, i.e. enabling teacher candidates to design intervention strategies for every child that have an impact on their learning, make evidence-based professional judgements based on research as well as evidence gathered by them. When the AITSL standards were published in 2011, and as part of the reaccreditation of the Early Childhood and Primary programmes, a mapping exercise was carried out by the University in parallel with the refinement of learning outcomes for each course. The process consisted of identifying which standards were addressed in each course through their specific learning outcomes, and verifying the representation of all standards in the programme. Since all standards could be matched to at least one, often several courses within a programme, the alignment process did not significantly impact on the programme structure and content, and had only minor impact in terms of identifying standards in course content. As the interviewees reported, the programme was not constrained by the standards, and the focus remained on the development of teacher candidates as clinical practitioners – a genuine model that the AITSL standards do not spell out.

The reaccreditation of the programme in 2016 had to meet the programme standards introduced by AITSL in 2015 as a result of the Action Now report. This process was particularly pertaining to the assessment of teacher candidates. It involved documenting the evidence of how each of the graduate standards was measured, i.e. demonstrating that they were taught, practiced and assessed (based on the AITSL templates). This involved a

[8] Data to describe the processes was collected through a semi-structured interview with two key informants from Melbourne Graduate School of Education, conducted in February 2018. Further to the interviews, a part of the curriculum and the standards were analysed to compare their contents (see details in Annex B).

more extensive planning and mapping exercise across all courses in each of the programmes. This second alignment process had reportedly a greater impact on the programme, in particular on the nature of assessment.

Following this, in 2017, MGSE was involved with nine other universities in developing a teacher performance assessment tool which ensures that what is understood as evidence of teacher impact is shared across multiple providers.

5.3.2. Content analysis

This section looks at the links between the curriculum of the Master of Teaching (secondary) programme of the Melbourne Graduate School of Education and the Australian graduate standards.

Table 5.4. Sample full time course plan of the Melbourne Graduate School of Education

Year 1	Semester 1	Educational Foundations	Introduction to Clinical Practice	Learning area subject	Learning area subject
		Clinical Teaching Practice 1 (21 placement days across the semester)			
	Semester 2	Diverse and Inclusive Classrooms	Integrating Language and Clinical Practice	Learning area subject	Learning area subject
		Clinical Teaching Practice 2 (21 placement days across the semester)			
Year 2	Semester 1	Becoming a Clinical Practitioner	Contemporary Education Debates	Inclusive Language, Literacy and Numeracy	Researching Education Practice or Education Research Methodology*
		Clinical Teaching Practice 3 (21 placement days across the semester)			
	Semester 2 (Coursework pathway)	Education Research Project		Elective	Elective
	Semester 2 (Research coursework)	Education Research Study			

Note: * Research pathway option.
Source: MGSE (2017[90]), MGSE Master of Teaching (Secondary), Melbourne Graduate School of Education, http://education.unimelb.edu.au/study_with_us/courses/master-of-teaching/secondary (accessed on 01 January 2018).

The analysis is based on the programme structure and the 2018 Handbook (University of Melbourne, 2018[91]), of which the content of two courses – Educational Foundations and Diverse and inclusive classrooms – were analysed to illustrate links to the standards.

This Master of Teaching is a graduate programme which requires an undergraduate degree in two learning areas (with a major study in at least one learning area, and a minor, sub-major or equivalent in a second area) (MGSE, 2017[90]). While following a consecutive teacher education model, this school still requires developing content knowledge, although these subject-specific studies represent a much smaller proportion of credits (25 out of 200) (University of Melbourne, 2018[91]). Pedagogical content knowledge is not a separate part of the curriculum, nor is it in the standards, although standard 2.1 explicitly refers to content and pedagogical content knowledge ("demonstrate knowledge and understanding of the concepts, substance and structure of the content and teaching strategies of the teaching area" (AITSL, 2011, p. 10[87])).

Overall, the greatest focus is on general pedagogy both in the curriculum and in the standards. The programme is structured differently from the standards. The broad subjects of the pedagogical curriculum (Table 5.4) and their learning outcomes do not map onto a particular section of the standards, rather one course might cover a number of standards from different sections. Similarly to the Estonian case, while the standards distinguish professional knowledge and professional practice, the MGSE programme integrates theory and practice in its courses, which is a distinctive feature of clinical practice programmes (McLean Davies et al., 2015[92]).

While all course descriptions are explicitly linked to the professional standards through a list of learning outcomes, some of the matchings seem unclear (Annex B, Table B.1). Learning outcomes do not consistently use the same text as the standards to which they are associated, and many of them are only loosely or not at all related to these. In terms of scope, the programme seems more extensive than the standards: it covers all professional knowledge areas set in the standards, and offers unique features, i.e. areas not set by the standards such as contemporary educational debates.

The two documents conceptualise knowledge differently. What is conceived as professional knowledge in the standards is somewhat restricted, while an important body of pedagogical knowledge is described as professional practice, rather than knowledge. While this might seem to correspond to the MGSE programme structure in that clinical teaching is its core element, the interviews clearly revealed that clinical teaching reflects a strongly knowledge and research-based conceptualisation rather than a practical approach. In fact, these courses cover the knowledge areas of the standards the most comprehensively. The difference is also manifested in the fact that all course descriptions clearly formulate knowledge building as an objective, and the development of teacher candidates' teaching skills always explicitly draws on knowledge.

Using again Furlong and Whitty's framework of knowledge traditions, the programme of the University of Melbourne is an example for an integrated tradition coined research informed clinical practice, i.e. is a model in which research knowledge and evidence of different sources are brought together and are in mutual interaction with teachers' practical knowledge (Whitty and Furlong, 2017[19]). This is exactly what one of the interviewees describe:

> *"We are trying to do something that the standards weren't envisaging when they were set up: a genuine clinical practitioner. It's really drawing everything together: are they able to find out of a particular child, what are the challenges of that child, what's the evidence-based interventions that will take him or her to the next level (whatever that is) and what are the appropriate intervention strategies and how do they know they have an impact on student learning."*

The AITSL graduate standards, by their nature as a competence framework, are closest to the practical tradition. While the document does explicitly require teachers to draw on knowledge in the professional practice section as well (e.g. "Plan lesson sequences using knowledge of student learning.", "Demonstrate knowledge of a range of resources), this does not seem to be a core, underlying feature of the standards.

In sum, the Australian case yields the same finding as the Estonian one: substantial differences can prevail between the standards and teacher education curriculum, even when explicit links are established. Moreover, the programme seems to be broader in focus and more knowledge-oriented.

6. Singapore

Education has been a key element in Singapore's success in transforming a third world to first world state in less than half a century (NCEE, 2018[68]). The education system is highly centralised: the Ministry of Education sets the national goals, curriculum guidelines and national examinations, sets guidelines for teacher development, evaluation and promotion, and hires most education officers (NCEE, 2018[68]). Schools are clustered to provide local support for implementing policies and initiatives (NCEE, 2018[68]). These clusters, led by superintendents, have a certain amount of autonomy to adapt central recommendations to local needs (NCEE, 2018[68]).

6.1. Teacher education

Teacher education in Singapore is provided by a single institution, the National Institute of Education (NIE), an autonomous institute of the Nanyang Technological University, which works in partnership with the Ministry of Education (MOE) and schools in preparing teachers (Lim, 2013[93]). NIE offers both consecutive and concurrent programmes. Concurrent ones include the Diploma in Education, Bachelor of Arts (Education), Bachelor of Science (Education) and Bachelor of Education programmes, all but the latter available for primary and secondary levels (Lim, 2013[93]). The majority of entering teacher candidates are enrolled in a consecutive programme (Postgraduate Diploma in Education), and have already completed a bachelor's degree in the subject they are going to teach (NCEE, 2018[94]).

Selection to enter teacher education is based on an estimated need of the number of teachers and is a highly competitive process in Singapore. Candidates are recruited from the top third of secondary graduates, and less than a fifth of applicants are admitted (NCEE, 2016[95]). Those who satisfy the admission criteria of NIE are interviewed by a panel consisting of members of the ministry and the teacher education faculty (Lim, 2013[93]).

Teacher education includes academic subjects, education studies, curriculum studies, service learning and a significant amount of teaching practicum (NIE, n.d.[99]). Academic subjects cover knowledge of the content and fundamental concepts and principles of either one or two subjects, depending on the programme in which the student teacher is enrolled (NCEE, 2016[95]). During their teaching practicum, teacher candidates are supported by school-based mentors and university supervisors. A key objective of practicum is to help candidates to link theory and practice. They have opportunities to actively participate in all aspects of the school's activities (NIE, n.d.[99]). New teachers enter an induction programme that is centrally organised by the Minister of Education, but suits the local needs of schools (NCEE, 2016[95]).

6.2. Teaching standards

6.2.1. Processes and functions

Teaching quality is governed through a set of frameworks and instruments in Singapore. The Ministry of Education developed a competency-based management framework, the Enhanced Performance Management System (EPMS). The EPMS lays out the knowledge, skills and professional characteristics for the three types of educational

officers: teachers, leaders and senior specialists (Ministry of Education, Singapore, 2006[96]).

The only teacher education provider, NIE, started to develop its frameworks for ensuring the quality of its training early on, starting in 2000, and has revised them twice since (NIE, 2009[97]). The 2010 NIE report articulates its current teacher education model for the 21st century in six recommendations:

1. Recommendation I: The New V^3SK Model
2. Recommendation II: Graduand Teacher Competences
3. Recommendation III: Strengthening the Theory-Practice Nexus
4. Recommendation IV: Programme Refinement and An Extended Pedagogical Repertoire
5. Recommendation V: Assessment Framework for 21st Century Teaching and Learning
6. Recommendation VI: Enhanced Pathways for Professional Development (ibid.).

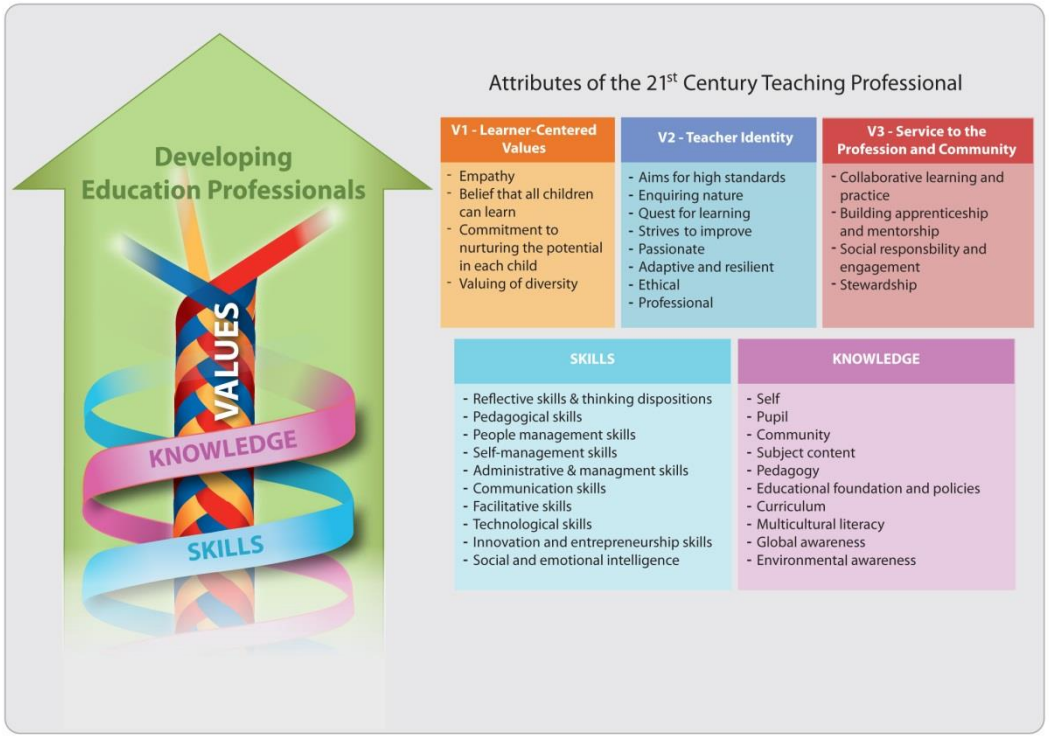
The new V^3SK model (Figure 6.1), a revision of earlier frameworks, spells out the values, skills and knowledge required of teachers (NIE, 2009[97]). The Graduand Teacher Competences (GTC) is the professional standards for graduating teacher candidates.

6.2.2. Content analysis

The V^3SK model's value paradigms are conceptualised as the core of the model and are described in a more detailed manner, while the skills and knowledge paradigms are short lists of bullet points. Knowledge is defined as broad areas that go beyond the knowledge of subject content and pedagogy, extending to that of self, the community and society at large (NIE, 2009[97]).

Figure 6.1. The V^{3}SK Model

Values, skill, knowledge framework of the National Institute of Education, Singapore



Source: National Institute of Education (2009[97]), *A Teacher Education Model for the 21st Century: A Report by the National Institute of Education*, Singapore, pp. 45.

There is no one-to-one match between the V^{3}SK model and the Graduand Teacher Competences, however, the influence of individual values, skills and knowledge lies in the definition of each of the GTCs. The standards are structured in three performance dimensions – professional practice, leadership and management, personal effectiveness – and seven core competences. Two levels are possible for each of the competences: the capacity building level indicates that graduate teachers are required to demonstrate the achievement of the competency, while the awareness level means they need to know what the competency involves but are not required to have achieved it by graduation. Following the recommendation made in the 2010 report, the standards are to be used as a basis to revise the teacher education programmes, and to assess graduate teachers through measures such as self-reporting and a portfolio (NIE, 2009[97]).

Unlike the Estonian and the Australian standards, the GTC does not separate knowledge requirements and teachers' activities or practice. The majority of the competences are formulated as actions, i.e. the teacher develops, uses, creates, plans, delivers, manages, identifies, makes, analyses, etc. Nevertheless, some refer to knowledge more or less explicitly through expressions such as "the teacher understands, comprehends…", or within the fourth competency, "Cultivating knowledge with…", through describing what knowledge the teacher should draw on. Implicit knowledge requirements can be identified across the three core domains of general pedagogy (Table 6.1).

Table 6.1. Examples for professional practice in the Singapore Graduand Teacher Competences

Pedagogical area	Examples for standards for professional practice	Implicit knowledge requirements
Learning process	2. Providing Quality Learning of Child - has a well-integrated understanding of how pupils learn and develop and provides learning opportunities that support their development	Knowledge of learning and development of learners
Instructional process	2. Providing Quality Learning of Child - creates instructional opportunities adapted to diverse learners - uses a variety of instructional strategies to teach concepts in ways that encourage pupils to see learning as meaningful - has a repertoire of approaches that engage pupils in problem-solving, and critical and creative thinking;	Knowledge of teaching methods/strategies
	2. Providing Quality Learning of Child - creates and maintains an effective classroom environment that encourages positive social interaction, self-motivation and active engagement in purposeful learning; - manages the resources of time, space; activities, and attention to engage pupils individually and in groups in productive tasks; - proactively plans to maintain discipline and order in class	Knowledge of classroom management, Knowledge of lesson planning
Assessment and inquiry	1. Nurturing the Whole Child - uses a variety of methods to determine current and future pupil needs and expectations, and provides necessary guidance and support	Knowledge of diagnoses of pupil needs, Knowledge of learners (cf. Learning process)
	2. Providing Quality Learning of Child - understands the link between the purpose of assessment and the intended learning outcomes; - comprehends that assessment is closely tied to the teaching learning activities; - comprehend that assessment is closely tied to pupil motivation and their academic performance; - understand the interdependence of "assessment of learning" on "assessment for learning"; - can use a range of appropriate monitoring and assessment strategies and instruments to identify learning needs, to evaluate progress, to provide evaluative feedback to help pupils in their progress, and to take follow-up action	Knowledge of diagnoses and assessment principles, forms and procedures
	2. Providing Quality Learning of Child - understands statistical concepts in representing pupils' patterns of responses to assessment tasks; and, - recognises objective and ethical assessment procedures	Knowledge of data analysis and use, and research literacy
	4. Cultivating Knowledge with: Reflective Thinking - is aware of major areas of research on teaching and of resources for professional learning Analytic Thinking - identifies possible cause-and-effect relationships, develops plans to respond, prioritises tasks in order of importance, and carefully monitors responses; - makes and defends complex choices and decisions; and, - frames, analyses and synthesises information in order to solve problems and provide solutions.	Research literacy, Knowledge of data analysis and use

Source: Examples extracted from NIE (2013[98]), *Graduand Teacher Competencies*, http://www.nie.edu.sg/docs/default-source/td_practicum/te21---gtc.pdf (accessed on 08 January 2018).

6.3. Linking pedagogical curriculum, standards and educational sciences

6.3.1. Processes

Singapore is a special case in terms of implementing professional standards in teacher education curriculum[9], in that it is the only provider, who developed the standards itself. Therefore standards do not enter the field of teacher education as an external pressure by central government, but rather as an internal endeavour. In fact, the report itself that published both the V^{3}SK model and the GTC contains a section on their impact on programmes. It formulates a "need to re-examine programmes in terms of structure, delivery and assessment so that those competences termed as capacity building are the 'guaranteed' outcomes" (NIE, 2009, p. 54[97]). It also explicitly sets out a task to map the competences to the courses, and see how each of those required to be achieved by graduation is developed and assessed (NIE, 2009[97]).

Initial teacher education programmes are managed by the Academic Consortium at NIE, which works closely with the Ministry of Education, Nanyang Technological University (of which it is part of) and the Institute's Academic Groups on programme-related issues. The Student Consortium (also consisting of university staff) leads in reviewing and enhancing programmes, as well as developing new programmes.

A key pedagogical change since the introduction of the standards reported in the interview was making learning learner-centred to develop self-directed and lifelong learners. This entailed a shift of the ownership of learning from the teacher educators to the learners (i.e. teacher candidates). The link between theory and practice was also strengthened in several ways. Teacher candidates were increasingly more asked to engage in inquiry and reflection in the classroom, for example through using real-life school scenarios in courses (Lee and Low, 2014[99]). Moreover, NIE's programmes are guided by the EPIIC framework, i.e. teacher education as Experiential, Participatory, Inquiry-based, Image-rich and Connected. This model is supported by three key pedagogical approaches: problem-based learning, blended learning and flipped classroom, as reported by the institution.

The GTC framework is embedded in NIE's courses to support teacher candidates' growth and development and is also used to evaluate their outcomes (NIE, 2009[97]). Following the development of the V^{3}SK model and the introduction of the GTC, programmes at NIE were re-examined in terms of structure, delivery and assessment to make sure that the competences termed as "capacity building" are the "guaranteed" outcomes. Similarly to the Australian case, the institute explored how this "guarantee" can become evidence-based and aligned assessment practices with these accordingly (NIE, 2010). In terms of the actual content of Education Studies, the interview confirmed that teacher candidates "are exposed to almost all aspects of the V^{3}SK model and the GTCs". The written interview however was unable to ascertain the exact procedure of matching.

[9] Data to describe the processes was collected through a structured written interview completed by a key informant and their team from the National Institute of Education in February 2018. Further to the interview, a part of the curriculum and the standards were analysed to compare their contents (see details in Annex C).

6.3.2. Content analysis

To investigate the nature of links between the standards and the curriculum, this section analyses the Postgraduate Diploma in Education (PDGE) programme for secondary level teacher candidates based on the handbook for students who started in December 2017.

The curriculum is composed of four study areas (Table 6.2). Curriculum studies cover the content knowledge of two subjects, educational studies help teacher candidates acquire general pedagogical knowledge, and practicum is conceived as crucial in bridging theory and practice while also developing all areas of professional knowledge (NIE, n.d.[99]). Pedagogical content knowledge is not explicitly present in the curriculum. While the standards are not organised based on the three knowledge categories, standards 4.i. explicitly refers to content and pedagogical content knowledge.

Table 6.2. Curriculum structure of the PDGE (secondary, general) programme at NIE, Singapore

Area	Number of Academic Units[1]
Education studies	19
Curriculum studies (two subjects)	11 x 2
Language enhancement and academic discourse skills (LEADS)	3
Practicum	13

Note: 1. A consistent measure of students' academic workload. Each academic unit typically represents a total of 13 hours of lesson activities.
Source: NIE (2017[100]), *Postgraduate Diploma in Education (PGDE) Programme Handbook*, http://www.nie.edu.sg (accessed on 12 January 2018).

Teacher education programme is organised differently than the standards, the performance dimensions and core competences of these latter do not directly map onto specific courses. Unlike the Estonian and Australian cases, teachers' activities and knowledge are not separate in the Singapore standards, but rather integrated in the professional practice dimension. Some of the requirements of the other two dimensions are covered in courses within the education studies area (e.g. 5.i. "Understanding the environment" in the Social Context of Teaching and Learning course, 6.i. "Partnering Parents" in the Effective Parent Engagement for Teachers course), and within Practicum (e.g. some competences described in 7. "Knowing Self and Others"). In terms of scope, the curriculum seems comparable to the standards.

Courses are not explicitly linked to professional standards through their descriptions in the programme handbook, except for one general link to both the V^3SK and the GTC frameworks. The content coverage in terms of competency development is largely overlapping, but no one-to-one matching exists. Each course develops competences pertaining to a number of standards, and each standard's competency list is developed by a number of courses. The analysis of some selected courses (Annex C) suggests that courses have both stronger, direct links to the Professional Practice section of the GTC and indirect links suggesting that competences taught in the courses are necessary to achieve those described in the standards.

The way the two documents conceptualises knowledge also differs, which is reflected in the terms and language used. In general, more scientific-theoretical terms are used in the course descriptions than in the standards. The only standard that explicitly refers to

knowledge (i.e. uses this word) is Cultivating knowledge with: Subject Mastery. Clearly knowledge is associated with content (disciplinary) and pedagogical content knowledge, while pedagogical knowledge is described as teachers' actions or skills. Educational studies curriculum on the other hand refers to the knowledge of various pedagogical areas, indeed about half of the course descriptions use this word. The word theory similarly is only used in the course descriptions, but not in the standards. Interestingly, while an awareness of "major areas of research on teaching" is required by the standards, the word research is not used in the course descriptions.

Similarly to the Estonian and Australian cases, the link between theory and practice is a strong element in the curriculum, explicitly addressed in four courses, as well as the extensive practicum. The PDGE programme seems thus to reflect an integrated knowledge tradition in general. A sign of the academic tradition is apparent however in the course Educational Psychology: Theories and Applications for Learning and Teaching. This is the only course that refers to a specific academic discipline and its focus seems to be more applied, suggesting the Applied Educational Research and Scholarship model described by Whitty and Furlong (2017[19]). The Singapore standards can be categorised in the practical knowledge tradition, with some elements of integrated traditions (section on Reflective Thinking).

In sum, despite the fact that it is the (only) provider that developed the standards, the link between the competency requirements and the teacher education curriculum is not always direct and explicit. Nevertheless, a considerable overlap between competences described in the Graduand Teaching Standards and those developed by the PDGE courses does exist.

7. Discussion

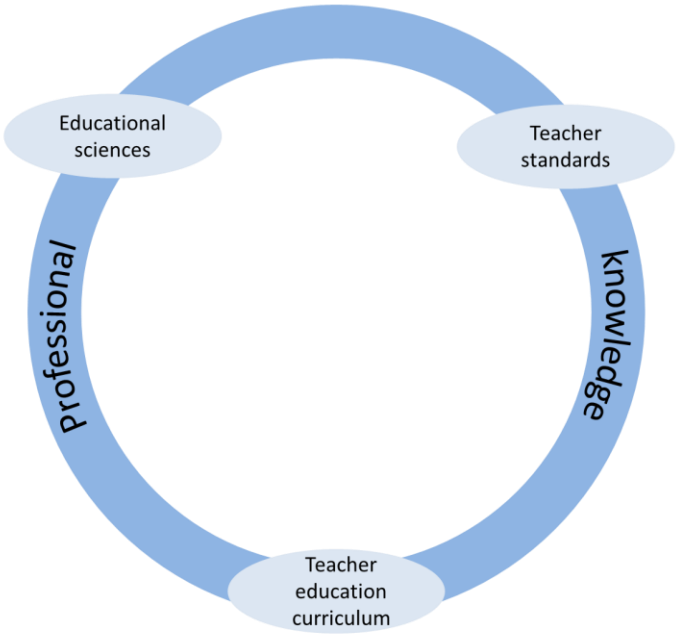
The intention underlying standards development is raising the quality of teachers through establishing common requirements to enter the profession, and to guide teacher appraisal and professional development (OECD, 2013[2]). This includes assuring the quality of teacher education, through standardising programmes by aligning them in a way that they prepare teachers for the same outcomes. The general policy objective is thus embedded in a discourse of accountability, evaluation and assessment. In this discourse standards are considered as tools that should operate in combination with other tools, such as guidelines, evaluation instruments, to fulfil the above objectives. There is however a need to understand how standards work in practice, what function they have in raising teacher quality, if any, and how this is achieved.

More specifically, the questions driving the analyses were:

- What does aligning teacher education programmes to standards really mean? To what extent is this achieved and what are the obstacles?
- What conception of educational sciences is reflected in the standards and the curriculum? How does that relate to the link between these two?

The process of analysis demonstrated the difficulty of dissociating the three elements of the initial framework – standards, teacher education curriculum and educational sciences –, and examining the linkages two by two. What seems to emerge from the analytical discourse is the idea that the concept of teachers' professional knowledge acts as a connecting tissue among these three elements (Figure 7.1). This section discusses how an underlying concept of educational sciences manifests in different conceptualisations of professional knowledge in the standards and in the curriculum based on the three case studies.

Figure 7.1. Analytical approach revisited



7.1. Standards, teacher education programmes and educational sciences

The three cases analysed reflect different policy contexts in terms of the processes relating to standards implementation:

- In Australia the implementation of standards is strongly regulated by the state government through programme accreditation. Providers need to review the programmes, and thus the curriculum, and the standards are central to this process. Due to the size of the country, the implementation of standards can be mediated by a number of institutions and actors as they "travel" through the state authorities and institutions.
- In Estonia the implementation of the standards is controlled through teacher licensing. Institutions obtain the right to issue licences if they demonstrate that their courses prepare teacher candidates to meet the professional standards at graduation. Standards development and the revision of the selected teacher education programme were linked through a key actor.

- In Singapore standards are developed by the (only) teacher education provider itself, and thus linking them to the curriculum is an internal drive of the institution. Implementation here is happening in the exact same context as development.

What is common, is that in all three cases standards are supposed to play a central role in teacher education programmes. In the Estonian and Australian cases, courses' learning outcomes could in principle establish explicit links between the course content and the standards, as both formulate a desired performance/outcome required from teacher candidates. Explicit links were indeed observable in these cases, but no coherent one-to-one associations could be identified. The analyses showed varying degrees of correspondence (Table 7.1), and revealed a number of elements that can explain the apparent tensions between these documents.

Table 7.1. Correspondence between standards and teacher education curriculum in the selected cases

	Extent of alignment	Structure/Organisation	Language used	Conceptualising knowledge	Knowledge tradition of standards	Knowledge tradition of curriculum
Estonia	Explicit	Different	Different	Different	Practical with marks of academic and integrated traditions	Integrated
Australia	Explicit, partly direct and coherent, partly indirect and/or unclear	Different	Similar, but not consistently	Different	Practical with marks of an integrated tradition	Integrated
Singapore	Implicit, partly direct and coherent, partly indirect	Different	Different	Different	Practical with marks of an integrated tradition	Integrated with marks of an academic tradition

We have seen that teachers' professional knowledge can be conceptualised differently in the curriculum and in the standards even when there is an explicit alignment. This may be due to the very different historical and epistemological context of a university, where teacher education curriculum is designed, and the context in which standards are developed. Universities are traditionally knowledge production and dissemination institutions, historically representing academic traditions. Knowledge in this context would often imply theoretical and scientific understandings of certain disciplines. These academic traditions may of course involve internal epistemological differences originating from the different nature of disciplines (Whitty and Furlong, 2017[19]). In these institutions, teacher education curriculum is negotiated and designed by people with academic backgrounds, and will thus reflect their knowledge conceptions.

On the other hand, when standards are developed through a consultation process, the different stakeholders involved can have very different epistemological backgrounds. These may include different disciplinary epistemologies (e.g. from teacher educators delivering psychology, sociology, mathematics courses), purely practical approaches (e.g. from representatives of local authorities or teacher unions), and potentially other mixed conceptions. These different conceptions will be negotiated through the development process, and the result is likely to reflect some kind of mixture, as is demonstrated in the three case studies.

Different conceptualisations of knowledge are reflected in the different structures of standards and curriculum. Some standards (Australian, Estonian) separate knowledge requirements and those related to professional practice. A way to reflect this separation in a teacher education curriculum would be to develop teacher candidates' knowledge in educational studies courses, and their practical skills through teaching practicum. This is clearly not the approach of the integrated traditions that all three cases represent. Rather, both courses and practicum emphasises the development of teachers' capacity to apply theoretical knowledge in practice, as well as for analysing and reflecting on practice.

The use of language also differs in the two kinds of documents, both in terms of what is considered as knowledge, and regarding the specific terms with which teacher competences are described. Inconsistency of what is considered as knowledge can be observed not only between the two different kinds of documents, but also across countries. What seems to be common is that subject content and pedagogical content knowledge are more generally seen as knowledge than general pedagogical areas in the standards. In terms of general pedagogy, it is knowledge of student learning (e.g. psychology, cognitive, social and emotional development) that is more often viewed as knowledge, while other domains such as the instructional process, or assessment are described as practice or activities.

This phenomenon might be linked to the lack of common understanding of what teachers' knowledge base is like evoked earlier. Why some pedagogical areas are not recognised as knowledge is certainly a complex question involving a number of interdependent reasons such as:

- a general lack of accumulated systematic evidence on which teaching practices and approaches are conducive to student learning in each context
- in some countries a dominance of foundational disciplines in educational studies rather than an applied educational research approach originating from questions of practice
- teaching considered largely as a craft and not a knowledge based profession in some countries, etc.

Another significant factor in implementing standards in teacher education is the teacher educator staff. First, as mentioned already, their epistemological background and academic interests influences their understandings of standards and the way they incorporate them in a curriculum. Second, there are more general human and financial resources considerations involved. A radically new curriculum can entail recruiting new staff with suitable expertise or reskilling existing staff. In Estonia for example, the revision of teacher education curriculum involved reskilling staff members of the subject pedagogy department so that they can teach general pedagogical subjects. Initiatives for reskilling (involving for example pair teaching of one staff member from the department of education and one from a subject department) were eventually abandoned as reported by the institution.

In sum, numerous factors mediate the implementation of teacher standards in the curriculum: professional knowledge as conceived at the university, university staff with their unique interests and backgrounds, the structure and culture of educational studies and knowledge production to name the few most important ones. All these represent potential difficulties to the institution and its staff. Using the concept of policy enactment, this section argues that enacting standards is not just a social (Maguire, Braun and Ball, 2015[43]), but a socio-material process, i.e. it involves the interaction of both human actors

and material elements (Fenwick, Edwards and Sawchuck, 2012[52]), influenced by many factors in complex ways.

7.2. Standards as agents of change

If "aligning" teacher education curriculum to standards strictly speaking (i.e. establishing explicit, direct and consistent correspondence) seems to be inherently problematic, what roles do standard play in raising the quality of initial teacher education? The near impossibility of a strict alignment does not mean that standards do not have a policy impact. This section attempts to evoke some of the ways in which standards actually contribute to policy objectives.

Creating dialogue and reflection

Policy documents point to the potential impact of standards in creating a shared language. A report by a European Commission working group on improving initial teacher education states that competence frameworks "create a shared language between phases of the teaching profession and between stakeholder groups" (ET2020 Working Group on Schools Policy, 2015, p. 33[79]). Creating a shared language for teaching is one of the perceived impacts of implementing the standards noted by the Australian report on the evaluation of AITSL standards (AITSL, 2016[88]). In particular, the report specified that "discussion about teaching is starting to be based on and utilise the language of the Standards" (AITSL, 2016, p. 20[88]).

Analysis conducted in this paper only partly supports that argument. Indeed some of the language used in teacher education curriculum is similar to the one used in the standards, important differences however often remain. In-depth studies into the implementation of standards also suggest differences (Tummons, 2014[12]; Ceulemans, Simons and Struyf, 2012[15]). Ceulemans, Simons and Struyf (2012[15]) even trace the process of the transformation of language. The same study however underlines that this process is not to be interpreted as a failure of standardisation, to the contrary, inscription is a sign of success (ibid.).

Another concern with seeing creating a shared language as a desired function of the standards is that it does not take into account the opposite process. The opposite process being the way in which teacher education programmes/curriculum influences the language of standards, for example in the process of their development and revision. To understand the interplay between standards and teacher education, studying how standards are revised, and how teacher education programmes influence this process is as important as studying the inverse process. Indeed, as several scholars argue, professional standards should not be fixed and final at any point of time, but rather flexible and adaptable (Mulcahy, 2011[38]; Sachs, 2003[46]). It could thus be argued, that instead of creating a shared language, standards can and should be used to create a constant dialogue for an ever-evolving understanding of teachers' competences.

Part of this function is in fact a dialogue between actors in the field of education. The Australian evaluation report identified impacts such as

- supporting communication and collaboration between initial teacher education institutions, teacher employers and authorities
- facilitating school-level and school-department level networks of discussion and collaboration

- facilitating professional collaborations at the organisational and individual levels (AITSL, 2016[88]).

The case studies in this paper did reveal an important impact of the standards in creating that dialogue within the field of initial teacher education. In all three cases, a number of relevant actors got engaged in the process, thus got engaged in a collaborative reflection on teachers' knowledge and competences. This in all cases led to some kind of change in the programme, although to a varying extent: more substantial changes manifested in a new structure or content, while in other cases they only involved some new practices such as assessment.

Through the processes of negotiation and the dialogue of different actors, there is also an interaction occurring between the artefacts themselves. As standards can exert an impact on teacher education programmes, the opposite is also possible, or in fact, desirable. As the case studies demonstrate, programmes can be broader in scope and sometimes show more depth in their knowledge requirements. Thus they can represent a rich source for reflecting on standards and potentially revising them. This has not yet happened in the three countries studied in this paper, although it is now being prepared in Estonia.

Shifting knowledge traditions

The case studies demonstrated that standards in some cases (e.g. Estonia) can play a role in inducing a shift in knowledge traditions as described by Furlong and Whitty (2017[19]). In Estonia, revisiting a teacher education programme driven also by the standards resulted in a clear shift from an academic to an integrated tradition. A major element of all three case studies is the strong discourse around linking theory and practice through teacher education. As standards by nature represent a largely practical tradition – although often bearing the marks of integrated ones – they would be conflicting with teacher education institutions' traditions in all cases where these latter are not practical. The process of incorporating standards' requirements into the programme is characterised by this tension. Standards can therefore naturally create a dialogue between different knowledge traditions, and will probably tend to drag teacher education towards an integrated tradition. Managing this tension also implies an evolving understanding of teachers' pedagogical knowledge.

As Ceulemans, Simons and Struyf put it, "teacher's professional profile and core competences are more than mere tools, as they actively influence or (re-)direct the process of educational reform" (2012, p. 44[15]). They do this by generating different activities and reflection involving various actors. The objective in this sense is therefore not to eliminate differences between different conceptualisations, traditions, understandings and language, but to use existing tensions to maintain reflections and dialogue. This is what will eventually lead to raising teacher quality (Mulcahy, 2011[38]).

To conclude, this paper argues that the way in which standards impact on teacher education is not straightforward, but rather complex. It is not the document itself, nor are its requirements of teachers' knowledge and skills that directly shape/change what is taught and how in initial teacher education. It is rather the processes through which standards are negotiated, the involvement of different actors in a dialogue through the standards as artefacts that can have an impact on teacher quality. Initial teacher education curriculum can be viewed as a similar artefact that can also generate dialogue and could (and should) influence standards. In this sense, standards should not be seen as having a higher hierarchical status, but an equal one to teacher education curricula.

8. Conclusions

Many policy documents suggest that national policies should be aiming for aligning sub-policies and documents, such as aligning teacher education programmes to standards (OECD, 2013[2]). This paper aimed to better understand how standards operate in practice, in particular to understand how they were linked to teacher education programmes and educational sciences. Although a more in-depth investigation of the linkages would be necessary to draw clear conclusions (for example, comparing the curriculum used before the introduction of the standards to the revised one), the case studies and the review did generate a number of discussion points. The paper thus argued that alignment cannot be interpreted in a narrow sense as explicit, direct and consistent correspondence. Rather, it requires a broad conceptualisation involving non-linear processes and feedback loops.

The review and analyses suggest that standards, curriculum and courses can be seen as distinct agents that are assembled in each context and at each moment of time in unique ways. Human actors (teacher educators, teacher candidates, schools and mentors, local authorities, etc.) naturally shape these assemblages as they are involved in working with them, and through that shape the professional knowledge and practice of a graduate (or in-service) teacher. The objective should thus rather be to empower actors to engage with these documents and facilitate a constructive dialogue among these. Existing tensions between the different artefacts (standards, curriculum, course descriptions, accreditation standards, etc.) do not need to be eliminated, but rather managed (Labarre, 2017[101]) in order to maintain this constructive dialogue.

Alignment in policy recommendations should thus not be understood as a process in which standards are considered as static (fixed) elements to which all else should be adjusted, rather, as a process of creating mutual dialogue between different elements. As standards can and should shape teacher education programmes and practices (as we have seen in the selected cases, they do), programmes should also shape the standards. For example, in some cases teacher education programmes may have a broader, more innovative view of professional knowledge that could positively influence standards if they were revised. Standards in this sense essentially serve the purpose of a dynamic communication and reflection tool that exerts its effect through creating dialogue among actors, as well as among different tools, documents, procedures. Following Mulcahy's standpoint (2011[38]), this paper also argues that it is important that standards are regularly renegotiated as a result of such dialogue and reflections.

In terms of policy impact, it is crucial to monitor and understand the revision and renegotiation process of national standards, and analyse the change of both standards and teacher education curriculum over time to reveal whether they constructively influence each other towards: 1) a more integrated conception of professional knowledge and 2) raising teacher quality. Such a regular and mutual revision might be a way that would lead to a more systematic and integrated knowledge base of teachers in the long term. In this sense, the essence of standards policies lies in the process of continuous negotiation and renegotiation of the participating artefacts. The key policy objective should thus be to facilitate this dialogue.

References

AITSL (2016), *Final Report - Evaluation of the Australian Professional Standards for Teachers*, https://www.aitsl.edu.au/docs/default-source/default-document-library/final-report-of-the-evaluation-of-the-apst.pdf?sfvrsn=428aec3c_0 (accessed on 28 December 2017). [88]

AITSL (2016), *Graduate to Proficient: Australian guidelines for teacher induction into the profession*, https://www.aitsl.edu.au/docs/default-source/default-document-library/graduate-proficient-induction-guidelines-(1).pdf?sfvrsn=c6fdec3c_0 (accessed on 01 January 2018). [86]

AITSL (2015), *Accreditation of Initial Teacher Education Programs: Standards and Procedures*, https://www.aitsl.edu.au/docs/default-source/initial-teacher-education-resources/accreditation-of-ite-programs-in-australia.pdf (accessed on 30 December 2017). [84]

AITSL (2011), *Australian Professional Standards for Teachers*, https://www.aitsl.edu.au/teach/standards (accessed on 30 December 2017). [87]

Allas, R., Ä. Leijen and A. Toom (2017), "Supporting the construction of teacher's practical knowledge through different interactive formats of oral reflection and written reflection", *Scandinavian Journal of Educational Research*, Vol. 61/5, pp. 600-615, http://dx.doi.org/10.1080/00313831.2016.1172504. [83]

Australian Bureau of Statistics (2018), *Educational Statistics*, http://www.abs.gov.au/ausstats/abs@.nsf/mf/4221.0 (accessed on 26 January 2018). [67]

Ball, S., M. Maguire and A. Braun (2012), *How Schools Do Policy : Policy Enactments in Secondary Schools*, Routledge, https://www.routledge.com/How-Schools-Do-Policy-Policy-Enactments-in-Secondary-Schools/Ball-Maguire-Braun/p/book/9780415676274 (accessed on 05 January 2018). [40]

Barber, M. and M. Mourshed (2007), *How the World's Best-Performing Schools Systems Come out on Top?*, McKinsey&Company, https://www.mckinsey.com/~/media/mckinsey/industries/social%20sector/our%20insights/how%20the%20worlds%20best%20performing%20school%20systems%20come%20out%20on%20top/how_the_world_s_best-performing_school_systems_come_out_on_top.ashx (accessed on 05 March 2018). [23]

Beach, D. and C. Bagley (2013), "Changing professional discourses in teacher education policy back towards a training paradigm: a comparative study", *European Journal of Teacher Education*, Vol. 36/4, pp. 379-392, http://dx.doi.org/10.1080/02619768.2013.815162. [32]

Biesta, G. (2015), "What is education for? On good education, teacher judgement, and educational professionalism", *European Journal of Education*, Vol. 1, pp. 75-87, http://dx.doi.org/10.1111/ejed.12109. [71]

Brante, T. (2010), "Professional fields and truth regimes: In search of alternative approaches", *Comparative Sociology*, Vol. 9/6, http://booksandjournals.brillonline.com/content/journals/10.1163/156913310x522615, pp. 843-886. [27]

Braun, A., M. Maguire and S. Ball (2010), "Policy enactments in the UK secondary school: [41]

examining policy, practice and school positioning", *Journal of Education Policy*, Vol. 25/4, pp. 547-560, http://dx.doi.org/10.1080/02680931003698544.

Burns, T. and F. Köster (2016), "Modern governance challenges in education", in Burns, T. and F. Köster (eds.), *Governing Education in a Complex World*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264255364-3-en. [47]

Burns, T. and F. Köster (eds.) (2016), *Governing Education in a Complex World*, Educational Research and Innovation, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264255364-en. [44]

Carter, A. (2015), *Carter Review of Initial Teacher Training*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/399957/Carter_Review.pdf (accessed on 22 March 2018). [60]

Ceulemans, C., M. Simons and E. Struyf (2012), "Professional standards for teachers: how do they 'work'? An experiment in tracing standardisation in-the-making in teacher education", *Pedagogy, Culture & Society*, Vol. 20/1, pp. 29-47, http://dx.doi.org/10.1080/14681366.2012.649414. [15]

Chung, H. and H. Kim (2010), "Implementing professional standards in teacher preparation programs in the United States: Preservice teachers' understanding of teaching standards", *KEDI Journal of Education Policy*, Vol. 7/2, https://search.proquest.com/openview/c41a52a1c7558849518889e8abda61c0/1?pq-origsite=gscholar&cbl=946348 (accessed on 20 October 2017), pp. 355-377. [11]

Cordingley, P. (2008), "Research and evidence-informed practice: focusing on practice and practitioners", *Cambridge Journal of Education*, Vol. 38/1, pp. 37-52, https://doi.org/10.1080/03057640801889964. [55]

Craven, G. et al. (2014), *Action Now: Classroom Ready Teachers*, Teacher Education Ministerial Advisory Group, https://docs.education.gov.au/system/files/doc/other/action_now_classroom_ready_teachers_accessible.pdf (accessed on 29 December 2017). [69]

Darling-Hammond, L. (2006), *Powerful Teacher Education : Lessons from Exemplary Programs*, Jossey-Bass. [5]

Darling-Hammond, L. (2000), "Teacher quality and student achievement: A review of state policy evidence", *Education Policy Analysis Archives*, Vol. 8/1, pp. 1-44, http://dx.doi.org/10.14507/epaa.v8n1.2000. [24]

Darling-Hammond, L. et al. (2017), *Empowered Educators: How High-Performing Systems Shape Teaching Quality Around the World*, Jossey-Bass, https://edpolicy.stanford.edu/publications/pubs/1489 (accessed on 31 October 2017). [6]

Darling-Hammond, L., R. Wei and A. Andree (2010), "How high-achieving countries develop great teachers", *Stanford Center for Opportunity Policy in Education, Research Brief*, http://www.oup.hu/howhigh_doug.pdf, pp. 1-8. [3]

Department for Education (2016), *Educational Excellence Everywhere*, Department for Education, UK, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508447/Educational_Excellence_Everywhere.pdf (accessed on 22 March 2018). [61]

Department for Education (2011), *Teachers' Standards - Guidance for school leaders, school staff and governing bodies*, Department for Education, UK, [59]

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/665520/Teachers__Standards.pdf (accessed on 22 March 2018).

Department for Education (2010), *The Importance of Teaching - The Schools White Paper 2010*, Department for Education, UK, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/175429/CM-7980.pdf (accessed on 22 March 2018). [58]

Dumont, H., D. Istance and F. Benavides (2010), *The Nature of Learning : Using Research to Inspire Practice*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264086487-en. [54]

Estonian Qualifications Authority (2013), *Professional Standard - Master Teacher Level 8*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 05 April 2018). [103]

Estonian Qualifications Authority (2013), *Professional Standard - Senior Teacher Level 7*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 05 April 2018). [104]

Estonian Qualifications Authority (2013), *Professional Standard - Teacher Level 7*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 19 December 2017). [81]

Estonian Qualifications Authority (n.d.), *Occupational Qualifications System*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng/use_range (accessed on 15 December 2017). [106]

ET2020 Working Group on Schools Policy (2015), *Shaping Career-long Perspectives on Teaching: A Guide on Policies to Improve Initial Teacher Education*, European Commission, Directorate-General for Education and Culture, http://ec.europa.eu/dgs/education_culture/repository/education/library/reports/initial-teacher-education_en.pdf (accessed on 25 October 2017). [79]

Fenwick, T., R. Edwards and P. Sawchuck (2012), *Emerging Approaches to Educational Research: Tracing the Socio-Material*, Routledge, https://www.routledge.com/Emerging-Approaches-to-Educational-Research-Tracing-the-Socio-Material/Fenwick-Edwards-Sawchuk/p/book/9780415570923. [52]

Freidson, E. (2001), *Professionalism : the Third Logic*, Polity, Cambridge. [29]

Goldacre, B. (2013), "Building evidence into education", *Bad Science*, https://www.gov.uk/government/news/building-evidence-into-education (accessed on 03 November 2017). [20]

GTCS (2018), *History of the General Teaching Council for Scotland*, http://www.gtcs.org.uk/about-gtcs/history-of-GTCS.aspx (accessed on 09 February 2018). [33]

Guerriero, S. and K. Deligiannidi (2017), "The teaching profession and its knowledge base", in Guerriero, S. (ed.), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264270695-3-en. [28]

Guerriero, S. (ed.) (2017), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, Educational Research and Innovation, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264270695-en. [16]

Hamilton, T. (2014), "Leadership capacity and equity building through the review and revision of the Scottish teacher education standards", in Révai, N. (ed.), *School Leadership Policy* [48]

Practices for Equity and Learning: EPNoSL Case Studies, European Policy Network on School Leadership, http://www.schoolleadership.eu/sites/default/files/Deliverable_3.3_-_EPNoSL_Case_Studies_on_Good_Policy_Practices_0.pdf (accessed on 01 March 2018).

Hammerness, K. and K. Klette (2015), "Indicators of quality in teacher education: Looking at features of teacher education from an international perspective", in *Promoting and Sustaining a Quality Teacher Workforce*, Emerald Group Publishing Limited, http://www.emeraldinsight.com/doi/abs/10.1108/S1479-367920140000027013. [4]

Hargreaves, D. (1996), *Teaching as a Research-based Profession: Possibilities and Prospects*, The Teacher Training Agency, London. [17]

Hiebert, J., R. Gallimore and J. Stigler (2002), "A knowledge base for the teaching profession: What would it look like and how can we get one?", *Educational Researcher*, Vol. 31/5, pp. 3-15, http://dx.doi.org/10.3102/0013189X031005003. [18]

Hordern, J. (2017), "Bernstein's sociology of knowledge and education(al) studies", in Whitty, G. and J. Furlong (eds.), *Knowledge and the Study of Education: an International Exploration*, Symposium Books, Oxford, http://dx.doi.org/10.15730/books.100. [57]

Howsam, R., D. Corrigan and G. Denemark (1985), *Educating a Profession : Report of the Bicentennial Commission on Education for the Profession of Teaching of the American Association of Colleges for Teacher Education - Reprint with postscript.*, American Association of Colleges for Teacher Education, https://eric.ed.gov/?id=ED270430 (accessed on 04 January 2018). [26]

Ingvarson, L. (2002), *Development of a National Standards Framework for the Teaching Profession*, Australian Council for Educational Research Publishing, http://research.acer.edu.au/teaching_standards (accessed on 05 January 2018). [37]

Jensen, B. et al. (2016), *Not So Elementary Primary School Teacher Quality in Top-Performing Systems*, National Center on Education and the Economy, Washington DC. [7]

Kleinhenz, E. and L. Ingvarson (2007), *Standards for Teaching - Theoretical Underpinnings and Applications*, New Zealand Teachers Council, https://educationcouncil.org.nz/sites/default/files/Standards%20for%20Teaching%20-%20Theoretical%20Underpinnings%20and%20Applications%20-%202007.pdf (accessed on 30 January 2018). [10]

König, J. (2014), *Background Document: Designing an International Instrument to Assess Teachers' General Pedagogical Knowledge (GPK): Review of Studies, Considerations, and Recommendations*, OECD, Paris, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/CERI/CD/RD(2014)3/REV1&doclanguage=en (accessed on 15 January 2018). [74]

König, J. et al. (2011), "General pedagogical knowledge of future middle school teachers: on the complex ecology of teacher education in the United States, Germany, and Taiwan", *Journal of Teacher Education*, Vol. 62/2, pp. 188-201, http://dx.doi.org/10.1177/0022487110388664. [76]

Kriewaldt, J. (2012), "Reorienting teaching standards: learning from lesson study", *Asia-Pacific Journal of Teacher Education*, Vol. 40/1, pp. 31-41, http://dx.doi.org/10.1080/1359866X.2011.643761. [14]

Kuhlee, D. and C. Winch (2017), "Teachers' knowledge in England and Germany: the conceptual background", in Whitty, G. and J. Furlong (eds.), *Knowledge and the Study of* [21]

Education : an International Exploration, Symposium Books.

Labarre, D. (2017), "Futures of the field of education", in Whitty, G. and J. Furlong (eds.), *Knowledge and the Study of Education: an International Exploration*, Symposium Books, http://dx.doi.org/10.15730/books.100. [101]

Larsen, M. (2010), "Troubling the discourse of teacher centrality: a comparative perspective", *Journal of Education Policy*, Vol. 25/2, pp. 207-231, http://dx.doi.org/10.1080/02680930903428622. [22]

Lee, S. and E. Low (2014), "Conceptualising teacher preparation for educational innovation: Singapore's approach", in Lee, S., W. Lee and E. Low (eds.), *Educational Policy Innovations: Levelling Up and Sustaining Educational Achievement*, Springer, Singapore, http://dx.doi.org/10.1007/978-981-4560-08-5_4. [99]

Leijen, Ä. et al. (2014), "Guided reflection for supporting the development of student teachers' practical knowledge", *Procedia - Social and Behavioral Sciences*, Vol. 112, pp. 314-322, http://dx.doi.org/10.1016/j.sbspro.2014.01.1170. [82]

Leijen, Ä. and M. Pedaste (in press, 2018), "Pedagogical beliefs, instructional practices, and opportunities for professional development of teachers in Estonia", in Niemi, H. et al. (eds.), *The Teacher's Role in the Changing Globalizing World: On Resources and Challenges Related to the Professional Work of Teaching*, Brill, Leiden. [80]

Lim, K. (2013), *Teacher Education in Singapore*, http://dx.doi.org/10.13140/2.1.3100.2245. [93]

Maguire, M., A. Braun and S. Ball (2015), "'Where you stand depends on where you sit': the social construction of policy enactments in the (English) secondary school", *Discourse: Studies in the Cultural Politics of Education*, Vol. 36/4, pp. 485-499, http://dx.doi.org/10.1080/01596306.2014.977022. [43]

McLean Davies, L. et al. (2013), "Masterly preparation: embedding clinical practice in a graduate pre-service teacher education programme", *Journal of Education for Teaching: International research and pedagogy*, Vol. 39/1, pp. 93-106, http://dx.doi.org/10.1080/02607476.2012.733193. [89]

McLean Davies, L. et al. (2015), "Teaching as a clinical profession: translational practices in initial teacher education – an international perspective", *Journal of Education for Teaching*, Vol. 41/5, pp. 514-528, http://dx.doi.org/10.1080/02607476.2015.1105537. [92]

MGSE (2017), *MGSE Master of Teaching (Secondary)*, Melbourne Graduate School of Education, http://education.unimelb.edu.au/study_with_us/courses/master-of-teaching/secondary (accessed on 01 January 2018). [90]

Ministry of Education and Research, Estonia (2014), *The Estonian Lifelong Learning Strategy 2020*, Ministry of Education and Research, Tallinn, https://www.hm.ee/sites/default/files/estonian_lifelong_strategy.pdf (accessed on 11 April 2018). [77]

Ministry of Education, Singapore (2017), *Education Statistics Digest 2017*, https://www.moe.gov.sg/docs/default-source/document/publications/education-statistics-digest/esd_2017.pdf (accessed on 26 January 2018). [65]

Ministry of Education, Singapore (2006), *Singapore Staff Appraisal (Education Service)*, https://assets.aspeninstitute.org/content/uploads/files/content/docs/education/ED_SINGAPORESTAFFAPPRAISAL.pdf (accessed on 12 January 2018). [96]

Mulcahy, D. (2012), "Thinking teacher professional learning performatively: a socio-material account", *Journal of Education and Work*, Vol. 25/1, pp. 121-139, http://dx.doi.org/10.1080/13639080.2012.644910. [51]

National Institute of Education (2009), *A Teacher Education Model for the 21st Century: A Report by the National Institute of Education*, Singapore, pp. 45. [97]

Mulcahy, D. (2011), "Assembling the 'Accomplished' teacher: The performativity and politics of professional teaching standards", *Educational Philosophy and Theory*, ANT
standards, pp. 94-113, http://dx.doi.org/10.1111/j.1469-5812.2009.00617.x. [38]

NCEE (2018), *Singapore Overview*, http://ncee.org/what-we-do/center-on-international-education-benchmarking/top-performing-countries/singapore-overview-2/ (accessed on 26 January 2018). [68]

NCEE (2018), *Singapore: Teacher and Principal Quality*, National Centre on Education and the Economy, http://ncee.org/what-we-do/center-on-international-education-benchmarking/top-performing-countries/singapore-overview-2/singapore-teacher-and-principal-quality/ (accessed on 12 January 2018). [94]

NCEE (2016), *Empowered Educators: How High-Performing Systems Shape Teaching Quality around the World Australia: Toward a National System*, National Center on Education and the Economy, Washington, http://ncee.org/wp-content/uploads/2017/02/AustraliaCountryBrief.pdf (accessed on 27 October 2017). [85]

NCEE (2016), *Empowered Educators: How High-performing Systems Shape Teaching Quality around the World Singapore: A Teaching Model for the 21st Century*, National Center on Education and the Economy, http://ncee.org/wp-content/uploads/2017/02/SingaporeCountryBrief.pdf (accessed on 27 October 2017). [95]

NIE (2017), *Postgraduate Diploma in Education (PGDE) Programme Handbook*, National Institute of Education, Singapore, http://www.nie.edu.sg (accessed on 12 January 2018). [100]

NIE (2013), *Graduand Teacher Competencies*, National Institute of Education, Singapore, http://www.nie.edu.sg/docs/default-source/td_practicum/te21---gtc.pdf (accessed on 08 January 2018). [98]

NIE (n.d.), *Teacher Education*, http://www.nie.edu.sg/teacher-education/ (accessed on 14 January 2018). [105]

OECD (2016), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, PISA, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264266490-en. [64]

OECD (2015), *Education Policy Outlook 2015: Making Reforms Happen*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264225442-en. [1]

OECD (2014), *TALIS 2013 Results: An International Perspective on Teaching and Learning*, TALIS, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264196261-en. [30]

OECD (2013), *PISA 2012 Results: Excellence through Equity (Volume II): Giving Every Student the Chance to Succeed*, PISA, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264201132-en. [63]

OECD (2013), *Synergies for Better Learning: An International Perspective on Evaluation and Assessment*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264190658-en. [2]

OECD (2007), *Evidence in education : linking research and policy.*, OECD Publishing, Paris. [56]

OECD (2005), *Teachers Matter - Attracting, Developing and Retaining Effective Teachers*, OECD Publishing, Paris, http://new.sourceoecd.org/education/9264018026 (accessed on 14 March 2018). [25]

Page, T. (2015), "Common pressures, same results? Recent reforms in professional standards and competences in teacher education for secondary teachers in England, France and Germany", *Journal of Education for Teaching*, Vol. 41/2, pp. 180-202, http://dx.doi.org/10.1080/02607476.2015.1011900. [13]

Pedaste, M. et al. (2014), "A model of Innovation Schools: Estonian case-study", *Procedia - Social and Behavioral Sciences*, Vol. 112, pp. 418-427, http://dx.doi.org/10.1016/j.sbspro.2014.01.1184. [78]

Révai, N. and S. Guerriero (2017), "Knowledge dynamics in the teaching profession", in Guerriero, S. (ed.), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264270695-4-en. [35]

Sachs, J. (2003), "Teacher professional standards: Controlling or developing teaching?", *Teachers and Teaching: theory and practice*, Vol. 9/2, pp. 175-186, http://dx.doi.org/10.1080/13540600309373. [46]

Sachs, J. (2001), "Teacher professional identity: competing discourses, competing outcomes", *Journal of Education Policy*, Vol. 16/2, pp. 149-161, http://dx.doi.org/10.1080/02680930116819. [31]

Santiago, P. et al. (2016), *OECD Reviews of School Resources: Estonia 2016*, OECD Reviews of School Resources, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264251731-en. [66]

Schmidt, W. et al. (2008), "Opportunity to learn in the preparation of mathematics teachers: its structure and how it varies across six countries", *ZDM - International Journal on Mathematics Education*, Vol. 40/5, pp. 735-747, http://dx.doi.org/10.1007/s11858-008-0115-y. [8]

Seameo Innotech (2010), *Teaching Competency Standards in Southeast Asian Countries: Eleven Country Audit*, http://www.seameo-innotech.org (accessed on 20 October 2017). [49]

Shalem, Y. (2014), "What binds professional judgement? The case of teaching", in Young, M. and J. Muller (eds.), *Knowledge,Expertise and the Professions*, Routledge, London, https://www.researchgate.net/profile/Yael_Shalem/publication/261834193_What_binds_professional_judgement_The_case_of_teaching/links/0deec53596b425a78b000000/What-binds-professional-judgement-The-case-of-teaching (accessed on 15 March 2018). [72]

Sheikh, I. and C. Bagley (2017), "Towards a policy social psychology: Teacher engagement with policy enactment and the core concept of affective disruption", *British Educational Research Journal*, Vol. 44/1, pp. 43-60, http://dx.doi.org/10.1002/berj.3316. [42]

Shulman, L. (1987), "Knowledge and teaching: Foundations of the new reform", *Harvard Educational Review*, Vol. 57/1, pp. 1-23, http://dx.doi.org/10.17763/haer.57.1.j463w79r56455411. [73]

Sivell, J. (2005), "Second language teacher education in Canada: the development of professional standards", *Teaching English as a Second or Foreign Language*, Vol. 9/2, https://files.eric.ed.gov/fulltext/EJ1065836.pdf (accessed on 01 March 2018). [50]

Sonmark, K. et al. (2017), "Understanding teachers' pedagogical knowledge: report on an international pilot study", *OECD Education Working Papers*, No. 159, OECD Publishing, Paris, http://dx.doi.org/10.1787/43332ebd-en. [70]

Tatto, M. and J. Hordern (2017), "The Configuration of Teacher Education as a Professional Field of Practice: a comparative study of mathematics education", in Whitty, G. and J. Furlong (eds.), *Knowledge and the Study of Education : an International Exploration*, Symposium Books. [62]

Toledo, D., N. Révai and S. Guerriero (2017), "Teacher professionalism and knowledge in qualifications frameworks and professional standards", in Guerriero, S. (ed.), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264270695-5-en. [9]

Trowler, P. (2003), *Education Policy*, Routledge, London and New York. [39]

Tummons, J. (2014), "Professional standards in teacher education: tracing discourses of professionalism through the analysis of textbooks", *Research in Post-Compulsory Education*, Vol. 19/4, pp. 417-432, http://dx.doi.org/10.1080/13596748.2014.955634. [12]

University of Melbourne (2018), *University Handbook: Master of Teaching (Secondary)*, https://handbook.unimelb.edu.au/courses/mc-teachsa (accessed on 01 January 2018). [91]

University of Tartu (2017), *Teacher Education Curriculum at the University of Tartu*, https://www.is.ut.ee/pls/ois/!tere.tulemast (accessed on 23 January 2018). [102]

Viennet, R. and B. Pont (2017), "Education policy implementation: A literature review and proposed framework", *OECD Education Working Papers*, No. 162, OECD Publishing, Paris, http://dx.doi.org/10.1787/fc467a64-en. [45]

Voss, T., M. Kunter and J. Baumert (2011), "Assessing teacher candidates' general pedagogical/psychological knowledge: Test construction and validation.", *Journal of Educational Psychology*, Vol. 103/4, pp. 952-969, http://dx.doi.org/10.1037/a0025125. [75]

Whitty, G. and J. Furlong (eds.) (2017), *Knowledge and the Study of Education : an International Exploration*, Symposium Books. [19]

Winch, C., A. Oancea and J. Orchard (2015), "The contribution of educational research to teachers' professional learning: philosophical understandings", *Oxford Review of Education*, Vol. 41/2, pp. 202-216, http://dx.doi.org/10.1080/03054985.2015.1017406. [34]

Annex A. Estonia – Comparative analysis of professional standards and a selected pedagogical curriculum

The extent to which courses prepare for meeting the professional standards is illustrated through the analysis of the two most extensive core courses: Designing Learning and Instruction and Teaching and Reflection, equivalent to 6 and 10 credits respectively. The former is a one semester course, while the latter stretches over three semesters (University of Tartu, 2017[102]). The relation of the learning outcomes and the standards' competence requirements (section B) were mapped. All learning outcomes could be

related to some competence areas, mostly to the "activity parameters" and to a lesser extent, to the knowledge areas described in the standards (Table A.1). Two learning outcomes were only loosely or indirectly related to the standards; both relate to theoretical and research knowledge.

While the language of the two documents show some overlaps, important differences can be observed. Terminology in both documents includes, for example, special education needs, curriculum, teaching materials and methods, learning environment and counselling. On the other hand, the most striking difference is the significantly more dominant presence of theories, knowledge and evidence in the learning outcomes. In some cases the differences seem to reflect a broader scope in the learning outcomes. For example, while both documents expect teachers to be able to adapt decisions to the context, the standards are more specific. They require adapting learning materials and activities to learners' needs, whereas teacher education courses include, further to these, a requirement to adapt curriculum development and instructional decisions "based upon reflection". Any comparison of language should however be treated cautiously, as both documents are translations from Estonian. A different translator may easily have translated the same term in two different ways.

Table A.1. Course learning outcomes matched with professional teaching standards

Course	Learning outcomes	Relation to standards' activity parameters (AP) and knowledge (K)
Designing Learning and Instruction	1) is informed about the main ideas of the theories of learning and motivation, concerning the organisation of studies and assuring the discipline	Not directly related to the standards, but underlying several (e.g. AP: B.2.3/3, K: B.2.1, B.2.2)
	2) designs instruction in a systemic way, evidence-based and creatively, based upon the both regulations as well as specifics of the student, institution, grade and subject matter	Related to AP: B.2.1 / 2,4.
	3) is able to analyse a particular school/kindergarten curricula and pupils individual learning plan in order to find initial solutions to meet special educational needs	Related to AP: B.2.1 / 1, 2. B.2.3./1.
	4) adapts curriculum development/ instructional decisions, including assessment, based upon reflection	Related to AP: B.2.1/2, 4, B.2.3/ 1, B.2.6/2
	5) knows the objectives of assessment and appreciates the support function of assessment for learning	Related to AP: B.2.3/4
Teaching and Reflection	1) knows groups of special needs and their main characteristics, is able to detect learners with special educational needs	Related to AP: B2.1/1,2, underlying also B2.1/4, B2.3/3
	2) is able to assess learner's characteristics and pre-knowledge, introduce learning objectives and evaluation models to learners and to support learners in setting their individual learning objectives, based on curriculum, learner's characteristics and pre-knowledge	Related to AP: B2.1/3, B2.3/1, 4
	3) knows main teaching methods and forms (incl. group-based and individual) and is able to justify their selection based on theories of learning and instruction, curriculum, and knowledge about child development	Related to AP: B2.1/2, B2.3/3, K: B2.1, B2.2, B2.3
	4) is able to analyse how secure is the learning environment, and how it supports inclusion and formation of successful experiences in the case of all learners (incl. learners with special needs); is able to choose and adapt teaching materials according to learner's characteristics	Related to AP: B2.1/4, B2.2/1,2, B2.3/3
	5) knows how the teacher can support (on the basis of a program designed with support specialists) learners' with special needs, has an overview of the pedagogical counselling system	Related to AP: B2.5/1, B2.3/3, K: B2.5, indirectly to AP: B2.1/1, 3, B2.2/2, B2.3/2, 5, B2.4.3
	6) applies in educational settings (incl. instruction, evaluation, feedback, and reflection) the affordances of a modern learning environment and resources, incl. computers, and other equipment of information and communication technologies	Related to AP: B2.1/4, B2.7/11
	7) is able to reflect in action and on action during and after his/her work and, if needed, to modify it flexibly and guide learners towards successful reflection of their learning process	Related to AP: B2.4/1, K: B2.4/2, indirectly related to AP: B2.3/5
	8) is able to formulate research aims and research questions of educational research, possesses knowledge about research ethics in social sciences and his/her subject field and about planning and conducting of educational research	Related to AP: B2.4/2, K: B2.4/1
	9) knows different data collection and analysis methods, and basic principles of research findings interpretation	Related to AP: B2.3/3 Indirectly related to AP: B2.4/2
	10) is able to find and analyse scientific literature and to make generalisations based on scientific literature and his/her own studies	Indirectly related to AP: B2.4/2

Source: University of Tartu (2017[102]), *Teacher Education Curriculum at the University of Tartu*, https://www.is.ut.ee/pls/ois/!tere.tulemast (accessed on 23 January 2018), Estonian Qualifications Authority (2013[81]), *Professional Standard – Teacher Level 7*, https://www.kutsekoda.ee/en/kutsesysteem/tutvustus/kutsestandardid_eng (accessed on 19 December 2017).
Notes: In column 3 of this table, numbers denoted with B correspond to the competence numbers as they appear in the Estonian Teacher Level 7 standards.

Mapping requirements defined in the standards onto the programme curriculum is illustrated through what is described as knowledge in the standards. More than one third of these areas (five out of the fourteen) are not specifically covered in the teacher education courses. However, almost all knowledge areas that are not mentioned in any way in the course description have limited scope and are marginal to teacher education (e.g. first aid and intellectual property). Those that are specifically related to the teaching profession are directly or indirectly covered.

Interestingly, the Designing learning and instruction course, although perhaps the most crucial for future teachers, could only be linked to one knowledge area indirectly. This course covers the following objectives:

- "understanding about the principles, regularities and conditions of teaching and learning
- initial skills of instructional design
- primary realisation about the manifestation and ways to meet special needs
- understanding about the principles of assessment for learning" (University of Tartu, 2017[102]).

While all of the above areas feature among the teachers' tasks described in the standards, none of them are considered as knowledge in the document.

Annex B. Australia – Comparative analysis of professional standards and a selected pedagogical curriculum

This paper looks at the content of Educational Foundations, and Diverse and inclusive classrooms as examples for how course content is linked to professional standards and what they cover in terms of knowledge. The analysis builds on publicly available documents, i.e. the course descriptions of the programme handbook and the standards. Some of the documentation, in particular the accreditation report, is not available publicly. As a result, the analysis is complemented with information from the interviews to better understand seeming discrepancies.

All course descriptions are explicitly linked to the professional standards through a list of learning outcomes (Table B.1). The learning outcomes, however, only rarely use the same text as the standards to which they are associated. In fact, most of them are only indirectly and very loosely, or not at all, related to the standards in the course description. A reason for this is that the course has a strong sociological orientation, while none of the standards actually formulate requirements in a sociological context. While the standards are somewhat more oriented towards psychology and learning sciences, the course description's focus is clearly not these disciplines as the following extract shows:

> *This subject enables the Master of Teaching cohort examine historical, cultural, sociological and philosophical constructions of childhood, youth, families and the educative process. By exploring these themes, Teacher Candidates have the opportunity to develop a sense of how the role of the family, constructions of*

childhood and youth, and questions of curriculum and pedagogy are determined by global historical and colonial movements that influence contemporary educational systems. (University of Melbourne, 2018[91])

Table B.1. Course learning outcomes matched with professional teaching standards

Course	Learning outcomes	Relation to standards
Educational Foundations	Demonstrate broad knowledge and understanding of the impact of culture, cultural identity and linguistic background on the education of students from Aboriginal and Torres Strait Island background, perspectives on care and schooling, including cultural constructions of childhood and youth (Graduate Standards 1.4, 2.4)	Identical text in the first part, Second part (perspectives…) added
	Describe and understand a broad range of strategies for working effectively, sensitively and confidentially with parents/carers in the educative process. (Graduate Standards 3.7, 5.5, 7.3)	Mix of 3.7 and 7.3
	Analyse contemporary educational debates, drawing on relevant research literature regarding the purposes of schooling and care (Graduate Standards 4.1, 4.4)	Not directly related to the given standards, closest would be: highly accomplished and lead standards 6.2
	Demonstrate awareness of the multiple, and competing, interests in schooling policy and practice (Graduate Standards 4.1, 4.4)	Not related to the given standards, closest would be: graduate standards 7.2
	Understand contemporary educational debates in social, cultural, political and historical context (Graduate Standards n/a)	Not related to standards
Diverse and inclusive classrooms	Critically consider system and school-based responses to addressing issues relating to equity, inclusion and social justice (Graduate Standards 4.1, 4.4)	Different focus, but inclusion is a common point with 4.1. Not directly related to 4.4. Other related standards would be: 1.3, 1.4, 1.5, 1.6
	Build an understanding of the socio-cultural factors that shape students' learning, their school experiences and educational outcomes (Graduate Standards 4.1)	Not directly related to any of the standards
	Demonstrate knowledge of practical strategies for creating rapport with students and supporting students' wellbeing and safety in the classroom (Graduate Standards 4.4)	Different text: formulated as knowledge, rapport with students added
	Demonstrate knowledge and understanding of teaching and learning strategies which are responsive to students' physical, cultural, social, linguistic, religious and intellectual needs. (Graduate Standards 1.1, 1.2, 1.3, 2.3, 5.1)	Mix of 1.1, 1.3, not directly related to 2.3 and 5.1
	Develop a critical analysis of the wider social and global context of education systems, schools and classrooms (Graduate Standards 5.4)	Not related to the given standard, closest would be: graduate standards 7.2

Source: University of Melbourne (2018[91]), *University Handbook: Master of Teaching (Secondary)*, https://handbook.unimelb.edu.au/courses/mc-teachsa (accessed on 01 January 2018).

There are also a number of learning outcomes related to a broad understanding of the educational context (educational debates, schooling, school policy, socio-cultural factors shaping education, education systems), which are not directly part of any of the professional standards. Interestingly, all of these apart from one, are matched to standards 4.1 (Identify strategies to support inclusive student participation and engagement in classroom activities) and/or 4.4 (Describe strategies that support students' wellbeing and safety working within school and/or system, curriculum and legislative requirements), even though they have a seemingly different focus. These two standards might have been

identified as the most general ones to suit a broad educational focus. In fact, some of these broad understandings are integrated to the highly accomplished and lead standards (6.2), and graduate standards 7.2 (understand the relevant legislative, administrative and organisational policies and processes required for teachers according to school stage).

The Diverse and inclusive classrooms course has two main foci: diversity and inclusion, and school and classroom including their values, ideologies and relationships. The description of the former in the course overview uses the text of graduate standards 1.1 and 1.3. The latter uses the text of standards 7.3 (will understand strategies for working effectively, sensitively and confidentially with parents/carers) to specify how the course examines interpersonal relationships in schools and classrooms and with communities. This latter is not listed as a learning outcome of the course however. As noted earlier, the standards, and in particular the professional knowledge requirements, have a very strong focus on teaching diverse classrooms, which is very much reflected in this course. In this sense it is surprising that the first learning outcome relating generally to equity, inclusion and social justice is not associated with any of the standards in area number one, even though the text relates much more clearly to those than to 4.1 and 4.4.

The above suggests that some courses correspond more, others less directly to the focus of the standards. The interviews revealed that the reflection process underlying the matching exercise included interpreting the standards and embedding them within a systemic approach. For example, the decision of matching standards 4.1 and 4.4 to the broad knowledge of education systems was preceded by a reflection on how those particular standards can be achieved. This led to the recognition that these cannot be met without a solid knowledge of systems, educational debates, etc. Therefore, some of the apparent discrepancies demonstrated above are in fact the result of a deep analysis, understanding and interpreting of the standards. This corresponds to the inscription process described in other studies (Ceulemans, Simons and Struyf, 2012[15]).

To illustrate the inverse matching, i.e. whether all the foci of the standards are reflected in the curriculum, professional knowledge areas (standards 1.) are mapped onto compulsory courses that cover them. This analysis shows that all knowledge areas are covered by at least one course. More than half of the areas are extensively covered (by at least five courses), and only two of them are covered by less than three courses. The three Clinical teaching practice courses are the most comprehensive, as these support teacher candidates in acquiring almost all professional knowledge areas required by the standards, in contrast to other courses, which match to at most half of the areas. The fact that theoretical courses correspond to considerably less knowledge areas can indicate that professional knowledge is not viewed in the same way by the curriculum as by the standards.

Annex C. Singapore – Comparative analysis of professional standards and pedagogical curriculum

Table C.1. Course descriptions matched with Graduand Teaching Standards

Course	Extracts from course description	Relation to standards
Educational Psychology: Theories and Applications for Learning and Teaching	[…] understanding the 21st century learners, learner development, and the psychology of learning and motivation	Specific link to Standard 2 (Providing Quality Learning for Child), esp. to section (1) on "Teaching for Learning", point 1: "integrated understanding of how pupils learn…"
	The ways in which these aspects influence the processes of learning	
	[…] proactive approaches to enhancing student motivation, learning, and thinking	
	Theories with a focus on students' psychosocial and cognitive development […] their implications for classroom-practice	Indirect links to most points of Standard 2. and Standard 4. (Cultivating Knowledge with), iii. "Analytic Thinking" and v. "Creative Teaching", which presuppose knowledge of these aspects
	[…] how students learn and the challenges they face in the process. Students' intellectual, social, emotional, personal and moral development	
Pedagogical Practices	[…] it allows them [student teachers] to consolidate and explicitly link theory to practice, applying what they have already learnt […] on different classroom management theories, skills and strategies	Specific link to Standard 2 (Providing Quality Learning for Child), esp. to section (2) on "Management of Learners and Learning", points 1, 2, 3: engaging pupils in learning, maintain discipline
	[…] various instructional approaches, and how differentiated instruction is carried out in a typical classroom	
	Discipline techniques such as managing disruptive students	Indirect links to most points of Standard 2, section 2, and Standards 4. (Cultivating Knowledge with), iii. "Analytic Thinking" and v. "Creative Teaching", which presuppose knowledge of these aspects
	[…] help the teacher increase their students' engagement and enhance their academic skills and competences	
	[…] promoting Social Emotional learning at the same time	
Professional Practice and Inquiry I and II	[…] understand the process of integrating and aggregating their learning, be reflective and establish the theory-practice connection to their practice.	Explicit link to V3SK and GTC in general.
	[…] (i) explore and reflect on their beliefs as teachers, (ii) understand the process of inquiring into their teaching and (iii) articulate their growing understanding of what constitutes a 21st century educator pivoted on NIE's value-based V 3SK framework	Specific links to Standard 4 (Cultivating Knowledge with), esp. ii. "Reflective Thinking": "critically reflective stance towards his/her own professional practice"
	[…] use of an e-Portfolio to facilitate student teachers' construction of their conceptual framework of learning and teaching	Indirect links to most points of Standard 4./ii., iii. "Analytic Thinking" and iv. "Initiative", which presuppose the capacity of linking theory and practice
	[…] facilitates student teachers' inquiry into their own practice with a focus on the Theory-Practice Nexus	
	[…] student teachers articulate their growing understanding of what constitutes good teaching in relation to NIE's Graduand Teacher Competences (GTC)	
Assessing Learning and Performance	[…] understand and apply the basic principles of educational assessment	Specific links to Standard 2 (Providing Quality Learning for Child), esp. to section (3) on "Monitoring and Assessing Learning", points 4, 5: assessment of and for learning, assessment strategies and instruments
	[…] principles of educational measurement of learning	
	[…] knowledge and skills to monitor, appraise and evaluate learners' content knowledge, progress and performance achievement	Indirect links to all points of Standard 2, section 3
	[…] paper and pencil testing methods and performance-based, authentic assessment procedures	
	[…] different approaches to the use of assessment in education, namely assessment of, for and as learning	Indirect links to most points of Standard 4./iii. "Analytic Thinking", which presuppose the knowledge of these aspects

Source: NIE (2017[100]), *Postgraduate Diploma in Education (PGDE) Programme Handbook*, http://www.nie.edu.sg (accessed on 12 January 2018), NIE (2013[98]), *Graduand Teacher Competencies*, http://www.nie.edu.sg/docs/default-source/td_practicum/te21---gtc.pdf (accessed on 08 January 2018).

Clearly, all selected courses have both stronger and direct links to the Professional Practice section of the GTC, and indirect links suggesting that competences taught in the courses are necessary to achieve those described in the standards. It seems from this selection that courses mostly focus on two standard areas: Providing Quality Learning of Child and Cultivating Knowledge.

To illustrate the inverse matching, we mapped whether the standards described in the Professional Practice section associated to the capacity-building level are covered by the PDGE curriculum. The analysis revealed that all core competences are covered by at least two courses. Also, almost all specific defining points of these are developed by one or more courses, with the exception of: engaging pupils in problem-solving, and critical and creative thinking; using basic helping skills to assist pupils in coping with learning; understanding statistical concepts in representing pupils' patterns of responses to assessment tasks; and recognising objective and ethical assessment procedures, which were not explicitly found in any of the course descriptions. It is nevertheless possible that some broader domains addressed in the courses also cover these specific areas. The most comprehensive courses in terms of the number of competences covered are Pedagogical Practices and Assessing Learning and Performance.

The PDGE programme offers a number of other courses related to standards described in the Leadership and Management, and Personal Effectiveness areas. For example, Effective Parent Engagement for Teachers is strongly linked to the competency "Working with Others: Partnering parents", while the Social Context of Teaching and Learning develops competences in the area "Winning hearts and minds: Understanding the Environment". Two courses provide teacher candidates with a broad view of the society and communities that corresponds to the knowledge requirements of the V^3SK framework (educational foundation and policies, multicultural literacy, global awareness, environmental awareness).

The terminology used in the two texts differs. While some of the general terms are used in both documents (instructional approaches, assessment, etc.), more scientific-theoretical terms are used in the course descriptions (e.g. classroom management, differentiated instruction, ICT-enhanced teaching) versus the more descriptive language of the standards (effective classroom environment, adapted to diverse learners, IT-integrated and multimedia supported learning experiences).