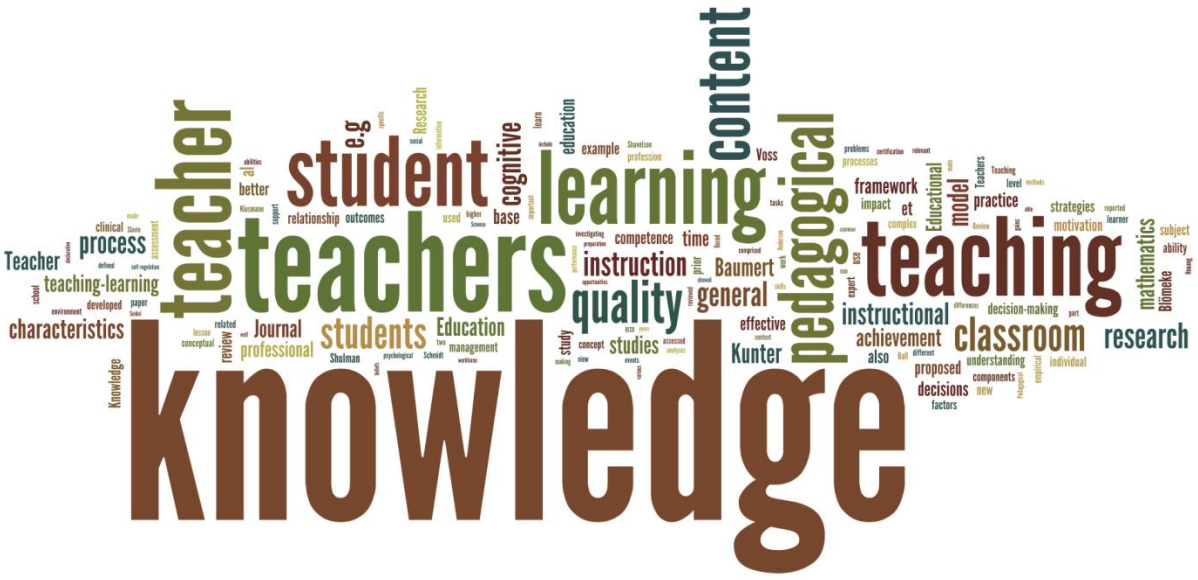
Teachers' Pedagogical Knowledge and the Teaching Profession

Background Report and Project Objectives



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Rationale and Policy Context

The imperative in recent years about improving student outcomes is also about improving the quality of the teaching workforce. In recent years, however, recruiting and retaining quality teachers has become a challenge among some OECD countries. In addition to the ageing of the teaching workforce, some countries experience high rates of attrition among new teachers and a shortage of quality teachers in high-demand subject areas and disadvantaged schools. There is also concern about attracting high-achieving and motivated candidates into teacher education programmes and the lowering of qualification requirements in the certification and licensing of new teachers.

Issues such as these have an impact on the quality of the resulting teaching workforce that is tasked with improving student outcomes. For example, the ageing of the teacher workforce entails the loss of experienced teachers through retirement. High attrition rates among new teachers is costly to the system and may prompt education authorities to fill teacher shortages by lowering qualification requirements for the certification of new teachers or by assigning teachers to teach subjects or grades for which they were not trained. In such cases, the quality of the teaching workforce is negatively affected.

As research has shown, teacher quality is an important factor in determining gains in student achievement, even after accounting for prior student learning and family background characteristics. Predictors of teacher quality have typically included factors such as class size, certification, type of qualification, degrees earned, or years of experience. Another, less studied, indicator of teacher quality is the pedagogical knowledge of teachers. *Pedagogical knowledge* refers to the specialised knowledge of teachers for creating effective teaching and learning environments for all students. This project focuses on the pedagogical knowledge base of teachers and the knowledge dynamics in the teaching profession in order to examine their implications for the instructional process and to derive evidence-based suggestions for educational policy.

Project Objectives

As part of the Innovative Teaching for Effective Learning (ITEL) programme of work within the Centre for Educational Research and Innovation (CERI) at the OECD, this study aims to answer the following questions:

- Does the knowledge base of the teaching profession sufficiently incorporate the latest scientific research on learning?
- Does the knowledge base of the teaching profession meet the expectations for teaching and learning 21st century skills?

In recent years, the interdisciplinary field of the Science of Learning, which includes the neurosciences, has made huge progress in understanding how the human brain processes, encodes, and retrieves information. The potential of the learning sciences to inform the pedagogical knowledge of teachers and, hence, to improve pedagogical practice is significant. Our study asks, do teachers sufficiently incorporate this new knowledge in their practice?

The policy imperative for the teaching and learning of 21st century skills, such as problem-solving, collaboration, communication, and creativity, might entail a re-skilling of the current teacher workforce and upgrading of the knowledge base of the teaching profession. Our study asks, do teachers have the relevant knowledge for teaching 21st century skills?

To address these questions, we are developing a survey to profile the knowledge base of teachers and the knowledge dynamics in the teaching profession. This document has been prepared to serve as a background report for the project and aims to summarise the research literature related to the key questions addressed by the study.

Teachers as Learning Specialists

We view teaching as a knowledge-rich profession with teachers as 'learning specialists.' As professionals in their field, teachers can be expected to process and evaluate new knowledge relevant for their core professional practice and to regularly update their knowledge base to improve their practice and to meet new teaching demands.

By investigating the knowledge underlying effective teaching and learning, we are studying how to improve teacher quality. Teacher quality itself is an important factor in determining gains in student achievement. In fact, the main motive for investigating teacher knowledge is *to improve student outcomes*. On the other hand, to improve teacher quality, it is crucial *to understand what teacher professionalism involves*. Thus, this study focuses on teacher knowledge as a key factor in teacher professionalism. In other words, the two main themes underlying the study of teacher knowledge are improving student outcomes and teacher professionalism.

➢ How to recognise an expert teacher? What does teacher professionalism involve?

Literature highlights many features that characterise expert teachers, which include extensive pedagogical content knowledge, better problem solving strategies, better adaptation for diverse learners, better decision making, better perception of classroom events, greater sensitivity to context, and greater respect for students.

Several studies stress the importance of the knowledge teachers hold, highlighting that in addition to assimilating academic knowledge, student teachers also need to incorporate knowledge derived from experiential and practical experiences in the classroom. Research also shows that variations in 'opportunities to learn' in teacher preparation are related to differences in student achievement: teachers from countries that are top performers in PISA and TIMSS tend to have *more opportunities to learn* content, pedagogical content and general pedagogy.

While teacher knowledge is certainly a component of teacher professionalism, professional competence involves more than just knowledge. Skills, attitudes, and motivational variables also contribute to the mastery of teaching and learning. Blömeke and Delaney (2012) proposed a model that identifies *cognitive abilities* and *affective-motivational characteristics* as the two main components of teachers' professional competence (see Figure 1).

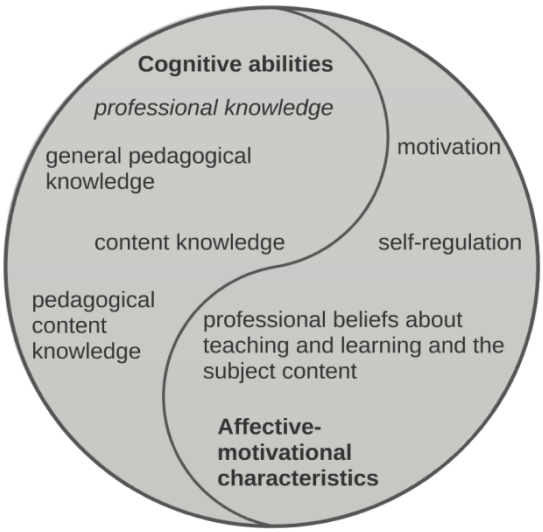

Figure 1: Professional competence of teachers
Adapted from Blömeke and Delaney (2012)

➢ How does Teacher Knowledge Influence Student Outcomes?

Research on the impact of teacher knowledge on student learning outcomes is scarce and the few studies that exist have focused on pedagogical content knowledge or content knowledge. Evidence is beginning to show the following implications:

Implications			Study
Better content knowledge of teachers	→	Higher student achievement	Mathematics teachers
Better pedagogical content knowledge	→	Higher student achievement	Mathematics teachers
Pedagogical content knowledge has more impact on student achievement than content knowledge;			
Only pedagogical content knowledge seems to have an impact on the quality of instruction			
Higher general pedagogical/psychological knowledge	→	Higher quality of instruction according to student perception (e.g. Higher cognitive activation, better instructional pacing, better student-teacher relationships)	Only one study on mathematics teachers

Based on Hill, Rowan and Ball (2005), Baumert et al. (2010), and Voss, Kunter and Baumert (2011)

Whereas there is a long history of discussion and debate around the connection between teacher knowledge and quality instruction, there is a lack of empirical research testing this hypothesis or even connecting knowledge to student learning. The studies reviewed show that while much research is still needed to fully support this relationship, as well to test a cross-cultural conceptualisation of general pedagogical knowledge, research thus far is beginning to show that teachers' general pedagogical knowledge is relevant to understanding quality teaching as understood by its impact on student learning outcomes.

Teachers' Knowledge Base

Conceptualising teacher knowledge is a complex issue that involves understanding key underlying phenomena such as the process of teaching and learning, the concept of knowledge, as well as the way teachers' knowledge is put into action in the classroom. The following is a short overview of these issues.

➢ What do we know about the process of teaching and learning?

Several models exist that capture the complex process of teaching and learning. Some models see learning as a change in the learner's experience or knowledge that results from a change in the learner's environment. Some approaches consider the teaching-learning process only from the perspective of teaching, while others take into account the student's input to the process as well (see Table 1).

Table 1: The main components of the various models of teaching and learning

Input from the teacher and the environment	Input from the students
• Construction of knowledge in a particular subject • Taking place in a social learning environment • Continuous monitoring and assessment of learning • Opportunity to learn (incentive and time allocated for learning) • Quality and levels of instruction	• General ability and aptitude • Prior knowledge • Motivation to learn

Based on Carrol (1963) and Slavin (1984)

The latest models indicate that student factors are part of, and interdependent with, the teaching-learning process. These models imply that a teacher's knowledge goes beyond mere knowledge of content and classroom management, and should also include knowledge of learners and learning.

➢ What do we understand by teacher knowledge?

The pedagogical 'knowledge base' of teachers includes all the required cognitive knowledge for creating effective teaching and learning environments. Research suggests that this knowledge can be studied. Identifying the content of this knowledge base, however, is a complex issue.

Most studies use the distinction between declarative ('knowing that') and procedural knowledge ('knowing how') from cognitive psychology as a theoretical basis. This approach is relevant as it focuses on understanding how knowledge is related to behaviour, or in other words, the quality of teaching performance.

The first key study on teacher knowledge (Shulman, 1987) categorised teacher knowledge into 7 categories, among which were the concepts of:

- *general pedagogical knowledge* (principles and strategies of classroom management and organization that are cross-curricular) and
- *pedagogical content knowledge* (the knowledge which integrates the content knowledge of a specific subject and the pedagogical knowledge for teaching that particular subject).

This latter was considered as the most fundamental element of teachers' knowledge and has been studied widely since. In contrast, general pedagogical knowledge has not been the object of many research studies even though several studies indicate that it is essential for developing quality teachers.

Some models of general pedagogical knowledge combine pedagogical and psychological aspects, whereas others don't make psychological aspects explicit. Psychological components account for the fact that learning occurs in a social context and learning success depends on the general cognitive and affective characteristics of individual students.

Table 2 below contains some of the elements that the different models identify. Since the list represents several models, some components overlap.

Table 2: The main components of the various models of general pedagogical knowledge

Pedagogical components	Psychological components
• *Knowledge of classroom management*: maximising the quantity of instructional time, handling classroom events, teaching at a steady pace, maintaining clear direction in lessons;	• *Knowledge of learning processes:* supporting and fostering individual learning progress by having knowledge of various cognitive and motivational learning processes (e.g. learning

Pedagogical components	Psychological components
• *Knowledge of teaching methods:* having a command of various teaching methods, knowing when and how to apply each method; • *Knowledge of classroom assessment:* knowledge of different forms and purposes of formative and summative assessments, knowledge of how different frames of reference (e.g., social, individual, criterion-based) impact students' motivation; • *Structure*: structuring of learning objectives and the lesson process, lesson planning and evaluation • *Adaptivity*: dealing with heterogeneous learning groups in the classroom	strategies, impact of prior knowledge, effects and quality characteristics of praise, etc.); • *Knowledge of individual student characteristics:* having knowledge of the sources of student cognitive, motivational, and emotional heterogeneity.

Based on Voss, Kunter and Baumert (2011) and König et al. (2011)

The key conceptual question that arises is whether a cross-culturally valid instrument of teacher knowledge can be developed. Since the way the brain processes information should be independent of the cultural context, by adapting a cognitive-psychological approach to teaching and learning, we can assume that there is a fundamental pedagogical knowledge base for creating effective teaching-learning situations that is independent of culture. This hypothesis has, in fact, been tested in studies which show that a standardised instrument designed to investigate general pedagogical knowledge is valid cross-culturally.

➢ How does teacher knowledge work in the classroom?

Investigating the knowledge of teachers as 'learning specialists' involves understanding how this knowledge functions in the teaching-learning process; more specifically, how teachers apply their knowledge in making decisions, for example, about lesson design or making on-the-spot judgements in the classroom.

A set of research studies conceptualises the teaching profession as a 'clinical practice profession' and compares it to the medical profession. Some argue that decision-making is actually a basic teaching skill – decisions are made regularly by teachers while processing cognitively complex information about the student in order to decide alternatives for increasing their understanding.

A review of the different models describing teachers' decision-making shows that factors influencing teachers' decisions include *antecedent conditions* such as students, the nature of the instructional task, the classroom, and the school environment, which combine with *teachers' characteristics* and *cognitive processes* to *impact the pedagogical decision made*. Decision-making is a cyclic process as pedagogical decisions in turn impact antecedent conditions.

Empirical research investigating how teacher knowledge is used in decision-making seems to be suggesting that in order to make informed pedagogical decisions, teachers must be able to analyse and evaluate specific learning episodes, in combination with contextual and situational factors, and to be able to connect all this information to their specialist knowledge of the teaching-learning process in order to guide subsequent teaching actions. Thus, making good pedagogical decisions hinges on the quality of the pedagogical knowledge held by the teacher.

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