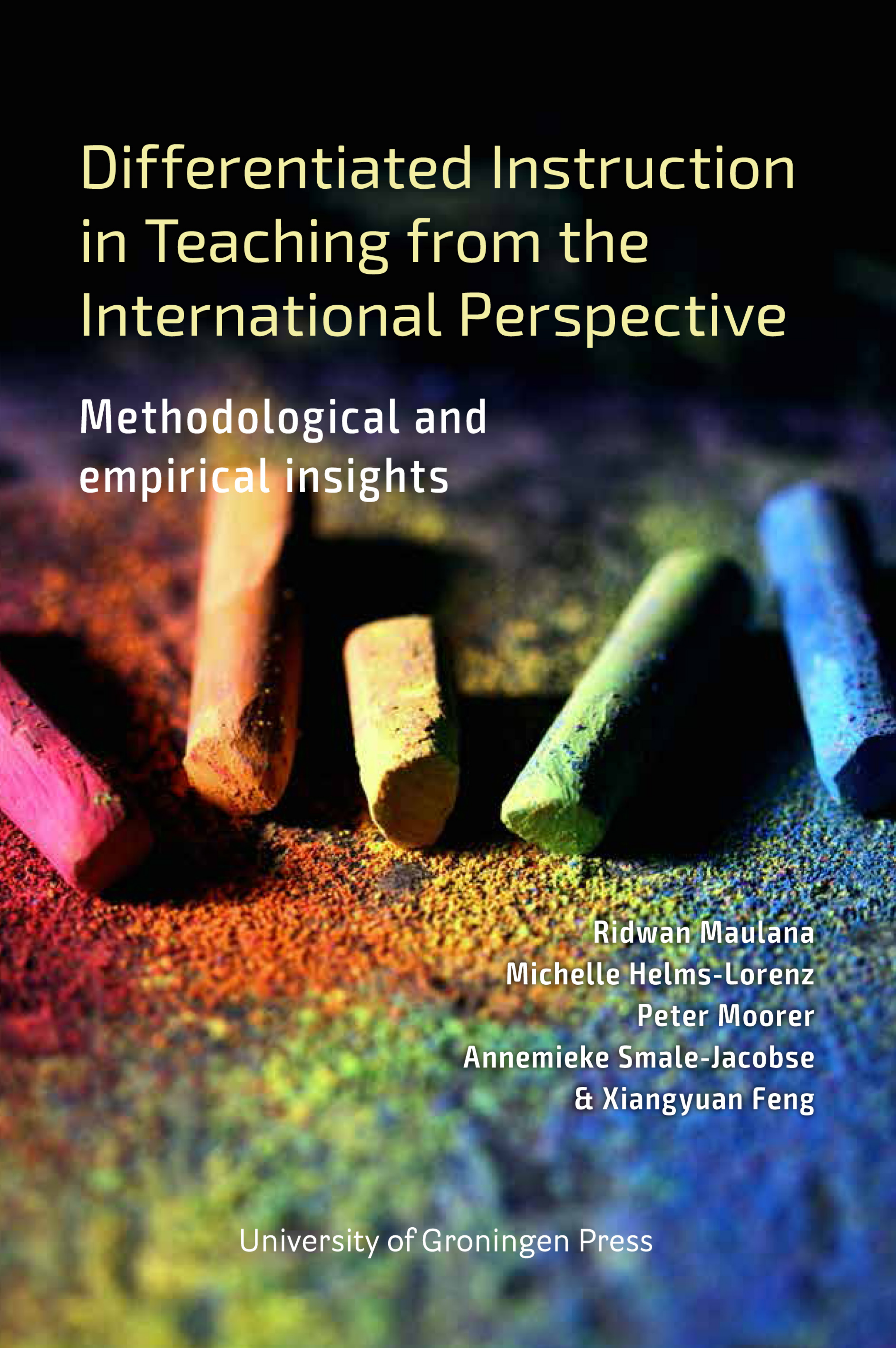

Differentiated Instruction in Teaching from the International Perspective

Methodological and empirical insights

Ridwan Maulana
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NRO NATIONAAL REGIEORGAAN ONDERWIJSONDERZOEK

University of Groningen Press

Published by University of Groningen Press
Broerstraat 4
9712 CP Groningen
The Netherlands

This book has been published open access thanks to the financial support of the Open Access Book Fund of the University of Groningen.

Cover design: Bas Ekkers
Typesetting: LINE UP boek en media bv | Mirjam Kroondijk, Riëtte van Zwol
Editing: Ezra van Wilgenburg, Minke Sikkema

ISBN (print): 9789403429571
ISBN ePDF: 9789403429816
DOI 10.21827/62c5541759973

Acknowledgements[1]

We thank all the Principal Investigators (PI) from the participating countries for their contributions to provide national project information for this report. We acknowledge the great accuracy and mindful work of Peter Moorer, who assisted with the data management. Xiangyuan Feng excellently assisted with data analyses – Thank you, Cathy! We highly acknowledge the significant contributions of our consortium members across participating countries. Particularly, we sincerely thank the principal investigators and co-investigators of the participating countries for their excellent contributions to this international project. We would like to thank, in no particular order: Michelle Helms-Lorenz (the Netherlands), Seyeoung Chun, Okhwa Lee, Meae Jeon and Deukjoon Kim (South Korea), Yulia Irnidayanti, Nurul Fadhilah, Rien Safrina and Nadia Ahya Hayati (Indonesia), Sibel Telli (Türkiye), Carmen-Maria Mercedes Garcia, Mercedes Inda Caro, Omar García-Pérez, María Paulina Viñuela Hernández and †José Vicente Peña Calvo (Spain), James Ko (Hong Kong – China), Christopher Bezzina and Michelle Attard Tonna (Malta), Thelma de Jager and Thys Coetzee (South Africa), Alison Kington, Ben Looker, Kimberley Hibbert-Mayne, Scott Buckler (United Kingdom), Esther Tamara Canrinus (Norway), James Ko and Steven Cantrell (Hong Kong and the United States), Ulziisaikhan Galindev and Amarjargal Adiyasuren (Mongolia), Abid Shahzad (Pakistan), Amanda Maraschin Bruscato (Brazil), Xiangyuan Feng (China) Rekha Koul and Henny Nastiti (Australia). Additionally, the contribution of Daniel Muijs and his team (United Kingdom) and Leonidas Kyriakides and team (Cyprus) in the early phase of the project is acknowledged. Many thanks to all teachers and students from all participating countries for their great contributions to the data collection over the last seven years.

The school partners in the Netherlands are highly acknowledged for their commitment to tie the project into school practice: Arie Trouwborst, Roos Willemsen and Geke Schuurman. The following researchers contributed to the project scientifically: Wim van de Grift, Peter Moorer, Annemieke Smale-Jacobse, Maria Magdalena Isac, Stefanie Andre, Marieke

1 We would like to thank NWO for supporting our project titled *Differentiation in Teaching from the International Perspective: Cross-Cultural Comparison, Development over Time, and Importance for Students' Academic Engagement*. The project fund (NRO project: 405-15-732) was granted in June 2015 by the Dutch research council. This project is the result of international collaboration of participating countries headed by The Teacher Education Department, University of Groningen.

van der Pers, Rikkert van der Lans, Anna Meijer, Amanda Maraschin Bruscato, and Xiangyuan Feng. We also highly appreciate the (student) assistants for their contributions to data entry: Wilma Moorer, Bernie Helms, Melissa Idemudia, Jochem Walstra, Wesley Idemudia, Patrick van de Wetering, Nadine den Heijer, Yorik Maatman, Paul Helms, David Dreunhuizen, Anton Jansen, Hessel van Hout, Chunyun Shen and Ping Li.

We thank the observation trainers who travelled the world, spreading knowledge and skills: Geke Schuurman, Carla Griep, Anna Verkade and Jaap Buitink. This project was also supported heavily by some of our colleagues; Jan-Folkert Deinum supported the project in terms of international networking, Els Lugthart supported administrative matters, Marieke van der Pers and Jolien Admiraal helped with practical matters in schools and also assisted on data screening. And last but not least, we would like to thank Wim van de Grift, who developed the ICALT observation instrument and was director of the Teacher Education Department when the project started, and Klaas van Veen, professor in educational research of the Teacher Education department. You have been great supporters and advisors to the project.

Thank you all for your outstanding scientific cooperation and for co-creating insights and wonderful memories that we will cherish forever. Words cannot express how proud and grateful we are to have been able work with you on this very interesting and dynamic adventure. We are looking forward to our next adventure!

With deepest appreciation and admiration,

Ridwan Maulana (University of Groningen)
Michelle Helms-Lorenz (University of Groningen)

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Chapter 1

Introduction

In the Netherlands, twelve-year-old students are assigned to different learning tracks, based on their prior learning achievements. About twenty years ago, less than one third of students in the Netherlands was assigned to the higher vocational and pre-academic tracks. Currently, about 45% of pupils are assigned to the higher vocational and pre-academic tracks. The same trend is visible in the middle tracks, leaving the lowest track with the smallest proportion of students. Currently, this upward trend seems to have stabilized. The increasing proportions of students ending their secondary education with higher level diploma's is an achievement of the policy of the Dutch Educational system changes, introduced in the last few decennia. However, this tendency forces teachers, to a greater extent than fifteen years ago, to attend to more heterogeneous student populations in their classroom, by applying so-called differentiation practices.

Differentiation practices are advocated widely in education nowadays. Policymakers and researchers urge teachers to embrace diversity and to adapt their instruction to the diverse learning needs of students in their classrooms (Schleicher, 2016). Differentiation is a philosophy of teaching in which differences between students are valued and in which teachers are willing to make an effort to meet varying learning needs. In the classroom, this philosophy is manifested when teachers proactively modify curricula, teaching methods, resources, learning activities, learning environments or requirements to better meet students' learning needs (Tomlinson et al., 2003). Such differentiated practices in the classroom are often referred to as Differentiated Instruction. A number of developments in education, both in the Netherlands and internationally, boost the need for Differentiated Instruction. Firstly, contemporary classes in many countries including the Netherlands are becoming more diverse. Secondly, international trends aimed at the inclusion of students from culturally and linguistically diverse backgrounds, and a stronger focus on inclusive education in which special education students (SEN) attend classes along with non-SEN students have amplified the diversity of learning needs (Rock, Gregg, Ellis, & Gable, 2008; Tomlinson, 2015). Since early tracking may have unintended effects on the educational opportunities of students with varying background characteristics, addressing students' learning needs by differentiation practices within heterogeneous classrooms has been proposed as a preferable choice for a fair educational system (Oakes, 2008; OECD, 2012; OECD, 2018d; Schofield, 2010; Schütz, Ursprung, & Woessmann, 2005). Policy makers emphasize that students should be supported to develop their knowledge and skills at their own level (OECD, 2016; Rock et al., 2008). Around the world there is the wish to improve equity and equality among students (Kyriakides, Creemers, & Charalambous, 2018). When the aim is to decrease the gap between low- and high-achieving students, teachers could invest more in supporting low-achieving students. This is called convergent differentiation (Bosker, 2005). Alternatively, teachers may apply divergent differentiation, in which they strive for equality by dividing their efforts equally across all students, allowing for variation between students in the learning goals they reach, time they use, and outcomes they produce (Bosker, 2005), or a combination of both.

Although the concept of Differentiated Instruction is quite well known, teachers across different countries generally do not adapt their instruction much to student characteristics (Schleicher, 2016). Struggling students may work on demanding tasks or, conversely, high-ability students may practice skills they have already mastered (Tomlinson et al., 2003). Clearly, more information about effective differentiation practices is needed. A meta-analysis of Differentiated Instruction practices in primary education shows that Differentiated Instruction has some potential for student outcomes, when implemented well (Deunk, et al., 2018). For secondary education, evidence for the benefits of Differentiated Instruction is scarce (Coubergs, et al., 2013). The bulk of the studies in secondary education focus on differentiation of students between classes by means of streaming or tracking (Slavin, 1990; Schofield, 2010). However, a recent meta-analysis on Differentiated Instruction practices in secondary education did find small to moderate positive effects of Differentiated Instruction on student achievement, which gives some indication of the possible benefits of Differentiated Instruction (Smale-Jacobse et al. 2019).

1.1 Differentiation as part of effective teaching behavior

Differentiation is bound by several guiding principles. They include a focus on essential ideas and skills in each content area, responsiveness to individual differences, integration of assessment and instruction, and ongoing adjustment of content, process, and products to meet students' learning needs (Rock et al., 2008). Differentiation typically includes proactive and deliberate adaptations of content, process, product, learning environment or learning time based on the assessment of students' readiness or other relevant student characteristics, such as learning preference or interest (Roy, Guay, & Valois, 2013; Smale-Jacobse et al., 2019; Tomlinson, 2014). Applying Differentiated Instruction requires a comprehensive process of preparations prior to lessons, Differentiated Instruction during the lesson(s), and evaluation of the learning processes and the teaching after the lesson(s) (Keuning et al., 2017). In Table 1.1, the schema of the theoretical construct of Differentiated Instruction in the lesson embedded within the broader definition of within-class differentiation is presented (Smale Jacobse et al., 2019). This project specifically focuses on Differentiated Instruction, examining teachers' practices during lessons.

Differentiated Instruction in the classroom entails two aspects. First and foremost is the *pedagogy and didactics of Differentiated Instruction*, referring to which teaching practices and techniques teachers use to differentiate (McQuarrie, McRae, & Stack-Cutler, 2008; Valiande & Koutselini, 2009). Teachers may offer students' adapted *content*, offer various options in the learning *process*, use different assessment *products*, or adapt the *learning environment* to students' learning needs (Tomlinson, 2014). Teachers may also offer certain students more *learning time* or, conversely, encourage high-achievers to speed up their learning process (Coubergs et al., 2013). They may use pre-teaching or extended instruction to cater to the needs of students (Smets & Struyven, 2018), and they may adapt instructions throughout the lesson. Secondly, the *organizational aspect of Differentiated Instruction* entails the structure in which it is embedded. There are different approaches a teacher may choose (see Table 1). Teachers may use some form of *homogeneous clustering* to organize their Differentiated Instruction (Corno, 2008), including fixed or flexible grouping of students based on a common characteristic such as readiness or interest. Alternatively, teachers could use *heterogeneous grouping* to organize their Differentiated Instruction. Differentiation of the learning process may occur because students divide tasks within the group based on their learning preferences or abilities. Alternatively, a teacher may suggest a division of tasks or support based on assessment of learning needs (Coubergs et al., 2013). When adaptations are taken to the level at which individual students work at their own pace on their level, this is called *individualization* (Education Endowment Foundation, n.d.). The learning goals are the same, but learning trajectories are tailored to individuals' needs. Some authors include individualized approaches into the construct of Differentiated Instruction (Coubergs et al., 2013; Smit, et al., 2011; Tomlinson, 2014), whereas others do not (Bray & McClaskey, 2013; Roy et al., 2013).

Table 1.1 Theoretical Model of Within-Class Differentiation
based on the literature review study of Smale-Jacobse et al. (2019)

Within-Class Differentiation
An approach to teaching in which teachers proactively plan, execute, and evaluate adaptations in the classroom based on assessment of students' learning needs with the aim of maximizing students' learning within a supportive and challenging learning environment

Facilitating context characterized by high quality teaching,curriculum, and learning environment

Ongoing assessment of learning needs

Prior to the lesson

Lesson planning and pre-assessment
Gaining insight in the curriculum and corresponding learning goals as well as in the learning needs of students.
Planning the content and organization of the adaptive lesson.

During the lesson

Differentiated Instruction
The adaptation of content, process, product, learning environment or learning time based on information about students' readiness or another relevant student characteristic (such as learning preference or interest). Adaptations may be organized by homogeneous, heterogeneous, or individualized clustering, with the goal of better aligning teaching to students' needs[1]

Homogeneous clustering[2]	**Heterogeneous clustering**[2]	**Individualized**
• The same learning goals for the whole class or for subgroups • Teachers base decisions about suitable adaptations on some form of assessment (or student choice) • A number of different learning pathways are designed for homogeneous groups of students (e.g. ability groups or interest groups)	• The same learning goals for the whole class or for subgroups • Teachers base decisions about suitable adaptations on some form of assessment (or student choice) • Differentiation by division of tasks or varying levels of support for individuals within the heterogeneous group	• The same learning goals for the whole class or for subgroups • Teachers base decisions about suitable adaptations on some form of assessment (or student choice) • Students follow individual learning pathways (e.g. variation in tasks, support, or learning rate) to reach learning goals.

After the lesson

Evaluation (leading to new planning)
Evaluating whether all students have met the desired learning goals and determining which students need remediation or more challenge
Reflection on long-term adjustments in the design or approach of the lesson

Ongoing assessment of learning needs

Ongoing assessment of learning needs

Facilitating context characterized by high quality teaching and supportive learning environment

Facilitating context characterized by high quality teaching,curriculum, and learning environment

1 Typically teacher-directed, but ICT applications may also be used to inform or direct the differentiated instruction.
2 Only settings in which content, process, product, environment or learning time are purposefully adapted to the learning needs of students within or across groups are included in our model. Merely working together without any planned adaptations does not fit our definition of differentiated instruction.

Several meta-analysis studies show that Differentiated Instruction practices relate to better student outcomes, mostly revealing small to moderate effects (Deunk, et al., 2018; Hattie, 2009; Kulik, Kulik & Bangert-Drowns, 1990; Smale-Jacobse et al., 2019; Steenbergen-Hu, Makel & Olszewski-Kubilius, 2016), although some studies found no or limited empirical evidence for benefits of the approach (Sipe & Curlette, 1996; Slavin, 1990a).

Conceptually, Differentiated Instruction can be defined as one of six domains of effective teaching behavior that together indicate observable teaching quality: creating a safe learning climate, efficient classroom management, quality of instruction, activating teaching methods, teaching learning strategies, and Differentiated Instruction (Van de Grift, 2007). This categorization has been used to operationalize teaching quality in the ICALT instrument (Van de Grift, 2014). The domains of teaching behavior used in this instrument focus primarily on general pedagogical knowledge (GPK) instead of subject didactic or pedagogical content knowledge (PCK). The domains of teaching behavior have been strongly grounded in the literature on teaching effectiveness and encompass nearly all teaching domains from other well-known instruments (Bell et al., 2019; Dobbelaer, 2019; Van de Grift, 2014), including the ones used by Pianta & Hamre (2009) and Danielson (2013; for a comparison, see Maulana et al., 2015).

1.2 Differentiated Instruction in the Netherlands

Although researchers and policy makers in the Netherlands recognize the importance of differentiation in teaching, most teachers still struggle to succeed in implementing this complex skill in their daily classroom practices. This is true for teachers in Dutch primary education. Nevertheless, research shows that Dutch primary school teachers are better in dealing with differentiation compared to their colleagues in Flanders (Belgium) and Lower-Saxony (Germany) (Van de Grift, 2007; 2014; Van de Grift, Van der Wal & Torenbeek, 2011). Research in Dutch secondary education indicates that teachers experience differentiation as one of the most difficult teaching behaviors to execute, compared to other teaching domains such as creating safe learning climates, classroom management, and clarity (Maulana, Helms-Lorenz, & Van de Grift, 2014a; Van de Grift, Helms-Lorenz, & Maulana, 2014). These studies indicate that most Dutch secondary school teachers pay little attention to differentiation in their teaching. This undesirable phenomenon is evident both for novice as well as experienced teachers, with novice teachers underperforming compared to experienced teachers (Van de Grift & Helms-Lorenz, 2012). In general, research has indicated that teachers with fifteen years of experience show the highest level in Differentiated Instruction (Van de Grift & Helms-Lorenz, 2012). Possibly, the fact that Dutch teachers do not optimally match their teaching to students' learning needs contributes to an explanation as to why Dutch students' performance in international comparison studies (e.g., PISA, TIMSS, PIRLS) has been good in general but never reached excellence compared to for instance, Finland and South Korea[1].

1 See https://www.oecd.org/pisa/publications/pisa-2018-results.htm for more information about Dutch ranking compared to other countries.

1.3 Differentiated Instruction in international contexts

Unfortunately, it remains unknown whether Dutch secondary school teachers perform better or worse in differentiated teaching in comparison to other countries. To date, international studies involving multiple countries addressing teaching behavior in the domain of differentiation remains underrepresented in literature. Currently, it is unknown whether high-performing countries in international studies such as South Korea and the UK have teachers who exhibit more differentiation practices compared to the Netherlands. Similarly, it remains undetermined whether teachers in a low-performing country such as Indonesia show less differentiation practices compared to the Netherlands. Gaining knowledge with cross-national comparisons facilitates learning from other countries. Based on this line of reasoning, and the NRO call regarding the need to study differentiation from the international perspective (NWO, 2014), this report addresses the findings of an investigation of the performance of Dutch secondary school teachers in the domain of differentiation compared to differentiated teaching practices in other countries (NRO call, Research Question 8).

In order to provide an accurate answer to the question mentioned above, two important issues need to be attended to first. The first issue concerns the measurement of differentiation. Van de Grift et al. (2014) developed an observation instrument that can be used to measure differentiation in Dutch secondary education classrooms. This "International Comparative Analysis of Learning and Teaching" (ICALT) instrument is based on a comparative study of teaching quality in primary education across European countries (Van de Grift, 2007, 2012). Shortly afterward, Maulana et al. (2014a) developed a questionnaire to measure students' perceptions of teachers' behavior associated with differentiation in classroom teaching. Unfortunately, there is no evidence yet that show if these instruments can be used in different countries in a straightforward fashion, i.e., if the items are interpreted in the same way in different countries. Therefore, a proper adaptation of the Dutch instruments into the language of the target countries prior to conducting the comparative study is crucial. Therefore, the first matter in question in this project was the language adaptation of the instruments measuring differentiation in different countries. A language adaptation process is necessary to make sure that the construct of differentiation is measured in the target country, using the target languages (Vijver & Leung, 1997: Harkness, 2009). During the adaptation process, various issues related to the construct validity, considering cultural differences, can be resolved (Van de Vijver & Tanzer, 2004). The present project pays ample attention to this issue.

The second prerequisite and another important matter, in comparative studies involving multiple countries, is the comparability of the instruments (measurement invariance). That is, whether or not the instruments measure the same construct (in this case Differentiated

Instruction) in the same way across different contexts (Hox, de Leeuw, & Brinkhuis, 2010). Failing to prove measurement invariance regarding the instruments used in comparative studies will compromise results of the comparison. This means one may interpret similarities and differences found based on invalid constructs (interpretation bias). Therefore, measurement invariance examination should be conducted prior to using the instruments for comparative purposes. The cross-country validation study to check the comparability of meaning of the differentiation construct across countries is reported in Chapter 6. Based on this study, questions concerning the extent to which the Dutch instruments measuring Differentiated Instruction can be used for comparing practices across countries in a straightforward way are explored. The study also provides insights into which adaptations, if any, are necessary to produce measurements that are comparable to the original Dutch measures.

Furthermore, prior research revealed that Dutch teachers' teaching quality associated with within class differentiation increased during the first three years of professional practice. During the first two years, the increase was steeper compared to the subsequent year (Maulana, Helms-Lorenz, & Van de Grift, 2014b). This study also indicated that differentiation remained the most difficult teaching behavior for Dutch novice teachers over time, which means that this skill has ample room for improvement. It will be beneficial to validate this Dutch study involving teachers in the Netherlands with more teaching experience as well teachers in other countries to examine whether or not the same trend will be found elsewhere (to confirm the generalizability of the findings). Replications will provide a confirmation whether the trend is universal or country specific. The findings are reported in Chapters 7 and 8. Comparative study provides an opportunity for countries to cooperate and learn from each other about how factors like experience are associated with differentiation.

1.4 Differentiated Instruction and student engagement

Despite the passage of time, the importance of academic engagement for facilitating educational outcomes remains evident (Appleton, Christenson, & Furlong, 2008). Recent research revealed a positive relationship between Differentiated Instruction and students' academic engagement in Dutch and Indonesian secondary schools (Helms-Lorenz, Maulana, & Van de Grift, 2014; Maulana, Helms-Lorenz, & Van de Grift, 2014c). These studies signify the importance of differentiation for student engagement. However, little is known about evidence of the effect of differentiation on academic engagement in other countries. If the effect will be found, it remains uncertain whether or not the extent of the effect is country dependent.

1.5 Research questions

To contribute to the body of knowledge regarding usefulness of measures, profiles, and development of Differentiated Instruction in teaching, as well as the (longitudinal) relationship between Differentiated Instruction and students' academic engagement from the international perspective, studies reported in the present work aims to answer the following research questions:

1. Are the Dutch measures of Differentiated Instruction in teaching reliable and valid to be used in other countries?
2. Are teachers in the Netherlands better at executing Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?
   - 2.1 Do teachers in other countries experience Differentiated Instruction in teaching as one of the most difficult teaching behaviors to execute?
   - 2.2 Are novice teachers in other countries less able to execute Differentiated Instruction in their teaching compared to experienced teachers?
3. Which personal and contextual factors explain differences between countries in Differentiated Instruction in teaching?
4. How does Differentiated Instruction in teaching develop over time across countries?
5. What personal and contextual factors explain differences and growth in Differentiated Instruction in teaching when comparing countries?
6. What is the impact of (changes in) Differentiated Instruction in teaching on students' academic engagement?
   - 6.1 Are there any differences regarding the impact of Differentiated Instruction in teaching between countries?
   - 6.2 If so, which factors explain these differences?

1.6 General conceptual model

This research project is guided by a conceptual model to study Differentiated Instruction across diverse national contexts (see Figure 1.1). The study integrates the context–system processes–outcomes model. At the context level, country, school, student, and time factors are included. The system processes cover the main topic of Differentiated Instruction and five other teaching behavior correlates. Background variables are included in this level. Student engagement is included as an outcome measure.

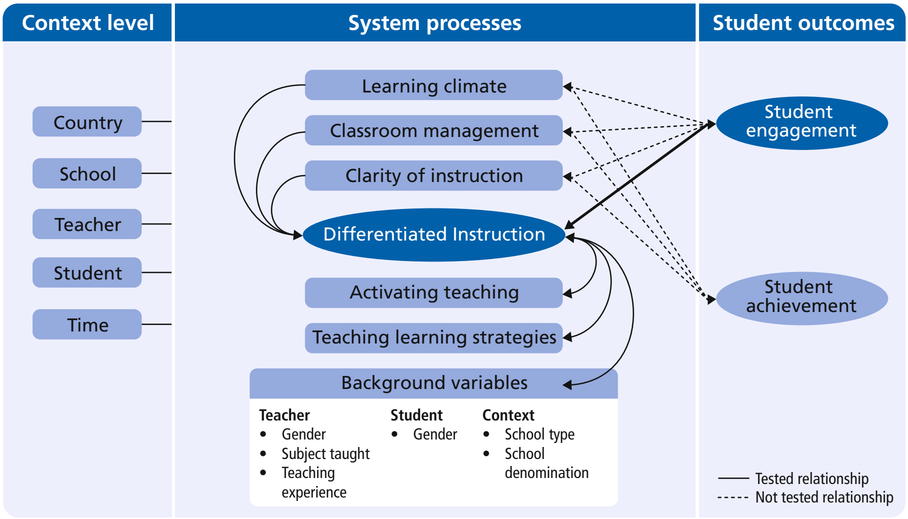

Figure 1.1 Conceptual model of the relationship between contexts, Differentiated Instruction, personal and contextual factors, and student engagement

Chapter 2
Research method

This study is divided into three steps, as follows:

Step 1

Setting up a cross-country study to validate Dutch instruments measuring both Differentiated Instruction and academic engagement across countries (Research question 1).

Step 2

Conducting an international comparative study into the quality of Differentiated Instruction across countries (Research questions 2 and 3).

Step 3

Conducting a longitudinal study following teachers across three years of teaching to model teacher development in Differentiated Instruction across countries, as well as to examine the (longitudinal) relationships between Differentiated Instruction and academic engagement (Research questions 4-6).

2.1 Procedure

Initially, a total of at least thirteen countries across the five continents were targeted to participate in this project. Invitations to participate in the project were sent to thirteen potential partner countries. The invitation was responded to very positively and enthusiastically by these partner countries. The partner countries also extended the invitation to their own professional network in more countries. Participation in the project followed a two-step procedure: 1) A partner country indicated an interest (via email) to join the project, and 2) The partner country signed a cooperation agreement with the University of Groningen to officially join the project. In the first step, a statement of interest from a total of 43 countries was received. In the second step, an agreement with a total of sixteen countries was reached. Other countries ultimately could not meet practical or financial requirements for participation.

During the first recruitment phase, ten countries joined the project officially: the Netherlands, South Korea, Indonesia, Türkiye, Spain, Hong Kong – China, Malta, South Africa, the UK, and Norway. In the second recruitment phase, seven more countries joined: Australia, the USA, Mongolia, Pakistan, Brazil, China, and Portugal (see Table 2.1). Other countries that indicated high interest in joining the project but were not able to join officially due to funding issues and other reasons were: Germany, Chile, Italy, Japan, Cyprus, Madagascar, Switzerland, Malawi, Mexico, Finland, Rwanda, Morocco, France, Iran, other parts of Norway, Belgium, New Zealand, Vietnam, the Philippines, Canada, Czech Republic, Poland, Malaysia, Hungary, Saudi Arabia, Singapore, and India[1].

Table 2.1 Overview of participating and non-participating countries after recruitment

Country name	Region	Participating country	Note
1. The Netherlands	Europe	Yes	Longitudinal data (4 waves) available
2. South Korea	Asia	Yes	
3. Indonesia	Asia	Yes	Longitudinal data (3 waves) available
4. Türkiye	Euro-Asia	Yes	
5. Spain	Europe	Yes	
6. Hong Kong – China	Asia	Yes	
7. Malta	Europe	Yes	
8. South Africa	Africa	Yes	Longitudinal data (2 waves) available
9. UK	Europe	Yes	Longitudinal data (4 waves) available
10. Norway	Europe	Yes	
11. Australia	*Australia*	*Yes*	*Participation started in 2019 (before the pandemic). Data collection was planned for 2019. Currently still attempting to collect data*
12. The USA	North America	Yes	Longitudinal data (2 waves) available
13. Mongolia	Asia	Yes	Longitudinal data (3 waves) available
14. Pakistan	Asia	Yes	Longitudinal data (2 waves) available
15. Brazil	South America	Yes	
16. China	Asia	Yes	
17. Portugal	*Europe*	*Yes*	No response from schools despite multiple reminders and invitations
18. Germany	Europe	No	The PI retired, the co-PI moved to another institution with a different research focus
19. Chile	*South America*	*Yes/No*	The PI did not succeed in securing local funding. Recently, a different researcher wanting to collect data in Chile approached us
20. Italy	Europe	No	No local funding
21. Japan	Asia	No	The PI was transferred to another institution with a different research focus
22. Cyprus	*Europe*	*Yes/No*	Unsuccessful in collecting data in secondary schools
23. Madagascar	Africa	No	No local funding
24. Switzerland	Europe	No	No local funding
25. Malawi	*Africa*	*Yes/No*	*Unable to proceed due to the pandemic*

1 The University of Groningen has been in contact with the majority of these countries to look for funding possibilities to run the project in their countries, even after the project ended in March 2022.

Table 2.1 continued

Country name	Region	Participating country	Note
26. Mexico	South America	No	No local funding
27. Finland	Europe	No	No local funding
28. Rwanda	Africa	No	Unsuccessful to connect the project with South Korean agency
29. Morocco	Africa	No	No local funding
30. France	Europe	No	No local funding
31. Iran	Asia	No	No local funding
32. Belgium	Europe	No	No human resource to handle the local project
33. New Zealand	Australasia	No	No local funding
34. Vietnam	Asia	No	Unsuccessful local funding application
35. the Philippines	*Asia*	*No*	Unsuccessful local funding application
36. Canada	North America	No	Local budget was available, but the amount was too small to participate
37. Czech Republic	*Europe*	*No*	Unable to collect data in secondary schools
38. Poland	Europe	No	No local funding
39. Malaysia	*Asia*	*No*	Unsuccessful local funding application
40. Hungary	Europe	No	No local funding
41.Saudi Arabia	Asia	No	No local funding
42. Singapore	Asia	No	No local funding
43. India	Asia	No	No local funding
44. Nicaragua	South America	Yes/no	The agreement with Korea who funded the project in Nicaragua was discussed. However, the data could not be shared due to conflict of interest

Participation in this project was voluntary. Each partner country was responsible to cover research expenses within the country. University of Groningen partially sponsored expenses. In all participating countries, a minimum of 400 secondary school teachers and their students were invited to participate in the national data collection. Teachers' classrooms were observed, and their pupils were surveyed. Some partner countries were able to collect more than the minimum number of data requested, while other countries were not able to due to various reasons[2] (see Sample section). By design, a stratified sampling strategy was planned. However, this strategy proved to be complex and delivered low response rates. Subsequently, a convenience sampling strategy was implemented. Participating countries strived to recruit participants as representative as possible, in terms of teaching experience (inexperienced versus experienced teachers), gender (male versus female), teaching subject (math and science/STEM versus non-science), grade level (lower versus higher grade), school type (vocational versus general), teacher certification status (certified versus uncertified), school denomination (pub-

2 Reasons include no response from schools/teachers at all, schools/teachers did not deliver data after agreeing to participate, geographical barrier and natural phenomena, illness, observer attrition, and COVID-19 pandemic.

lic versus private) and geographical spread. Some unique background characteristics of schools typical for specific countries were registered (i.e., urban versus sub urban/remote).

2.2 Observation training

An observer training was conducted in all participating countries using the ICALT observation instrument to obtain mutual consensus between observers and an expert-norm generated by a large number of experts (experienced teachers and educators) when observing video recordings of real lessons. Of the seventeen participating countries, eleven countries planned to collect observation data: the Netherlands, South Korea, South Africa, Mongolia, Indonesia, Pakistan, Spain, Hong Kong – China, the UK, the USA[3], and Australia.

In these eleven countries, an identical training in terms of standard, structure, and procedure for using the observation instrument measuring Differentiated Instruction and other effective teaching behaviors, was conducted. Two expert trainers from the Netherlands performed the face-to-face training sessions in ten countries, all except for Pakistan. Due to unavoidable circumstances, the training for Pakistan was conducted online[4]. The expert trainer was a university professor with a specialized expertise in the research instrument and the measurement of effective teaching including Differentiated Instruction, and one master teacher educator with specialized expertise in training teachers in how to use the instrument.

Training consisted of three phases: preparation, implementation, and evaluation. In the preparation phase prior to the training day, trainees were instructed to thoroughly read and study the theoretical framework underlying the instrument. The implementation phase refers to the interactive, face-to-face training day which lasted for one to two full days[5]. During this phase, explanations were given and discussions about the instrument and its corresponding theoretical framework were conducted. Afterward, discussions about how to evaluate effective teaching practices using the associated scoring rules were held. Furthermore, two videotaped lessons (English and geography) were used by observers to rate teaching behavior using the observation instrument. When analyzing the observation scores of trainees, a consensus level of 70% within the group and between the group and the expert norm was set as a sufficient cut-off. Discussions to resolve significant differences and improve

3 Data from the USA is part of the MET project (MET, 2015). Data collection and coding were conducted and partially funded by the Hong Kong Partner (The Education University of Hong Kong).
4 Unexpected political events between the Netherlands and Pakistan during planned training dates.
5 In the Netherlands, the training typically lasted for one day. In partner countries, the training was designed for two days due to factors which include, but are not limited to, familiarity with the theoretical framework and the observation instrument, language barriers, training infrastructure, number of trainees, and the trainees' backgrounds.

consensus were conducted subsequently. We had used the same procedure before in other research projects aimed at international comparison of teaching and learning (Van de Grift, 2007; 2014). We used a popular method for computing a consensus estimate (of interrater reliability) by using a simple agreement percentage: a product of adding up the number of items that received identical ratings by all observers and dividing that number by the total number of items rated by observers (Stemler, 2004). Finally, the evaluation phase involved the investigation of rating patterns and significant deviations from the average pattern. A small number of observers who deviated from the average were followed up, and extra guidance was given to this group prior to conducting the observation in natural classroom settings. Observers failing to meet the minimum consensus of 70% were not invited to conduct observations. The consensus estimates from the observer training were generally sufficient (see Table 2.2). The consensus estimates of Pakistan and Indonesia were lower than the cut-off criterium (0.63% and 67%). After the training sessions, extra guidance was provided to observers scoring too extreme (too low or too high) on certain indicators.

Table 2.2 Consensus estimates of observer training in the 11 participating countries

Country	Consensus estimates	
	Within the group	With the expert norm
the Netherlands	71	86
South Korea	80	88
Indonesia	74	67
South Africa	63	88
Hong Kong – China	77	75
Pakistan	100	63
Mongolia	77	83
Spain	74	96
UK	–	71
the USA[6]	77	75
Australia[7]	75	80

2.3 Instruments

Two instruments were used: 1) an observation instrument, and 2) a student questionnaire. The observation instrument was used to measure actual practices of Differentiated Instruction in

6 Observers of The American (met) data were the same as observers of Hong Kong – China data.
7 Due to the pandemic, school closures and the related challenges, Australia has not been able to collect data as of yet.

the classroom. The student questionnaire was used to measure students' perceptions of teachers' Differentiated Instruction practices. The two instruments will be discussed below.

2.3.1 Observed differentiation practices

To measure teachers' actual teaching behavior related to Differentiated Instruction, a Differentiated Instruction scale from an observation instrument called the International Comparative Analysis of Teaching and Learning (ICALT, van de Grift, et al. 2014) was used. Differentiated Instruction includes items referring to teacher behavior such as "[the teacher] offers weaker learners extra study and instruction time" and "[the teacher] adjusts instructions to relevant inter-learner differences". See Table 2.3.1 for specific items (high-inference structures) measuring Differentiated Instruction and the corresponding examples of good practices that were added for observers to illustrate examples of behaviors related to the item (low-inference structures). Each item is rated on a 4-point Likert scale with the following categories: 1 = Mostly weak, 2 = More often weak than strong, 3 = More often strong than weak and, 4 = Mostly strong.

Table 2.3.1 Differentiated Instruction items and the corresponding examples of good practices

Nr	The teacher …	Results	Examples of good practices	Observed
1	... evaluates if lesson aims have been reached	1 2 3 4	*... evaluates if lesson aims have been reached*	*0 1*
			... evaluates learners' performance	*0 1*
2	... offers weaker learners extra study and instruction time	1 2 3 4	*... gives weaker learners extra study time*	*0 1*
			... gives weaker learners extra instruction time	*0 1*
			... gives weaker learners extra exercises/practice	*0 1*
			... gives weaker learners pre- or post-instruction	*0 1*
3	... adjusts instructions to relevant inter-learner differences	1 2 3 4	*... puts learners who need little instruction to work (sooner)*	*0 1*
			... gives additional instructions to small groups or individual learners	*0 1*
			... does not simply focus on the average learner	*0 1*
4	... adjusts the processing of subject matter to relevant inter-learner differences	1 2 3 4	*... distinguishes between learners in terms of the length and size of assignments*	*0 1*
			... allows for flexibility in the time learners get to complete assignments	*0 1*
			... lets some learners use additional aids and means	*0 1*

To examine whether Differentiated Instruction was observed to be the most difficult teaching behavior across countries (RQ. 2), five additional domains of effective teaching behavior within the ICALT instrument were measured (observed) too: a safe and stimulating learning climate (4 items), efficient classroom management (4 items), clarity of instructions (7 items), intensive and activating teaching (7 items), and teaching learning strategies (6 items) (see Table 2.3.2).

Table 2.3.2 Domains of teaching behavior with high inference items and corresponding examples of good practices (Differentiated Instruction items in italics)

No.	The teacher ...	Results	Examples of good practice: *The teacher ...*	Observed
1	... shows respect for learners in their behavior and language	1 2 3 4	*... lets learners finish their sentences*	*0 1*
			... listens to what learners have to say	*0 1*
			... does not make role stereotyping remarks	*0 1*
2	... maintains a relaxed atmosphere	1 2 3 4	*... addresses learners in a positive manner*	*0 1*
			... uses and stimulates humour	*0 1*
			... accepts the fact that learners make mistakes	*0 1*
			... shows compassion and empathy for all learners present	*0 1*
3	... promotes learners' self-confidence	1 2 3 4	*... gives positive feedback on questions and remarks from leaners*	*0 1*
			... compliments learners on their work	*0 1*
			... acknowledges the contributions that learners make	*0 1*
4	... fosters mutual respect	1 2 3 4	*... stimulates learners to listen to each other*	*0 1*
			... intervenes when learners make fun of someone	*0 1*
			... keeps (cultural) differences and idiosyncrasies in mind	*0 1*
			... stimulates solidarity between learners	*0 1*
			... encourages learners to experience activities as group events	*0 1*
5	... ensures the lesson proceeds in an orderly manner	1 2 3 4	*... lets learners enter and settle in an orderly manner*	*0 1*
			... intervenes timely and appropriately in case of disorder	*0 1*
			... safeguards the agreed rules and codes of conduct	*0 1*
			... keeps all leaners involved in activities until the end of the lesson	*0 1*
			… makes sure that learners know what to do if they need help with their work and explains clearly when they can ask for help	*0 1*
			...makes sure learners know what to do when they have finished their work	*0 1*
6	... monitors to ensure learners carry out activities in the appropriate manner	1 2 3 4	*... checks whether learners have understood what they are expected to do*	*0 1*
			... provides feedback on learners' social functioning whilst carrying out a task	*0 1*
7	… provides effective classroom management	1 2 3 4	*... explains clearly which materials can be used*	*0 1*
			The materials for the lesson are ready for use	*0 1*
			Materials are aimed at the right level and developmental stage of the learners	*0 1*

No.	The teacher ...	Results	Examples of good practice: *The teacher ...*	Ob-served
8	... uses the time for learning efficiently	1 2 3 4	*... starts the lesson on time*	*0 1*
			... does not waste time at the beginning, during, or at the end of the lesson	*0 1*
			... prevents any unnecessary breaks from occurring	*0 1*
			... does not keep learners waiting	*0 1*
9	... presents and explains the subject matter in a clear manner	1 2 3 4	*... activates prior knowledge of learners*	*0 1*
			... gives staged instructions	*0 1*
			... poses questions which learners can understand	*0 1*
			... summarizes the subject material from time to time	*0 1*
10	... gives feedback to learners	1 2 3 4	*... makes clear* ***whether*** *an answer is right or wrong*	*0 1*
			... makes clear ***why*** *an answer is right or wrong*	*0 1*
			... gives feedback on the way in which learners have arrived at their answer	*0 1*
11	... engages all learners in the lesson	1 2 3 4	*... creates learners' assignments that stimulate active participation*	*0 1*
			... asks questions that stimulate learners to reflect	*0 1*
			... makes sure that learners listen and/or continue working	*0 1*
			... allows for "thinking time" after asking a question	*0 1*
			... also invites learners who do not volunteer to do so to participate	*0 1*
12	… during the presentation stage, checks whether learners have understood the subject material	1 2 3 4	*... ask questions that stimulate learners to reflect*	*0 1*
			… regularly checks whether learners understand what the lesson is about	*0 1*
13	… encourages learners to do their best	1 2 3 4	*... praises learners who do their best*	*0 1*
			... makes clear that all learners should do their best	*0 1*
			... expresses positive expectations about what learners are going to achieve	*0 1*
14	... teaches in a well-structured manner	1 2 3 4	*The lesson is structured in clearly defined stages and comprehensible transitions in between stages*	*0 1*
			The lesson is stuctured logically, moving from easy to complex	*0 1*
			Activities and assignments have a correlation with the materials presented during the presentation stage	*0 1*
			The lesson offers a good variety of presentation, instruction, controlled practice, free practice, et cetera	*0 1*
15	... gives a clear explanation of how to use didactic aids and how to carry out assignments	1 2 3 4	*... makes sure that all learners know what to do*	*0 1*
			... explains how lesson aims and assignments relate to each other	*0 1*
			... clearly explains which materials and sources can be used	*0 1*
16	... offers activities and working methods that stimulate learners to take an active approach	1 2 3 4	*... uses various forms of conversation and discussion*	*0 1*
			... offers controlled (pre-)practice	*0 1*
			... lets learners work in groups	*0 1*

Table 2.3.2 continued

No.	The teacher ...	Results	Examples of good practice: *The teacher ...*	Ob-served
			... uses Information and Communication Technology (ICT; e.g., digiboard, projector)	*0 1*
			... employs a variety of instruction strategies	*0 1*
			... varies assignments	*0 1*
			... varies lesson materials	*0 1*
			... uses materials and examples from daily life	*0 1*
			... asks a range of questions	*0 1*
17	... stimulates the building of self-confidence in weaker leaners	1 2 3 4	*... gives positive feedback on questions from weaker learners*	*0 1*
			... displays positive expectations about what achieve-ments weaker learners are expected to make	*0 1*
			... compliments weaker learners on their work	*0 1*
			... acknowledges the contributions made by weaker learners	*0 1*
18	... stimulates learners to think about solutions to problems	1 2 3 4	*… shows learners the path they can take toward a solution*	*0 1*
			... teaches strategies for problem-solving and referencing	*0 1*
			... teaches learners how to consult sources and reference works	*0 1*
			... offers learners checklists for problem-solving	*0 1*
19	... asks questions that stimulate learners to reflect	1 2 3 4	*... waits long enough to give all learners the opportuni-ty to answer a question*	*0 1*
			... encourages learners to ask each other questions and explain things to one another	*0 1*
			... asks learners to explain the different steps of their strategy	*0 1*
			... regularly checks if instructions have been under-stood	*0 1*
			... asks questions that stimulate reflection and learner feedback	*0 1*
			... regularly checks whether learners understand what the lesson is about	*0 1*
20	... lets learners think aloud	1 2 3 4	*... provides opportunities for learners to think out loud about solutions*	*0 1*
			... asks learners to erbalizes solutions	*0 1*
21	... gives interactive instructions	1 2 3 4	*... promotes interaction between learners*	*0 1*
			... promotes interaction between teacher and learners	*0 1*
22	... clearly specifies the lesson aims at the start of a lesson	1 2 3 4	*... informs learners about the lesson aims at the start of the lesson*	*0 1*
			...clarifies the aims of assignments and their objective	*0 1*
23	... evaluates if lesson aims have been reached	1 2 3 4	*... evaluates if lesson aims have been reached*	*0 1*
			... evaluates learners' performance	*0 1*
24	... offers weaker learners extra study and instruction time	1 2 3 4	*... gives extra study time to weaker learners*	*0 1*

No.	The teacher ...	Results	Examples of good practice: *The teacher ...*	Ob-served
			... gives extra instruction time to weaker learners	*0 1*
			... gives extra exercises/practice to weaker learners	*0 1*
			... gives weaker learners pre- or post-instruction	*0 1*
25	... adjusts instructions to relevant inter-learner differences	1 2 3 4	*... puts learners who need little instruction to work (sooner)*	*0 1*
			... gives additional instructions to small groups or individual learners	*0 1*
			... does not simply focus on the average learner	*0 1*
26	... adjusts the processing of subject matter to relevant inter-learner differences	1 2 3 4	*... distinguishes between learners in terms of the length and size of assignments*	*0 1*
			... allows for flexibility in the time learners get to complete assignments	*0 1*
			... lets some learners use additional aids and means	*0 1*
27	... teaches learners how to simplify complex problems	1 2 3 4	*... teaches learners how to simplify complex problems*	*0 1*
			... teaches learners how to break down complex problems into simpler ones	*0 1*
			... teaches learners to order complex problems	*0 1*
28	… stimulates the use of control activities	1 2 3 4	*... pays attention to prediction strategies for reading*	*0 1*
			... lets learners relate solutions to the context of a problem	*0 1*
			... stimulates the application of alternative strategies	*0 1*
29	... teaches learners to check solutions	1 2 3 4	*... teaches learners how to estimate outcomes*	*0 1*
			... teaches learners how to predict outcomes	*0 1*
			... teaches learners how to relate outcomes to the practical context	*0 1*
30	... stimulates the application of what has been learned	1 2 3 4	*... stimulates the conscious application of what has been learned in other (different) learning contexts*	*0 1*
			... explains to learners how solutions can be applied in different situations	*0 1*
			... relates problems to previously solved problems	*0 1*
31	... encourages learners to think critically	1 2 3 4	*... asks learners to provide explanations for occur-rences*	*0 1*
			... asks learners for their opinion	*0 1*
			... asks learners to reflect on solutions or answers given	*0 1*
			... asks learners to provide examples of their own	*0 1*
32	... asks learners to reflect on practical strategies	1 2 3 4	*... asks learners to explain the different steps of the applied strategy*	*0 1*
			... gives a clear explanation of possible (problem-solving) strategies	*0 1*
			... asks learners to expand on the pros and cons of different strategies	*0 1*

2.3.2 Student perceptions of differentiation practices

To measure student perceptions of Differentiated Instruction, the My Teacher Questionnaire (MTQ) (Maulana & Helms-Lorenz, 2016) was used. This questionnaire was developed based on the observable teaching behavior framework mentioned above. The Differentiated Instruction scale consists of four items provided on a 4-point Likert scale ranging from 1 (Never) to 4 (Often) (see Table 2.3.3).

Table 2.3.3 Differentiated Instruction items on the My Teacher Questionnaire

Nr.	Item	Response category
1	My teacher takes into account what I already know.	1 = Never
2	My teacher makes connections to what I already know.	2 = Seldom
3	My teacher checks if I have understood the content of the lesson.	3 = Frequently
4	My teacher knows what I have difficulty with.	4 = Often

To investigate whether Differentiated Instruction was perceived as the most difficult domain of teaching behavior by students across countries (RQ. 2), the other five domains of teaching behavior within the MTQ were surveyed as well. Those domains are: a safe and stimulating learning climate (5 items), efficient classroom management (8 items), clarity of instructions (7 items), intensive and activating teaching (10 items), and teaching learning strategies (7 items) (see Table 2.3.4).

Table 2.3.4 Other domains of teaching behavior of the MTQ student questionnaire

Nr.	Item	Domain
1	My teacher helps me if I don’t know something.	Classroom Management
2	My teacher makes sure that others treat me with respect.	Learning Climate
3	My teacher makes sure that I use my time effectively.	Activating Teaching
4	My teacher makes clear what I need to study for a test.	Classroom Management
5	My teacher repeats what we have learnt in the previous lesson.	Clarity of Instruction
6	My teacher asks me questions that I need to think about.	Activating Teaching
7	My teacher answers my questions.	Learning Climate
8	My teacher makes sure that I treat others with respect.	Learning Climate
9	My teacher explains how I need to do things.	Teaching Learning Strategies
10	My teacher makes sure that I know what to do.	Classroom Management
11	My teacher clearly explains everything to me.	Clarity of Instruction
12	My teacher makes sure that I keep on working.	Clarity of Instruction
13	My teacher clearly explains the objective of a lesson.	Clarity of Instruction
14	My teacher talks interestingly.	Activating Teaching
15	My teacher asks me how I am going to learn the content of the lesson.	Teaching Learning Strategies

Nr.	Item	Domain
16	My teacher teaches me how to check my solutions.	Teaching Learning Strategies
17	My teacher encourages me to think.	Activating Teaching
18	My teacher explains to me why my answers are correct or not.	Clarity of Instruction
19	My teacher clearly states when assignments/tasks are due.	Classroom Management
20	My teacher prepares their lessons well.	Classroom Management
21	My teacher approaches me respectfully.	Learning Climate
22	My teacher stimulates me to cooperate with my classmates.	Activating Teaching
23	My teacher makes sure that I pay attention.	Activating Teaching
24	My teacher uses clear examples.	Clarity of Instruction
25	My teacher applies clear rules.	Classroom Management
26	My teacher lets me summarize the content of a lesson.	Teaching Learning Strategies
27	My teacher tells me how I should learn something.	Teaching Learning Strategies
28	My teacher gives me confidence to work on difficult tasks.	Learning Climate
29	My teacher motivates me to think.	Activating Teaching
30	My teacher lets me explain to them how I approached a task/assignment.	Teaching Learning Strategies
31	My teacher pays attention to me.	Activating Teaching
32	My teacher states lesson objectives.	Clarity of Instruction
33	My teacher motivates me.	Activating Teaching
34	My teacher lets me explain the content of a lesson to other students.	Teaching Learning Strategies
35	My teacher makes sure that I do my best.	Activating Teaching
36	My teacher involves me in lessons.	Classroom Management
37	My teacher helps me if I do not understand.	Classroom Management

2.3.3 Student engagement

Student academic engagement was measured using two different instruments: observations and a student questionnaire.

The instrument of observation was used to measure actual student engagement in the classroom. The measure of observed academic engagement was based on a scale developed by van de Grift (2007). Observers rated a scale consisting of three items provided on a 4-points response, ranging from 1 (*predominantly not engaged*) to 4 (*predominantly engaged*). The conceptualization of academic engagement is consistent with that of Fredericks, Blumenfeld, and Paris (2004) with the emphasis on emotional, behavioral, and cognitive engagement (see Table 2.3.5).

Table 2.3.5 Observed student engagement scale

	Nr	The learners …		Examples in the classroom *The learners …*	Obser-ved
Behavioral	1	... are fully engaged in the lesson	1 2 3 4	*... pay attention when instructions are given*	*0 1*
				... participate actively in conversations and discussions	*0 1*
				… ask questions	*0 1*
Emotional	2	… show interest	1 2 3 4	*… actively listen when they are given instructions*	*0 1*
				… show interest by asking follow-up questions	*0 1*
Cognitive	3	... take an active approach to learning	1 2 3 4	*… ask follow-up questions*	*0 1*
				… show that they take responsibility for their own learning process	*0 1*
				… work independently	*0 1*
				… take initiative	*0 1*
				… use their time efficiently	*0 1*

Students' self-reported engagement was measured using an engagement scale developed by Skinner, Kindermann, and Furrer (2009). The engagement scale measures emotional (5 items) and behavioral (5 items) engagement (see Table 2.3.6). Response categories ranged from 1 (Never) to 4 (Often) (see Table 2.3.6).

Table 2.3.6 Self-report student engagement scale

Nr.	In this class …	Engagement scale
1	… I try hard to do well.	Behavior
2	… I work as hard as I can.	Behavior
3	… I participate in class discussions.	Behavior
4	… I pay attention.	Behavior
5	… I listen very carefully.	Behavior
6	… I feel good.	Emotion
7	…I am interested when we work on something.	Emotion
8	… I have fun.	Emotion
9	… I enjoy learning new things.	Emotion
10	… I get involved when we work on something.	Emotion

2.3.4 Personal and contextual variables

Several personal and contextual variables were collected during classroom observations and surveys. Personal variables collected: teacher gender (male vs. female), student gender (boy vs. girl). The contextual variables included: subject taught (natural science vs. social studies and others), grade level (junior vs. senior high school), school type (general vs. vocational), school denomination (public vs. private), class size (small vs. large class size), time of observation (morning vs. afternoon), and school location (urban vs. non-urban).

2.3.5 Translation and back-translation of the instruments

Following International Test Commission (ITC, 2018) guidelines, all instruments were translated from the source language (English) into the target language (Languages used in the participating countries). At least two native target language experts majoring in English as a Foreign Language were involved during this translation phase (Translation; step 1). Furthermore, the translated instruments were double-checked, proofread, and finally back-translated by at least two different independent experts who were qualified and experienced in these languages and knowledgeable about the instrument development and adaptation (Back-translation; step 2). The translated instrument items were checked for their content and the appropriateness of the translation. Concurrently, senior secondary school language teachers reviewed the instruments for the semantic structure (Committee approach; step 3). Through Translation 1 and Back-translation 2, all items of the instruments were independently double-checked with the original source language (English) by university experts and teacher educators. This combination was preferred for maximizing the suitability of the test adaptation and recognizing the differences (i.e., linguistic, cultural, and psychological) and equivalence (Grisay, 2003; van de Vijver & Tanzer, 2004). Based on this process, the instruments are currently available in multiple languages (see Table 2.3.7). Of the seventeen participating countries, not all collected both observation and student survey data due to specific challenges in the local country context (see Sample section).

Table 2.3.7 Observation and student questionnaire versions available in multiple languages

Instrument type	Language version
Observation	Dutch, English, Korean, Bahasa Indonesia, Mandarin, Mongolian, Spanish
Student questionnaire	Dutch, English, Bahasa Indonesia, Mongolian, Maltese, Turkish, Spanish, Mandarin, Korean, Portuguese

2.4 Sample

In Table 2.4.1 an overview of the data collected in each country is tabulated.

Table 2.4.1 Overview of data collection in the participating countries per data type

Country name	Data type		Remark
	Observation	Questionnaire	
1. The Netherlands	Yes	Yes	
2. South Korea	Yes	Yes	
3. Indonesia	Yes	Yes	
4. Türkiye	No	Yes	No resources to collect observation data
5. Spain	Yes	Yes	
6. Hong Kong – China	Yes	No	Collecting student survey is an uncommon practice, highly challenging
7. Malta	No	Yes	Classroom observation is uncommon and highly challenging
8. South Africa	Yes	Yes	
9. UK	Yes	Yes	
10. Norway	No	Yes	No possibility to collect observation data
11. Australia	In progress	In progress	Hampered by the pandemic and school closures
12. The USA	Yes	No	Observation data were available from videoed lessons based on the MET project
13. Mongolia	Yes	Yes	
14. Pakistan	Yes	No	Student surveys could not be carried out due to the pandemic and school closures
15. Brazil	No	Yes	No resources to collect observation data
16. China	No	Yes	No resources to collect observation data
17. Portugal	No	No	No response
18. Nicaragua	Yes	No	Data unavailable due to conflict of interest

Table 2.4.2 Overview of all observation data in the participating countries

Countries	Schools	School denomination			Total number of teachers	Number of teachers per data-wave					Teacher gender			Teacher experience			Subject taught		
		Public	Private	Missing		M1	M2	M3	M4	Total	Male	Female	Missing	Inexpe-rienced	Experi-enced	Missing	Science	Non-science	Missing
The Nether-lands	381	381 (100%)	0	0	1803	1803	1250	729	351	4133	752 (41.7%)	1051 (58.3%)	0	1704 (94.5%)	99 (5.5%)	0	598 (33.2%)	1205 (66.8%)	0
Indonesia	27	10 (37.0%)	6 (22.2%)	11 (40.7%)	512	512	254	74	0	840	195 (38.1%)	317 (61.9%)	0	48 (9.4%)	232 (45.3%)	232 (45.3%)	219 (42.8%)	293 (57.2%)	0
Mongolia	52	48 (92.3%)	4 (7.7%)	0	375	375	375	375	0	1125	56 (14.9%)	319 (85.1%)	0	135 (36.0%)	240 (64.0%)	0	177 (47.2%)	198 (52.8%)	0
South Africa	35	34 (97.1%)	1 (2.9%)	0	316	311	302	0	0	613	154 (48.7%)	162 (51.3%)	0	-	-	316	134 (42.4%)	182 (57.6%)	0
Pakistan	18	18 (100%)	0	0	336	336	336	0	0	672	192 (57.1%)	144 (42.9%)	0	221 (65.8%)	115 (34.2%)	0	162 (48.2%)	174 (51.8%)	0
USA	140	-	-	140	320	320	103	0	0	423	-	-	320	-	-	320	160 (50.0%)	160 (50.0%)	0
The UK	27	27 (100%)	0	0	181	181	115	92	89	477	73 (40.3%)	108 (59.7%)	0	10 (5.5%)	171 (94.5%)	0	83 (45.9%)	98 (54.1%)	0
South Korea	22	13 (59.1%)	9 (40.9%)	0	329	329	0	0	0	329	155 (47.1%)	174 (52.9%)	0	75 (22.8%)	249 (75.7%)	5 (1.5%)	-	-	329
Spain	29	0	20 (69.0%)	9 (31.0%)	114	114	0	0	0	114	38 (33.3%)	76 (66.7%)	0	6 (5.3%)	108 (94.7%)	0	-	-	329
Hong Kong – China	69	-	-	69	247	414	0	0	0	414	-	-	247	-	-	247	107 (43.3%)	140 (56.7%)	0

Note. M1-M4 refer to measurement moments (repeated measures).

Table 2.4.3 Overview of complete student data in the participating countries

Country	Regi-ons	Schools	School type			School denomination			Num-ber of tea-chers	Subject taught			Number of students per data-wave					Student gender			Student age			
			Gene-ral	Voca-tional	Mis-sing	Public	Pri-vate	Mis-sing		Sc	Non-sci	Mis-sing	M1	M2	M3	M4	Total	Male	Fe-male	Mis-sing	M	SD	Min	Max
The Nether-lands	12	480	385	102	0	480 (100%)	0	0	2834	974 (34.4%)	1860 (65.6%)	0 (0.0%)	36137	40999	26668	20392	124196	32336 (26.0%)	34021 (27.4%)	57839 (46.6%)	14.49	1.53	9	25
Indonesia	9	28	25	3	0	20 (71.4%)	8 (28.6%)	0	438	213 (48.6%)	224 (51.1%)	1 (0.0%)	6252	5836	0	0	12068	4933 (41.0%)	7128 (59.0%)	6 (0.0%)	17.09	1.21	12	34
Mongolia	2	54	54	0	0	49 (90.7%)	5 (9.3%)	0	378	181 (47.9%)	197 (52.1%)	0 (0.0%)	10285	0	0	0	9646	4447 (46.1%)	4901 (50.8%)	298 (3.1%)	13.73	1.44	10	19
South Africa	3	11	11	0	0	11 (100%)	0	0	318	135 (42.5%)	181 (56.9%)	2 (0.6%)	12193	4693	3511	9	20419	8977 (44.0%)	11176 (54.7%)	266 (1.3%)	15.55	1.55	12	18
South Korea	-	26	24	2	0	17 (65.4%)	9 (34.6%)	0	344	140 (40.7%)	204 (59.3%)	0 (0.0%)	7117	0	0	0	7117	3035 (42.6%)	4061 (57.1%)	21 (0.3%)	15.39	1.52	12	18
Türkiye	2	24	22	2	0	24 (100%)	0	0	446	179 (40.1%)	246 (55.2%)	21 (4.7%)	12036	0	0	0	12036	5186 (43.1%)	6544 (54.4%)	306 (2.5%)	16.53	1.20	14	21
The UK	-	14	14	0	0	12 (85.7%)	2 (14.3%)	0	57	34 (59.6%)	23 (40.4%)	0 (0.0%)	1195	0	0	0	1252	616 (49.2%)	636 (50.8%)	0	13.43	0.88	12	15
Brazil	4	11	11	0	0	3 (27.3%)	8 (72.7%)	0	17	6 (35.3%)	11 (64.7%)	0	281	0	0	0	281	120 (42.7%)	131 (52.2%)	30 (10.7%)	14.6	1.95	11	19
China	2	21	21	0	0	21 (100%)	0	0	148	64 (43.0%)	65 (44.1%)	19 (12.9%)	2981	0	0	0	2981	1521 (51.0%)	1460 (49.0%)	0	16.37	2.02	12	20
Malta	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	345	0	0	0	345	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Norway	1	1	n/a	n/a	n/a	132 (100%)	0	0	8	n/a	n/a	n/a	132	0	0	0	132	66 (50.0%)	65 (49.2%)	1 (0.8%)	16.67	0.58	16	18
Spain	3	51	26* (acade-mic)	0 (vocatio-nal)	25 (combin-ed)	33 (64.7%)	18 (35.3%)	0	271	81 (29.9%)	190 (70.1%)	0 (0.0%)	4935	0	0	0	4935	2467 (50.0%)	2400 (48.6%)	68 (1.4%)	16.14	2.07	13	52

Note. M1-M4 refer to measurement moments (repeated measures).

2.4.1 Sample information of each country

The Netherlands

General information. Schools were selected from lower to upper secondary general education including general vocational education. All schools were public. Student age ranged from 12-18 years. Data was collected in the period of March-April 2015 and March-April 2016. Schools were approached with project information and were requested to join the project including collection of lesson observations and student questionnaires. We offered three workshops to schools: one workshop to train teachers to observe using the ICALT instrument and two workshops to stimulate the development of Differentiated Instruction practices (September 2015, September 2016). Student surveys were collected in two ways: via paper-pencil questionnaires, or digital (web application or Qualtrics survey program) in the absence of another teacher at all times. All teacher and student participation was voluntary. Since September 2016, remuneration was provided to participating teachers.

Sample representativeness. The Netherlands is a small country, in the mid-north-western part of Europe. The country is divided into 25 educational regions. The percentages of schools per region of the national sample as well as the sample for this project can be found in Table 2.4.4.

Table 2.4.4 Distribution of schools (across Dutch educational regions in percentages)

Educational region	National distribution (%)	Sample distribution (%)
1	2.8	2.4
2	1.1	**
3	4.6	2.4
4	1.7	4.7*
5	4.6	4.7
6	3.1	11.2*
7	2.0	4.1
8	1.8	1.8
9	2.8	0.9
10	4.8	6.5
11	3.2	5.9
12	3.8	2.7
13	6.3	4.7
14	3.4	5.6
15	14.4	6.2**
16	9.8	20.1*
17	8.6	8.9
18	2.5	1.2
19	2.5	0.6
20	4.1	0.6
21	1.7	2.7
22	4.6	1.2
23	1.1	0.9
24	0.8	**
25	4.1	**

The project sample is overrepresented in regions marked with * and underrepresented in regions marked with **. By using demographic statistics of the Dutch national sample of secondary schools, we can compare the representativeness of our project sample (see Table 2.4.5).

Table 2.4.5 Demographic information on the Dutch education and the project sample

		All secondary schools in the Netherlands	Dutch Sample
Number of teachers		73,900[a]	339 (0,5%)
Percentage female		46.7% [a]	54%[8]
Schools[b]		655	135
Percentage of students per school	fewer than 1,000 students	38.2%	8.3%
	1,000-2,000 students	32.7%	31.6%
	2,000-3,000 students	18.6%	29.2%
	more than 3,000 students	10.6%	31.0%
Percentage of teaching qualification	qualified	88.2%[c]	97%
	appointable	6.2% [c]	
	not qualified	5.6% [c]	
Percentage of school with specific denomination	public (*openbare scholen*)	28.7%	33.6%
	catholic	23.9%	25.4%
	protestant/christian/evangelical/ reformed	29.9%	26.0%
	free schools (ABscholen)	15.3%	13.3%
	other	2.1%	1.8%
Percentage of urbanization	1 (most)	22.7%	20.4%
	2	30.5%	28.3%
	3	20.9%	26.3%
	4	19.6%	23.3%
	5 (least)	5.1%	0.9%
	Missing	1.2%	0.9%
Percentage of Social economic status (SES)	4th (lowest)	25.9%	28.6%
percentiles	3rd	19.9%	20.4%
	2nd	23.7%	24.3%
	1st (highest)	30.6%	26.7%

Note. a Data from 2013. Source: OCW (Ministerie van Onderwijs, Cultuur en Wetenschap, 2014).
b Data from 2014. Source: data from Dienst Uitvoering Onderwijs (DUO).
c Data from 2014. Source: IPTO-bevoegdheden en vakken in het VO (Fontein, Prüfer, de Vos & Vloet, 2016; p. 36).
d Data from 2014. Source: Statistics Netherlands
very urban: 2,500 or more addresses per km^2;
urban: 1 ,500-2,500 addresses per km^2;
suburban: 1,000-1,500 addresses per km^2;
rural: 500-1,000 addresses per km^2;
very rural: fewer than 500 addresses per km^2

8 13.6% is missing.

From Table 2.4.5 we can conclude that the project sample has an overrepresentation of larger schools and an underrepresentation of smaller schools. The percentage of teaching qualifications is higher than that of the national sample. The level of urbanization of the project sample does not differ greatly from the national sample. Only slightly less "very rural schools" are found in the sample compared to the national sample. The level of SES does not seem to be disproportional in the project sample compared to the national sample.

Table 2.4.6, the teacher age distribution, reveals that the project sample has an overrepresentation of teachers under the age of 30 compared to the national sample.

Table 2.4.6 Age distribution of Dutch teachers (OECD, 2016c) compared to our sample

National sample	< 30 years	30-39 years	40-49 years	50-59 years	≥ 60 years
Teachers in Lower secondary education	14%	23%	21%	29%	12%
Teachers in Upper secondary education	9 %	19%	21%	36%	15%
Project sample	51%	29%	13%	7%	0%

South Korea

General information. The Korean team collaborated with master teachers in the South Korean project. Master teachers in Korea are highly experienced teachers (> 25 years of teaching experience). Between 2014 and 2021, a total of 98 master teachers were trained to become observers. They agreed to conduct classroom observations and to particpate in national project seminars. The team received funding from the Korea Research Fund for three years, from November 2017 to October 2020, three events (2016, 2017, 2018) were funded by the Daejeon Metropolitan Board of Education and one (2017) by the Chungbuk Board of Education. Contracted observers aquired voluntary teachers who were willing to open up their classrooms and be observed. Observers actively participated in the project and received a small fee for observations and to attended regular and irregular training seminars for the project. In addition to this, a number of voluteer teachers, student teachers and other interested researchers, attended several training seminars and applied the Differentiated Instruction scheme for their self-designed classroom observation and coaching.

A total of 1,541 lower secondary (grades 7-9) and 985 upper secondary (grades 10-12) classroom teachers were observed. The Korean team collaborated with the Mongolian team and Nicaraguan Ministry of Education to support the project in these two countries.

Sample representativeness. Table 2.4.7 shows the total size of the teacher sample that was observed, by school level and gender. Most teachers were from urban schools in Daejeon City and some other areas, and from public schools.

Table 2.4.7 Sample of teachers observed in South Korea (from 2014 to 2021)

	Total	male	female	m %	f %
lower secondary	1,541	514	1,020	33.4	66.2
upper secondary	985	534	427	54.2	43.4

Table 2.4.8 shows general information about the Korean educational system: number of schools, students, and teachers. School size and pupil-teacher ratio are also presented. The project sample counts 0.87 % of the total number of teachers. Gender rate by school level compared with national average as follows 66.2 : 70.5, and 43.4 : 54.8 for lower and upper secondary education respectively.

Table 2.4.8 School size and teachers by gender in Korea
Source: Korean Education Statistics Service (http://kess.kedi.re.kr)

	Schools	Students	School size	Teachers	Female teachers	f %
total	11,710	5,346,874	457	433,284	297,163	68.6
lower secondary	3,223	1,315,846	408	111,894	78,844	70.5
upper secondary	2,367	1,337,312	565	132,104	72,386	54.8

Indonesia

General information. Researchers contacted school principals to participate in the study and asked teachers' permission to observe their classrooms. Schools were recruited to participate in the project on a voluntary basis. An agreement between the researcher and the school was made before conducting observations and surveying students in school. Upon official agreement to participate, observations were conducted throughout the school year on an appointment basis. Thirteen trained observers were involved in data collection. Students of the observed teachers filled out the student survey after completion of the lesson. A non-probabilistic convenience sampling method was employed.

Sample representativeness. An overview of general senior secondary school (gsss) in Indonesia by the Ministry of Education and Culture for 2019/2020 shows that within the total number of secondary schools (senior high schools), a number of 6,883 public schools

(49.36%) and 7,061 private schools (50.64%) are found. In total, a number of 3,638,280 (73.11%) students attend public schools and is 1,337,847 (26.89%) students go to private schools. The number of teachers certified undergraduate and less Grad. Prog is 24,174 (77.78%) in public schools, and 6,907 (22.22%) in private schools is. In public schools, 198,757 teachers (71.43%) are certified S1 / Grad. Prog. & Above vs. is 79,512 teachers (28.57%) in private schools.

A total of 24 secondary schools (vocational schools and senior high schools) distributed across thirteen provinces in Indonesia participated. More than 400 teachers took part in the project. However, due to attrition not all teachers delivered data. In year 1 of data collection (2015), 303 teachers were observed. In year 2 (2016), 335 teachers were observed. In year 3 (2018), 357 teachers were observed. The teacher sample came from varied socioeconomic areas and different sub ethnicities such as Sundanese, Javanese, Betawi, Lampung, Banten, Makassar, Dayak, Malay, and Aceh. The sample consisted of 89.7% of teachers from public schools, and the remaining teachers worked at private schools. The demographic distribution of the sample is as follows: 27.5% of schools were outside Java, 38.7% taught science related subjects (STEM), 41.6% were male teachers, 79.5% were experienced teachers and 85.6% had large class sizes.

A total of 6,410 students participated in the survey. The percentage of missing cases is very low (< 0.5%); the response rate was very high. Voverage of the observation and surveys includes thirteen provinces, including Java, Sumatra, Sulawesi, and Borneo Islands. Of the total sample, 60.1% were female students, 12.5% attended vocational schools, and 16.2% attended private schools. Students varied in terms of ethnic background, including Sundanese, Javanese, Betawi, Bantens, Malay, Dayak, and Acehnese, among others. The majority of the students (72.4 %) were taught by their teachers for about one school year, while the remaining were educated by the same teacher for more than one school year. Nearly half of the sample (43.4 %) consisted of students from the first grade of senior high school, and the remaining were in the second and third grades (higher grades of secondary education).

Türkiye

General information. The data collection targeted a population sample of the general upper secondary level (Grades 9-12, ages 15-18/19) of public schools in Türkiye. Before the data collection process started, permission from relevant authorities in the western part of the country was obtained. After permission was obtained, all schools were contacted and invited to participate in the study, providing that at least twenty teachers with one class of students would be willing to get involved. Schools with less than twenty classes (8-19 classrooms) were also invited but in those cases, all teachers were asked to participate on a voluntary basis. For each teacher, one class was randomly selected. Both teachers' and students' participation was voluntary, and they were informed that their responses would remain confidential, and their answers would be treated anonymously. Also, all participants were aware that that they could exempt themselves at any stage from the study and ask to have their data withdrawn from the study. All questionnaires were answered in class groups during a class hour session with no teacher being present during survey completion. Throughout the study, students, teachers, and schools were randomly selected and participated on a voluntary basis.

Sample representativeness. The data collection in Türkiye targeted general upper secondary level public schools. The sample consisted of 12,036 students and their 446 teachers (446 classes) from 24 schools. More than half of the students (N = 6,544, 54.40%) were female, while 306 students (2.5 %) did not report their gender. According to Ministry of Education (MEB) statistics (2017), of the total number of 1,537,036 students, 832,587 is female (54.17 %) in general public upper secondary schools. Therefore, the student gender distribution of the sample is considered representative for the country.

The distribution of student grades was as follows: 4,248 (35. 3%) were in ninth grade, 3,470 (28.8 %) in tenth grade, 2905 (24.1%) in eleventh grade and 1413 (11.7%) in twelfth grade. In Türkiye, schools and students are intensively preparing for the Central Examination for the University entrance exam, something which especially affects students' participation in the last two years (Grades 11-12). Distribution of students to subjects varied from school to school. Generally speaking, the distribution by subject was: 4,784 students (39.7%) were on the science track (biology, chemistry, physic, mathematics); 4,259 students (35.4%) on the language track (i.e., Turkish, English, German) 2,567 students (21.3%) on social sciences; 176 students (1.5%) on physical education; and 220 students (1.8%) on the music/art track.

Of 446 teachers, 239 teachers (53.6%) were female and 205 (46.0%) male, 2 teachers did not report their gender. The percentage of female teachers is slightly higher compared to the national secondary school female teachers' population of 49.14% (Ministry of Education, MEB 2017). Regarding teachers' experience, the large majority of participating teachers were in the profession for more than fifteen years (290 teachers, 65%), followed by teachers with six to fifteen years teaching experience (98 teachers, 22 %). A relatively small group of teachers had less than three years (13 teachers, 2.9%) or three to five years experience (14 teachers, 3.1%). 31 Teachers did not report the amount of experience. According to the Ministry of Education (2017), 52.7% of current teachers have less than ten years of teaching experience, 39.2% have 11 to 25 years of experience and 8.1% have more than 25 years of experience. The percentage of senior teachers in the present sample was therefore higher than the national average. All teachers had graduated or certified to teach in secondary education. Class size varied from 7 to 39 students, with an average of 26.29 students (SD = 6.31, mode = 33 students).

Schools were located at city centers (7995, 66.4%) and rural areas (4041 students, 33.6%), and participated in the study with their 8 to 29 classrooms. They were accessible to students from various socio-economic backgrounds. Until recently, 8th graders (the last grade of upper secondary school) took a high school entrance exam named TEOG (Temel Öğretim-den Ortaöğretime Geçiş Sistemi). This exam was updated with structural changes on March 2018 and in application by the 2018-2019 academic year (Ministry of Education, MEB, 2018). However, data collection was completed before these changes took place.

Spain

General information. The research team contacted the head teachers of schools, giving a brief presentation on the project and informing them about its objectives. After this initial contact, most of these schools passed the information to their teachers in order to see how many of them wanted to participate. Once teachers and principals approved to the collaboration, the research team negotiated the date and method of data collection. In some schools, the research team had to gather the information in person. In other cases, the questionnaires were passed on to the schools, for master teachers to be observed, and data to be collected a few days later. Any student who did not want to participate could leave the classroom, and a few did. All teachers and students participated on a voluntary basis. Convenience sampling was employed.

Sample representativeness. Data collection was organized in two phases. In the first phase, samples were collected from both public and private schools from Galicia, Asturias (sample majority) and Andalucía, three different Spanish Autonomous Communities. The initial intention of the research team was to use the probability proportional to size (PPS) sampling technique, as this procedure is highly appropriate when sampling units are very different in size, ensuring that all have the same probability of inclusion, regardless of size. Despite this preliminary plan, we had to use a non-probabilistic convenience sampling, due to the reticence found in schools.

According to several economic and industrial studies, the region of the Principality of Asturias is divided into eight geographic zones: Eo-Navia, Narcea, Avilés, Oviedo, Gijón, Caudal, Nalón and Oriente. Taking these zones into account, we tried to opt for schools from each of the mentioned areas and to consider simultaneously the school denomination (public/private schools) and the kind of tracks they provide (vocational, general, vocational, and general). Data collected from Galicia and Andalucía were used to complete the required number of questionnaires (400 teachers with at least one of their groups of students). The total amount of centers in Asturias was 39; 11 schools in Andalucía and 6 in Galicia.

In the second phase (also called observation phase), classroom observations were conducted in Asturias, due to the need of the research team and observers to attend the schools (part of the observations have been made by the ASOCED Research team and others by trained observers – all of which secondary and vocational education and training teachers in Asturias). The observations were representative of different areas and school ownerships.

The participants were 7,114 students taught by 410 teachers attending 56 public and private schools in Spain. A total of 3,577 of the sample were boys (51%), and 3,415 were girls (49%). A total of 122 students did not report their gender. Just under three quarters of the students (n = 5,112; 71.9%) were in lower secondary education (this secondary educational level comprises four years and is aimed at students aged 12-16 years), 1,105 students (15.5%) were in upper secondary education (last two years of secondary school, 16 to 18 year old students) and 897 students (12.6%) were in vocational education and training (one or two years, for students over 16 years old). A total of 3,183 students (44.7%) attended academic schools, 205 (2.9%) attended vocational schools and 3,726 (52.4%) attended schools which had both academic and vocational programs (multi-track). A total of 4,702 students (66.1%) went to public schools whereas 2,412 (33.9%) attended private schools. Teachers were classified into four categories according to their teaching experience: less than 10 years = less experienced (*M* = 6 years); 11-20 years of experience = moderately experienced (*M* = 16); 21-30 years of experience = very experienced (*M* = 26 years) and teachers with more than 30 years of teaching experience = extremely experienced (*M* = 35 years).

Table 2.4.11 Description of the Spanish student sample

		Galicia		Andalucía		Asturias	
Students' Gender	*Male*	56	42.4%	563	48.3%	2958	51.9%
	Female	76	57.6%	602	51.7%	2737	48.1%
School Denomination	*Public*	41	30.6%	1,084	91.6%	3,577	61.7%
	Private	93	69.4%	99	8.4%	2,220	38.3%
School Type	*Academic*	93	69.4%	303	25.6%	2,787	48.1%
	Academic and Vocational	41	30.6%	880	74.4%	205	3.5%
Educational Level	*Lower Secondary Education*	113	84.3%	757	64.0%	4,242	73.2%
	Higher Secondary Education			138	11.7%	967	16.7%
	VET	21	15.7%	288	24.3%	588	10.1%
Subjects	*Alpha (Languages)*	78	58.2%	465	39.3%	1,516	26.2%
	Beta (Exact and applied sciences)	26	19.4%	161	13.6%	1,771	30.6%
	Gamma (Social sciences)	9	6.7%	137	11.6%	1,503	25.9%
	Physical education			122	10.3%	293	5.1%
	Artistic education					132	2.3%
	Others (VET)	21	15.7%	288	24.3%	582	10.0%

For the observations, participants consisted of 344 teachers in 56 public and private schools in the Principality of Asturias (Spain). All were recruited based on voluntary participation in the study. Almost two-thirds of the teachers (214; 62.2%) were women, 130 (37.8%) were men. 215 teachers (62.5%) taught in lower secondary education, 66 (19.2%) in upper secondary education, and 63 (18.3%) in vocational education and training.

About a quarter (25.9%) taught languages, a quarter (25%) taught science and applied science, 18.3% taught social sciences, 17.4% taught vocational education and training subjects, 8.7% taught cultural and artistic education and 4.7% taught physical education. Focusing on the type of school, 259 (75.29%) teachers worked at public and 85 (24.71%) at private schools. Regarding geographic zones, in the case of public schools: 155 (59.8%) were urban, 28 (10.8%) suburban and 76 (29.3%) rural. Regarding private schools: 83 were urban (97.6%) and 2 rural (2.4%)

Teaching experience ranged from less than five years ($n = 34$) to over 30 years ($n = 42$). 215 Teachers (62.5%) taught in lower secondary education, 66 (19.2%) in upper secondary education, and 63 (18.3%) in vocational education and training. Teachers worked in classes ranging in size from 2 to 35 students, with a mean of 15.9 and a standard deviation of 6.4. Interesting internal differences in class size were found in the different educational stages: lower secondary education ($M = 17.6$; $sd = 5.9$); upper secondary education ($M = 15.5$; $sd = 7$); and vocational education and training ($M = 10.9$; $sd = 4.9$).

Table 2.4.12 Description of the sample of observed teachers in the Principality of Asturias

		Galicia		Andalucía		Asturias	
Teachers' Gender	*Male*	3	37.5%	33	51.6%	130	38.5%
	Female	5	62.5%	31	48.4%	208	61.5%
Mean Age			46		49.22		47.70
Years of experience Mean		Between 10-19 years		Between 20-29 years		Between 10-19 years	
School Denomination	*Public*	3	37.5%	64	100.0%	216	63.9%
	Private	5	62.5%			122	36.1%
School Type	*Academic*	5	62.5%	16	25.0%	168	49.7%
	Vocational			1	1.6%	16	4.7%
	Academic and Vocational	3	37.5%	47	73.4%	154	45.6%
Educational Level	*Lower Secondary Education*	6	75.0%	37	57.8%	242	71.6%
	Higher Secondary Education			7	10.9%	52	15.4%
	VET	2	25.0%	20	31.3%	44	13.0%

Table 2.4.12 continued

		Galicia		Andalucía		Asturias	
Subjects	*Alpha (Languages)*	4	50.0%	20	31.3%	90	26.6%
	Beta (Exact and Applied Sciences)	1	12.5%	10	15.6%	96	28.4%
	Gamma (Social Sciences)	1	12.5%	7	10.9%	85	25.1%
	Physical Education			7	10.9%	16	4.7%
	Artistic Education					7	2.1%
	Others (VET)	2	25.0%	20	31.3%	44	13.0%
Average of Students in classroom		19		17		18	
Average of Students in classroom by gender	*Male*	4		8		9	
	Female	5		9		7	
Mean Age in classroom		18.38		19.73		17.80	

Hong Kong – China

The data from Hong Kong – China was derived from the existing TEGO project of The Education University of Hong Kong. More information will follow.

Malta

General information. Malta only participated in the student survey. Participation in classroom observations is highly difficult in Malta. It is not very common for teachers to open the doors to their classrooms for external observers. Research permissions from the Research and Development Department within the Ministry for Education must be attained. Meeting with the principals of the colleges in Malta and Gozo were conducted to explain the scope of the study and to invite them to participate. Two different colleges were targeted for data collection. Teachers were invited to participate on a voluntary basis. The surveys in Malta were administered online.

Sample representativeness. The student questionnaire was distributed to 400 teachers/classrooms. The students of those 400 teachers were asked fill out the questionnaire. This is a representative sample in Malta, considering there are around 6,700 teachers in all schools at all levels in compulsory education. The participants are from state Middle Schools and range from 11- to 13year-olds.

South Africa

General information. Secondary-school teachers (N = 424) of 27 public schools situated in the Gauteng Province of South Africa were voluntarily observed by trained student teachers.

The observed participants included male (49.5%) and female (50.5%) secondary-school teachers with a diverse teaching experience, ranging from less than five years (21%) to over thirty years (5%). With regards to the teaching subject, 45% of the teachers taught science subjects (i.e., mathematics, physical sciences and life sciences), and the remaining 55% taught non-science subjects (i.e., languages, geography, computer application, economics, accounting, business studies, life orientation, and economics and management sciences). Permission to conduct the study in selected schools was granted by the Gauteng Department of Education and the schools' principals. Because the data were collected by student teachers as observers instead of experienced teachers, these data were not included in this report.

For the second observation, 4 observers (qualified teachers) were trained by Groningen experts before they observed the 314 teachers in 34 schools located in three provinces of South Africa (KwaZulu Natal, Mpumalanga and Gauteng) the third time the same teachers (n = 303) were observed a the second time to detect if any professional development had occurred.

Sample representativeness. The randomly selected public secondary schools embody poverty, a lack of educational opportunity and resources, and overcrowded classrooms (ratio 1:40). The Gauteng Province was selected because it hosts more than 25% (14 million) of the population although it is the smallest of nine provinces, has the highest secondary school completion rate (72%) followed by the Western Cape Province (70%), and is responsible for one third of South Africa's income (Statistics South Africa, 2016). In addition, the Grade 12 final examination results of the Gauteng Province do not deviate significantly from other provinces.

Data was collected in randomly selected public secondary schools (N = 27) of the Gauteng Province in South Africa. The research included secondary school students (N = 4510) of diverse cultures and their teachers (n = 424), who all voluntarily agreed to participate in this study.

The United Kingdom

General information. This study collected data from teachers (N = 209) and pupils (N = 2016) across 27 secondary schools situated in the West Midlands conurbation of the United Kingdom. Data were collected over four years, with a growing number of observations conducted each year as increasing numbers of practitioners wanted to participate in the study. Teacher participants recruited in each year of data collection remained participants in subsequent rounds of observations, with additional teachers recruited yearly. Teacher questionnaires were collected in years two and four from all teachers who were observed, whilst pupil questionnaires were completed in year four only. The number of participants in each data collection round is summarized in Table 2.4.13.

Table 2.4.13 Number of participants in each data collection round

Year	No. of lesson observations	No. of teacher questionnaires returned	No. of pupil questionnaires returned
1	102	-	-
2	102	102	-
3	127	-	-
4	209	209	2016

Lesson observations were conducted by one of four observers. Each observer worked in higher education, had previously worked as either a primary or secondary school teacher and received training in the lesson observation instrument.

Sample representativeness. The study recruited teachers on a voluntary basis, who possessed a range of teaching experience, from newly qualified teachers (first year of teaching) to veteran teachers (31 or more years of experience). Of 209 teachers, 58% were female and 42% male. Data were collected from a variety of subjects (N = 17) from all stages of secondary education, with 59% of subjects being the core subjects in the English National Curriculum (English, math and science). The West Midlands was chosen as a suitable area for data collection as the West Midlands is the largest conurbation in the UK, with the second largest diversity level, according to UK census data. All schools were state-funded. The sample represented a range of geographical locations (28.7% urban, 63.2% sub-urban, 8.1% rural) and slightly over-represented schools with low socio-economic contexts. This is reflected by pupils in the West Midlands slightly underachieving governmental minimum expected standards in English Literature and Mathematics at the age of 16 (59.2% achieve expected standard in English literature (UK = 63.3%), 53.9% achieve expected standard in mathematics (UK = 59.1%)).

Norway

General information. Survey data were collected from 94 students in upper secondary education in one school in the Southeast of Norway. Of these students, 49 (52.1%) were female and 44 (46.8%) male. One of the students did not want to reveal their gender. The average age of students was 16.91 years at the time of data collection. The youngest student was aged 16, the oldest was aged 18. A small group of eight students did not indicate their age. The first two years of upper secondary education were surveyed with the following distribution of students: 53 (56.4%) students in year 1 and 41 (43.6%) students in year 2.

Sample representativeness. The sample for this study was a convenience sample. The sample is considered representative for the population in Norway. In the province in which the school is located, the distribution of attained educational level of the population is similar to that of the whole country, with for example 5.06% obtaining a university level degree vs. 4.84% in the country as a whole. Compared to the whole country (66.2%), a slightly higher percentage of students in this province (71.2%) completes their secondary education within the standard time. A slightly lower percentage drops out of secondary education (7.9% in this province vs. 9.8 for the country as a whole).

Students' participation was voluntary. No identifying information was collected.

Australia

General information. Data in Australia will be collected in the Western part of Australia. A minimum of 400 teachers are planned to be observed, and their students to be surveyed, when schools will be welcoming us again after the pandemic. Observers' training was conducted at the end of 2019. Secondary schools in Western Australia are the target population. Balance proportions of background characteristics will be maintained, if possible. Collecting data in Australia is highly challenging, and the research ethics clearance is a very lengthy process. Convenience sampling method is a possible way to get voluntary responses from teachers and students.

Sample representativeness. Although it is desirable to collect data in the whole of Australia, it is practically impossible to do. The country is large, with very diverse population in education. The small support given by the NRO project through University of Groningen is very modest and will not be sufficient to collect data as desired by the project design. Focusing on Western Australia is more feasible, providing that extra local funding could be obtained. Our first attempt to get local funding was unsuccessful.

The USA

General information. Data from the USA was derived from the Measures of Effective Teaching (MET) project (MET, 2015) which is focused on observing a selection of videoed lessons to be connected to this project. Therefore, only observation data was focused on and student surveys were not feaseable. For this purpose, a total of five observers were trained by the University of Groningen trainer. Instead of observing lessons in classrooms naturalistically, the trained observers observed the selection of videoed classrooms.

Sample representativeness. Because the MET project produced a very large number of videoed lessons, a selection of samples was necessary. For practical reasons, the decision was made to focus on two subjects, mathematics and English. A random selection of 320 videoed lessons (at the teacher level) was made. The sample covered grades 6, 7, 8 and 9, with balanced proportion. Two measurement moments were chosen.

Mongolia

General information. Before data collection started, an official letter and project introduction were sent to the target school principals in order to receive their permission to observe classes. Throughout the project period, three waves of data collection from the same teachers were planned, along with the teacher and student questionnaires. Timings of each data collection wave and the number of teachers and students answering the perspective questionnaires are presented in Table 2.4.14.

Table 2.4.14 Mongolian data collected in three waves

	Observation period	Number of teachers	Number of students
First wave	Dec 2018-Feb 2019	403	10,285
Second wave	Mar 2019-May 2019	403	Student questionnaire not collected
Third wave	Sep 2019-Nov 2019	359	8,542

Sample representativeness. The observed teachers taught 23 different subjects, including 163 lessons of mathematics, ICT and science, 56 of social science, 118 of Mongolian and foreign languages, and 66 of other subjects. Average number of years of teaching experience was 11.15 years (the average number of years of teaching experience of middle school teachers in Mongolia is 10.6, and the percentage of female teachers is 81.8%). Average class size of observed classes was 26.5 students (average class size in Ulaanbaatar is 30.1, and 27.3 nationwide), where 31.5 in government schools excluding ICT and English sub-group lessons (see Table 2.4.15).

Table 2.4.15 Mongolian teacher characteristics

	Percentage of male teachers	Years of experience	Class size
Sample	16.4	11.2	26.5
Government schools (excluding ICT and English sub-groups)	18.2	10.6	31.5

Lesson observations took place between December 2018 and April 2019. A total of 403 teachers (percentage of male teachers 16.4%) from 55 schools were observed (see Table 2.4.16).

Table 2.4.16 Participating schools in Mongolia

Region	School type		Total
	government	private	
Ulaanbaatar	47	5	52
Zavkhan	3	–	3
Total	50	5	55

As shown in Table 2.4.17, 381 teachers were from the capital, and 22 from rural schools of Zavkhan province. 365 Teachers worked at government schools and 38 in private schools, lower secondary Grades 6 to 9.

Table 2.4.17 Number of participating teachers

Region	School type		Total
	government	private	
Ulaanbaatar	343	38	381
Zavkhan	22	–	22
Total	365	38	403

Table 2.4.18 Gender of participating teachers

Gender	School type		Total
	government	private	
Male	57 (9.2)*	9 (13.1)	66 (9.7)
Female	308 (11.7)	29 (8.3)	337 (11.4)
Total	365 (11.3)	38 (9.4)	403 (11.2)
* ( ): teaching experience			

Table 2.4.19 Subject taught by participating teachers

Subject	Number
Science	163
Social	56
Languages	118
Other	66
Total	403

In the first and third wave, student questionnaires were completed by students in class after lesson observations. The number of students by gender is described in Tables 2.4.20 and 2.4.21.

Table 2.4.20 Number of students in the first wave

Region	Gender		Total
	Male	Female	
Ulaanbaatar	4,894	4,789	9,683
Zavkhan	349	253	602
Total	5,243	5,042	10,285

Table 2.4.21 Number of students in the third wave

Region	Gender		Total
	Male	Female	
Ulaanbaatar	3,965	3,983	7,948
Zavkhan	253	341	594
Total	4,218	4,324	8,542

Pakistan

General information. Secondary-school teachers (N = 400) of twenty public schools in the City of Bahawalpur, Punjab Province of Pakistan were observed on a voluntary basis by trained teachers. The observed participants included male (50%) and female (50%) secondary-school teachers with a diverse teaching experience, ranging from under five years to 25 years. The longest term of teaching experience was 15-25 years (27%). With regards to the teaching subject, 32% of teachers taught science subjects (i.e., mathematics, physical sciences, and life sciences), and the remaining 68% taught non-science subjects (i.e., English and Urdu language, Pakistan studies, islamite, home economics, education, political science, geography). Permission to conduct the study in selected schools was granted by the District Education Officer of Bahawalpur and the principals of the relevant schools.

Sample representativeness. The randomly selected public secondary schools in Bahawalpur City, poorly managed in terms of teacher-student interaction (ratio 1:132). Bahawalpur City is a densely populated city in the Punjab province of Pakistan. Data was collected in randomly selected public secondary schools (N = 20) of Bahawalpur City. The study included secondary school students (N = 8,610) of south Punjab cultures and their teachers (N = 400), who all voluntarily agreed to participate in this study. There were twenty trained observers who took the responsibility of data collection.

Brazil

General information. Brazil joined the project in 2020. It was only possible to collect student data. Observation was not feasible, mainly due to the pandemic and funding issues. After approval from both the University of Groningen Ethics committee and the Brazilian ethics committee was obtained, schools were approached from different Brazilian states and invited to participate in the research. The invitation was for three months (March-May 2021). However, most schools did not reply or declined due to the pandemic challenges. In total, fourteen general urban schools from four states participated. The four states included Rio Grande do Sul (one public and six private schools), São Paulo (three public and two private schools), Rio de Janeiro (one private school), and Sergipe (one public school). Of these schools, a total of 340 students and 28 teachers responded to the survey.

Sample representativeness. Convenience sampling was applied. Representativeness of the sample is not met due to the sampling design and low response. Therefore, generalizations to the country or regional levels cannot be made. Of the fourteen schools, ten were private and four were public schools. Of the teachers, twenty were female and eight were male, ranging from 25 to 73 years old. Of the students, 167 were boys, 141 girls, and 32 did not indicate their gender. A total of 256 students were from lower secondary and 135 from upper secondary schools.

China

General information. 2981 Students of 148 teachers from over 22 public secondary schools situated in Beijing and Shanghai voluntarily responded to the online survey on their perceptions of teachers' observed teaching behavior. The survey participants included 1,521 male (51.0%) and 1,460 female students (49.0%), with an average age of 16.37 years old (SD = 2.02). Teachers of these student participants included 87 males (57.6%) and 64 females (42.4%), with diverse teaching experience, ranging from less than five years (21.2%) to five to ten years (21.9%) and over 10 years (57.0%). With regards to the teaching subjects, 41.7% of teachers taught science subjects (i.e., mathematics, physics, chemistry, biology), and the remaining 58.3% taught non-science subjects (i.e., 44.4%: languages, geography, political science and civil education, history; 13.9%: fine arts, music, physical education, psychology, other). Permission to conduct the study in selected schools and with participants was granted by the Teacher Education department of Groningen University. Because there are no regional research ethics bodies in China, permission was obtained from teacher and student participants themselves and the parents/legal representatives of the student participants before conducting the study. All subjects voluntarily participated in the project and received no compensation.

Sample representativeness. Considering the vast territory and teacher/student population ($N_{\text{schools nationwide}}$ = 67,097; $N_{\text{teachers nationawide}}$ = 5,793,900; $N_{\text{students nationwide}}$ = 74,085,400; Chinese Ministry of Education, 2021) with varying personal backgrounds ($\text{Percentage}_{\text{male students}}$ = 50.0%, $\text{Percentage}_{\text{urban students}}$ = 43.11%; $\text{Percentage}_{\text{male teachers}}$ = 43.73%, $\text{Percentage}_{\text{science teachers}}$ = 30.85%) the participants were invited via maximum variation (i.e., demographic backgrounds) and snowball sampling techniques. Specifically, at least one teacher or director from each school will first be contacted via email/WeChat for the voluntary participation of the project and the assistance in inviting more participants in the same schools. Considering the minimal risk, these volunteer communicators were asked to pass along information sheets that contain the project introduction, contact information, consent forms, and links to questionnaires among potential participants to safeguard individuals' privacy. However, so far, participants were predominantly recruited from two major cities in China, which have the best educational and financial resources, leaving teachers and students from rural areas underrepresented. Additionally, female teachers and non-science teachers were also relatively underrepresented compared to the national statistics (see Table 2.4.22 and Table 2.4.23).

Table 2.4.22 Teachers' national demographics in China
Source: Ministry of Education of the People's Republic of China (2021)

		All regular secondary schools in China				Study sample			
		Junior high		Senior high		Junior high		Senior high	
Number of teachers		3,747,429		1,859,242		61		89	
Gender proportion	Female	2,165,951	57.80%	1,017,816	54.74%	21	34.4%	43	48.3%
	Male	1,581,478	42.20%	841,426	45.26%	40	65.6%	46	51.7%
Age proportion	< 25	186,615	4.98%	81,241	4.37%	3	4.9%	1	1.1%
	25-34	1,006,718	26.86%	542,623	29.19%	33	54.1%	51	57.3%
	35-44	1,298,152	34.64%	680,951	36.63%	17	27.8%	26	11.3%
	45-54	1,074,321	28.67%	466,692	25.10%	5	8.2%	7	7.9%
	> 55	181,623	4.85%	87,735	4.72%	3	4.9%	4	4.5%
Subject proportion	Language & literature	660,413	17.62%	283,431	15.24%	12	19.7%	20	22.5%
	Math	637,467	17.01%	279,927	15.06%	20	32.8%	38	42.7%
	Foreign languages	591,984	15.80%	274,176	14.75%	15	24.6%	16	18.0%
	Science	597,812	15.95%	440,179	23.68%	1	1.6%	4	4.5%
	Arts	618,483	16.50%	330,683	17.79%	2	3.3%	1	1.1%
	PE & healthy & art	316,700	8.45%	161,705	8.70%	5	8.2%	4	4.5%
	Other	218,560	5.83%	102,679	5.52%	6	9.8%	6	6.7%
Degree proportion	Graduate	131,646	3.51%	197,002	10.60%	16	26.2%	49	55.1%
	Undergraduate	3,141,892	83.845	1,636,615	88.03%	45	73.8%	28	31.5%
	Associate bachelor	469,255	12.52%	25,257	1.36%	16	26.2%	12	13.5%
	High school graduate	4,496	0.12%	349	0.02%	0	0	0	0

Table 2.4.23 Students' national demographics
Source: Ministry of Education of the People's Republic of China (2021)

		All regular secondary schools in China			
		Junior high		Senior high	
Total		48,271,362		24,143,050	
Gender	Female	22,408,314	46.42%	12,242,772	50.71%
	Male	25,863,048	53.58%	11,900,278	46.42%
Grade	Grade 1	16,394,240	33.96%	8,398,599	34.79%
	Grade 2	16,037,276	33.22%	7,846,454	32.50%
	Grade 3	15,365,613	31.835	7,897,992	32.71%
Rural-urban	Rural	6,504,235	13.47%	828,916	3.43%
	Counties & Towns	23,698,943	49.10%	11,536,825	47.79%
	Urban	18,068,184	37.43%	11,777,309	48.78%

Portugal

No response from any of the participants. No data available.

Hong Kong – China

General information. Hong Kong – China joined the project in connection with their own national project on teaching effectiveness and improvement in primary and secondary education. For this project, classroom practices of Hong Kong and Chinese teachers in major cities near Hong Kong (Shenzhen and Guangzhou) were videotaped. More than 404 lessons conducted by teachers in Hong Kong, Shenzhen and Guangzhou were observed. The Chinese cities that were selected are comparable as they are all highly urbanized. While Hong Kong is a metropolitan city with a hybrid culture of the East and the West, Shenzhen and Guangzhou are the two most economically advanced cities in South China and designated experimental education zones for curriculum reform. Teachers in the two cities have more opportunities to practice classroom innovation. In this report, only data from secondary schools were included. Only observation data are available. Collecting student surveys in Hong Kong is highly challenging. After the first effort, that did not result in satisfactory results, the decision was made to drop the student survey.

Sample representativeness. Purposive sampling which allows the acquisition of a rich body of information was employed. This observation research focused on teacher effectiveness at junior secondary school level. Teachers teaching junior secondary classes generally have more autonomy than those who teach senior classes. Given the limitation of funding, videoed lessons were provided by the schools. The observed classes were core content courses: English, mathematics, Chinese, and general science. Videoed lessons were coded by four trained observers. Observation is the main research instrument used in the data collection, but it is also the most demanding of all research methods, necessitating a great deal of time and training of raters. The observation and rating of lessons are resource-intensive and subject to raters' prejudices.

2.5 Data analysis

Data from each participating country were firstly screened and checked for accuracy. Following the screening, descriptive statistics were derived. To examine the comparability of the measures across countries (validation study, Step 1), reliability analyses and categorical confirmatory factor analysis (CFA) were conducted for each country's data. Next, Categorical Multi Group Confirmatory Factor Analysis (MGCFA) was performed on combined country data (Muthén & Muthén, 2012). This analytic technique allows for analyzing the construct equivalence in different contexts (i.e., across countries) and provides hints regarding how to interpret the construct when (slight) differences emerge between countries.

To investigate the degree of difficulty of differentiation in teaching compared to other teaching quality domains (i.e., Learning Climate, Classroom Management, Clarity of Instruction), latent mean scores of Differentiated Instruction were compared with those of other effective teaching domains (based on scalar equivalence models). To examine the remaining research questions, multilevel modelling and multilevel (growth curve) modelling were performed (Rasbasch et al., 2005; Snijders & Bosker, 2012). This analysis allows to detect significant differences between groups (general level and growth), as well as links between Differentiated Instruction and student engagement, taking into account the hierarchical (and longitudinal) structure of the data.

Chapter 3

Contexts of participating countries

When studying Differentiated Instruction practices across countries, understanding each country's context is important (Van de Vijver & Tanzer, 2004). In this chapter, descriptions of the national contexts in which the research project took place are given, mainly derived from open-source OECD and Nuffic documents, without paraphrasing in all parts of this chapter. We do not claim the intellectual property of the sources used but merely gathered information with desktop research to provide solid open-source information of the countries included in this study, when not delivered by the primary investigators in a country.

3.1 Australia[1]

3.1.1 Socio-political context & implications for teaching/educational policy

Australia does not have a single national education system, but one for each region – Queensland, New South Wales, Victoria, Tasmania, South Australia, and Western Australia, including two territories, the Australian Capital Territory (ACT) and the Northern Territory. Education is compulsory for children aged 6-16. The six states and two territories are responsible for their own education administration and the education in Australia is similar across all six states. The Standing Councils on School Education and Early Childhood and Tertiary Education, Skills, and Employment collaborate with the Council of Australian Governments to develop a shared national policy framework. National agreements define a general idea of education goals through intergovernmental agreements between national and state governments. The majority of planning, structure, and resource decisions, including personnel management, are made by states. Greater autonomy has been granted to all of Australia's schools (71% public and 29% private) since 2003. The official language of teaching is English.

Funding for schools varies depending on whether a school is public or private. Government (public) schools are mostly funded by state and territory governments, while non-government (private) schools receive much less funding from states and territories (28%). Fund-

1 Principal investigator: Rekha Koul. Email: R.Koul@curtin.edu.au.

ing for schools lacks transparency and coherence, which prompts concerns about efficiency and equity in education. Moreover, private schools are getting more popular with students from better socio-economic backgrounds. Formal schooling in Australia is divided into four educational stages – early childhood education (ages four to five), primary education (ages six to eleven), secondary education (ages twelve to eighteen), and tertiary education. Higher education in Australia has a high level of diversity and flexibility and it is divided into two sectors: vocational education and training (VET), which is registered and regulated by the Australian Skills Quality Agency (ASQA), on the one hand, and universities which are registered by the Tertiary Education Quality and Standards Agency (TEQSA, see OCED, 2013) on the other.

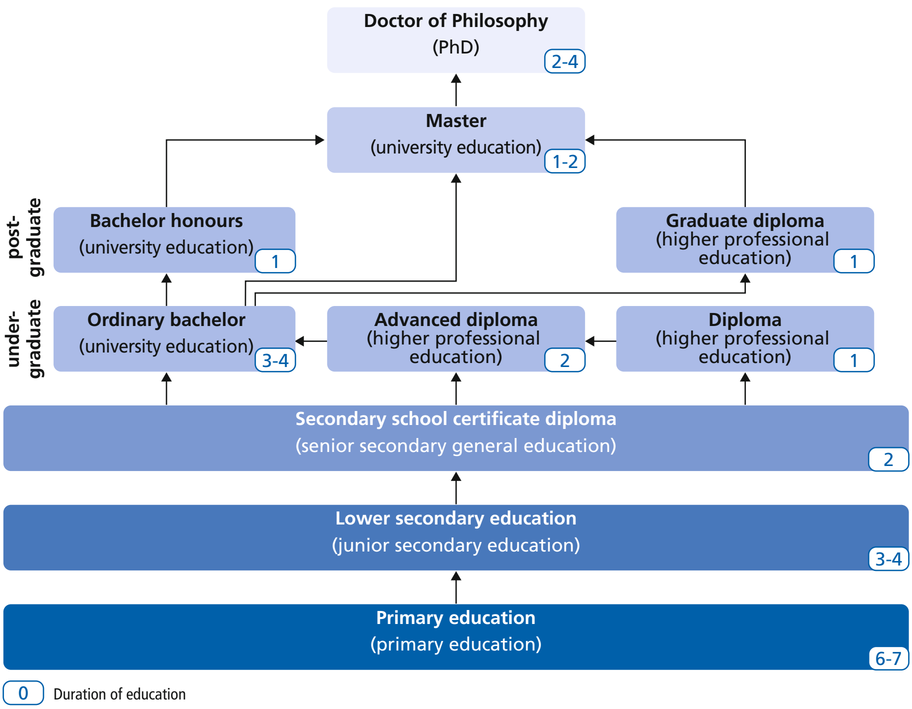

Figure 3.1.1 The education system of Australia
Source: Nuffic (2020)

3.1.2 Current trends in educational policy and practice & regional differences

There are 5 key trends in the Australian educational policy: 1) rising parent engagement, 2) focus on students' wellbeing, 3) preparing students for an unknown future, 4) complexity in education 5) attracting and retaining the emerging generation of teachers. The most important reform – the Australian Curriculum in 2010 – is the first national curriculum. It defines content and achievement standards for the entire country and contains three dimensions: three cross-curricular priorities, seven general capabilities and eight learning areas from foundation to year 10.

3.1.3 The status of teachers & the teaching profession

All teachers of pre-primary education who enter the profession are required to have a bachelor's degree in Australia, as in most other OECD countries. Pre-primary teachers in Australia are well-paid and work fewer hours compared to the OECD average. The age of the teaching workforce is concentrated in the 25–55 year age range. There are relatively few teachers younger than 25 (OECD, 2016a). Most teachers in Australia are female. With regards to job satisfaction, the majority of secondary teachers are satisfied with their job. But most of lower secondary education teachers feel their job is not valued and respected in society even though on average the public respects and trusts teachers. Teachers report high workloads. Ashiedu and Scott-Ladd (2012) reveal that a heavy workload is related to teachers leaving the profession.

Table 3.1.1 A profile of lower secondary teachers in Australia
Source: Teaching and Learning International Survey – Australian Report (Freeman et al., 2014)

Australian teacher profile	
Gender	59.2% of Australian teachers are female. This figure has remained constant since 2008, and is almost 10 percentage points lower than the TALIS average of 68.9%.
Age	The average age of the Australian teacher is 43.4. This is only marginally higher than the TALIS average of 42.9, but the proportion of Australian teachers who are 50 years and above is higher than almost all other countries (37.1%). The proportion of Australian teachers in the age groups below 30 has decreased from 18.2% in 2008 to just 15.7% in 2013. This has significant implications for succession planning.
Employment status	87.4% of Australian teachers are permanently employed and 84.3% work full time. These numbers have remained relatively constant since 2008. Of those teachers who work part time in Australia, 89.9% do so through choice, whilst 10.1% do so as there is no opportunity to work full time.
Level of education	Virtually 100% of the Australian teaching workforce hold a qualification at ISCED level 5A (undergraduate and postgraduate diploma or degree), or above. The TALIS average is 90.9%.
Teacher training components	In Australia, only 62.2% of teachers reported that the content of all subjects they now teach was included in their teacher training programme, whilst 64% reported that the pedagogy of all their subjects was included. These figures are lower than the TALIS averages of 72.5% and 69.6% respectively.
Out of field teaching	In Australia, 7.2% of English teachers have received no formal education or training in this subject, whilst 8.7% of foreign language teachers have received no education or training in their subject area. Figures for out of field mathematics and science teachers are slightly lower at 5.3% and 5.6% respectively.
Teacher preparedness	Across all subject domains, 7.4% of Australian teachers report feeling 'not at all prepared' or 'somewhat prepared' with respect to subject content, whilst 9.4% report feeling underprepared with regard to subject pedagogy. The TALIS averages were 6.8% and 11.1% respectively.

Table 3.1.2 Age distribution of teachers in Australia over time
Source: Teaching and Learning International Survey – Australian Report (2014)

	Percentage of teachers in each age group												Average age	
	Under 25 years		25-29 years		30-39 years		40-49 years		50-59 years		60 years or more			
	%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)
Australia 2008[1]	4.5	(0.5)	13.7	(0.7)	22.6	(1.1)	26.5	(1.0)	28.9	(1.2)	3.8	(0.4)	*	*
Australia 2013	4.2	(0.5)	11.5	(0.9)	22.9	(1.1)	24.3	(1.3)	30.2	(1.5)	6.9	(0.6)	43.4	(0.3)
TALIS Average	1.9	(0.1)	10.0	(0.1)	29.2	(0.2)	28.8	(0.2)	23.8	(0.2)	6.3	(0.1)	42.9	(0.0)
Asian Average	3.0	(0.2)	16.9	(0.4)	31.0	(0.5)	28.5	(0.5)	18.9	(0.5)	1.7	(0.1)	39.8	(0.1)
OECD Average	1.8	(0.1)	9.5	(0.2)	27.4	(0.2)	29.5	(0.2)	25.3	(0.2)	6.5	(0.1)	43.4	(0.1)
PISA Best Average	2.9	(0.2)	13.1	(0.2)	28.6	(0.3)	26.9	(0.3)	23.9	(0.3)	4.6	(0.2)	41.9	(0.1)

1 Australian data from the 2008 cycle are provided for comparison. These data are not used in the calculation of any of the 2013 averages.

3.1.4 Pre-service & in-service education of teachers

Basically, to become a qualified teacher in Australia, one must have a four-year or longer full-time equivalent higher education qualification.

Pre-service

Most Australian universities offer three TE routes: four-year education degrees, three-year degree plus postgraduate diploma year, and concurrent joint degrees. A small number of non-university higher education institutions also offer teacher training, two of which receive Commonwealth operating support. The Batchelor Institute of Indigenous Tertiary Education in the Northern Territory specializes in the education of Indigenous teachers. Generally, formal teacher education includes subject-matter training and pedagogical training, as well as opportunities of practical experience such as practicum and internship.

In-service

Teachers new to lower secondary schools would receive a formal induction (usually of one year) and the scheme 'teacher mentoring programs' is also used to support less-experienced teachers by more-experienced teachers. Most teachers in Australia attend professional development activities such as educational conferences and seminars where teachers and/or researchers present their research results and discuss educational issues, visits to other schools, and qualification programs (e.g., a degree program).

3.1.5 National policies directed toward improving teaching quality

The Australian Professional Standards for Teachers (2013) provides guidance for the quality of teaching across three domains (professional knowledge, professional practice and professional engagement) and four career stages (Graduate, Proficient, Highly Accomplished and Lead). The establishment of the Teacher Education Ministerial Advisory Group (2014) pursues approaches for the preparation of new teachers (OECD, 2015).

3.1.6 Specific, national policies directed toward improving differentiation in teaching

The Aboriginal and Torres Strait Islander Education Action Plan (2010-14) attempts to bridge the gap between Aboriginals and others. The Smarter Schools National Partnership for Low Socio-economic Status School Communities (2008-09 to 2014-15) is a multi-year initiative that focuses on underprivileged children's learning and well-being.

3.1.7 Current international examinations (PISA, TIMSS)

In PISA 2018, Australian pupils outperformed the OECD average in reading and science. However, in mathematics, Australian students did not deviate much from the OECD average. Reading, science, and math mean scores have been dropping since 2000, 2012, and 2003, respectively. In Australia, performance in these three topics was less strongly linked to socioeconomic level than in other OECD countries. In Australia, student competition is common, with over 90% of high-achieving advantaged children anticipated to complete their secondary school.

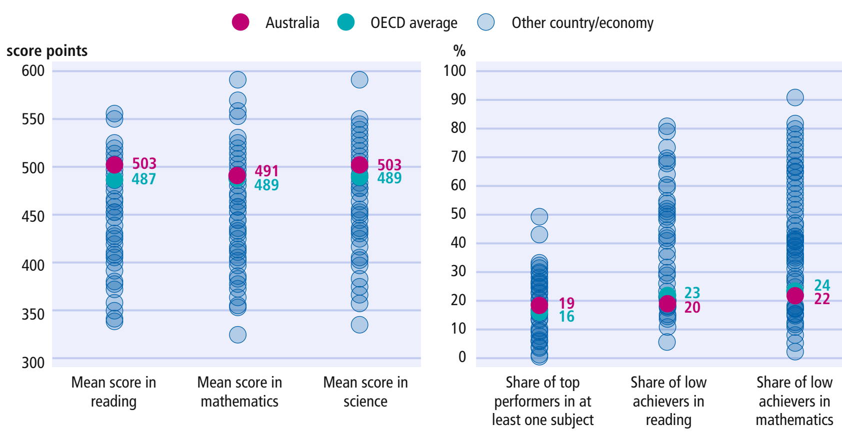

Figure 3.1.2 15-year-old Australian students' performance in reading, mathematics, and science
Source: OECD (2019a)

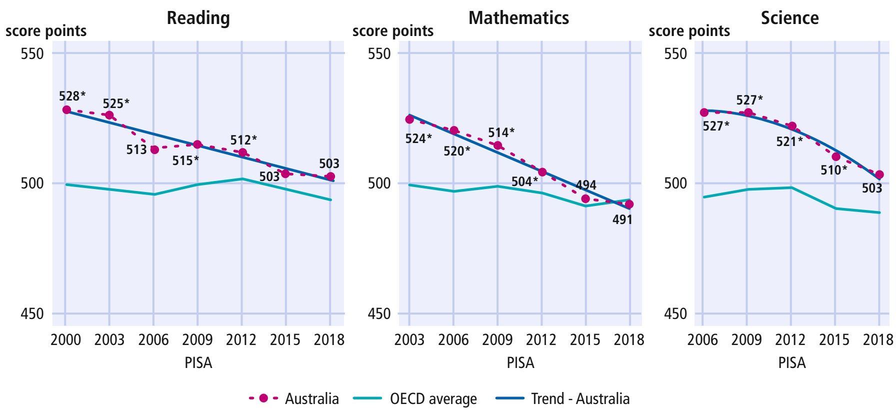

Figure 3.1.3 Trends in performance in reading, mathematics, and science
Source: OECD (2019a)

In TIMSS 2019 report, Australia is among the top ten countries in math and science. The TIMSS 2019 tested Australian students' math and science in year 8 and year 4. Compared to 2015, Australia's mean score increased by 12 points in year 8 math, 16 points in year 8 science and nine points in year 4 science.

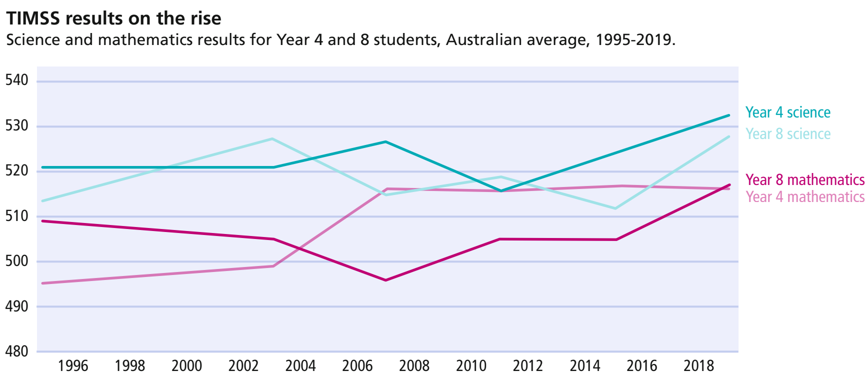

Figure 3.1.4 TIMSS results
Source: Thomson (2020)

3.1.8 Examples of good practices

Australia has lots of sunny days throughout the year. Students are frequently taken outside and have opportunities for incidental learning. As a result, schools and universities tend to have a strong emphasis on physical activity such as adventure camps, and more challenging playground equipment. Physical activity and overall fitness can have a positive effect on mental performance. Therefore, Australian students are educated in an environment where they are encouraged to develop both their minds and bodies.

Almost every school and postsecondary institution in Australia uses a Learning Management System (LMS) such as Blackboard or Moodle to deliver online education. Assessment instructions, learning resources, schedules, and interactive tools are all available in one place for students and teachers. Students submit tasks to the LMS, and teachers provide feedback.

3.2 Brazil[2]

3.2.1 Current national educational system

Brazil is a presidential federative republic. It is the largest country in Latin America and the 5th largest in the world and, according to the Brazilian Institute of Geography and Statistics (IBGE, 2021), the population projection for the year 2021 exceeds 212 million inhabitants. The country is divided into 27 federative units (26 states and the Federal District) and 5,570 municipalities (see Figure 3.2.1).

Figure 3.2.1 Map of Brazil
Source: maps Brazil (2022)

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3.2.2 Socio-political context and implications for teaching/educational policy

Brazil was ruled by a military dictatorship from 1964 to 1985. After the restoration of democracy, the Federal Constitution (CF) of 1988, known as the Citizen Constitution, was proclaimed. According to Article 6 of the CF, the right to education is a social right that must be guaranteed by State and family. Chapter III, Section I of the FC deals exclusively with Brazilian education. Together with the 1996 Law of Directives and Bases of National Education (LDB), it regulates the current Brazilian educational system.

It is the State's duty to guarantee free and compulsory public education for citizens from 4 to 17 years of age, as well as to offer free basic education to adults who have not completed it at the required age (Brazil, 1988, art. 208). According to the CF (art. 206), education will be provided based on the principles of: 1) equal conditions for access and permanence in school, 2) freedom to learn, teach, and research, 3) pluralism of ideas and educational conceptions, and coexistence of public and private educational institutions, 4) gratuity of public education in official establishments, 5) guarantee of quality standards, and 6) guarantee of the right to education and lifelong learning, among others.

As established in the CF and LDB, the Union will apply, annually, never less than 18%, and the states, the Federal District, and the municipalities 25% of the revenue resulting from taxes, for the maintenance and development of education. The percentages invested in education, however, are not sufficient for the realisation of the right to education. According to the data pointed out in 2021 by the National Education Plan (PNE) Observatory, which aims to monitor the agenda guiding educational policies in the country, the twenty goals for Brazilian education, which must be met by the year 2024, have not yet reached their objectives. Table 3.2.1 shows the data obtained for two goals.

Table 3.2.1 Partial Results of the PNE Goals according to the Observation

Goals PNE 2014-2024	Observation Data
Goal 3: Make school attendance universal for the entire population between the ages of 15 and 17 by 2016 and raise, by the end of the period this PNE is in force, the net enrolment rate in secondary education to 85%.	94.5% of 15–17-year-olds were in school in 2020. 75.4% of 15-17-year-olds were attending this stage in 2020.
Goal 16: To train, at the postgraduate level, 50% of teachers in basic education, until the last year of this PNE, and ensure that all basic education professionals receive continuous training in their area of work, considering the needs, demands and contextualization of education systems.	48.1% of Basic Education teachers had postgraduate degrees in 2019. 37.9% of Basic Education teachers had access to continuing education in 2019.
Source: PNE Observatory (2021)	

According to the OECD, in 2018 only 18% of the population aged 25 to 64 in Brazil had completed tertiary education, and 47% had not even finished secondary education. These percentages differ greatly from the OECD average (see Figure 3.2.2).

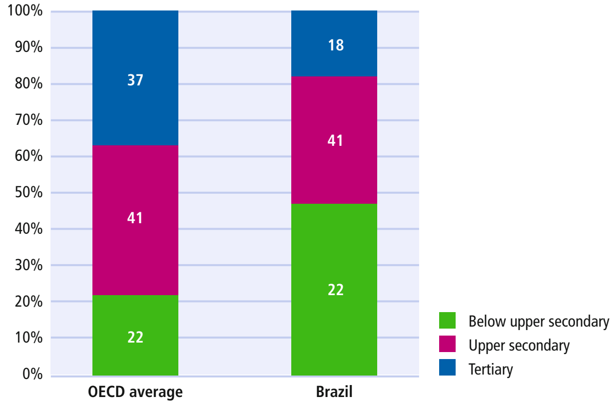

Figure 3.2.2 Education level of 25-64-year-old adults in 2018 (OECD)
Source: OECD (2018a)

3.2.3 Current trends in educational policy and practice & regional differences

The Brazilian Education System is divided into two levels of education, basic and higher education. Basic education comprises three stages: early childhood education (nursery school and pre-school), primary education (1st to 9th grade) and secondary education (1st to 3rd grade) (see Table 3.2.2).

Table 3.2.2 Organization of the Levels of Education
Source: authors based on LDB (Law nº 9394/1996)

Brazilian education	Higher education		
	Basic education	*Ensino médio*	Upper secondary education (3 levels)*
		Ensino fundamental	Lower secondary education (4 levels)*
			Primary education (5 levels)*
		Educação infantil	Pre-school (2 levels)*
			Nursery school (4 levels)
* Mandatory			

Although Brazilian curriculum schools follow the National Common Curriculum Base (BNCC, 2018), the country has large regional differences when it comes to education, especially regarding each state's investment. In relation to teachers' salaries, for example, in 2018 the Ministry of Education stipulated the wage floor at R$ 2,455.35 for a 40-hour work week. Figure 3.2.3 shows the wage floor for each state and the Federal District, with Maranhão being the state with the highest value (R$ 5,751.00) and Rio Grande do Sul with the lowest (R$ 1,298.00), not reaching the established floor.

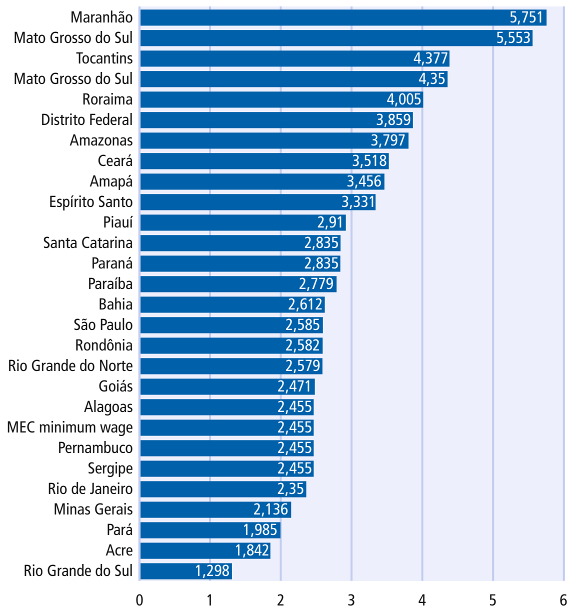

Figure 3.2.3 Teachers' Wage Floors in 2018

3.2.4 The status of teachers and the teaching profession

To teach in Brazil, it is necessary to complete a degree with an average duration of four years. Data from the Census of the National Institute of Educational Studies and Research Anísio Teixeira (INEP) indicated that, in 2018, there were more than 7,000 courses in the country and 1.6 million students enrolled (BRAZIL, 2019), with half of total enrolment being in the Distance Education modality (EAD). After graduating, teachers can work in public (municipal, state, or federal) and private schools, which have different wage floors.

Low salaries, substandard working conditions, and social valorization lead to the low status of the teacher and the teaching profession. However, there are still many young people who intend to become teachers if compared to the OECD average (see Figure 3.2.4).

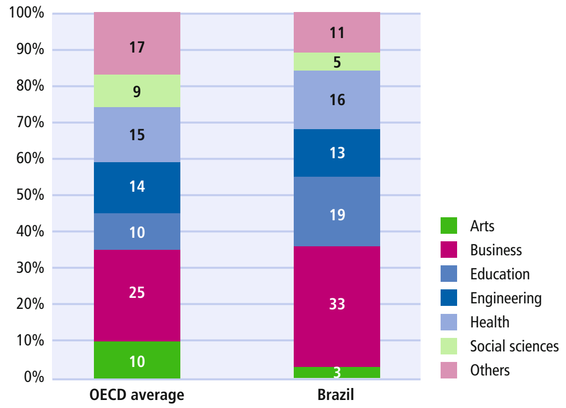

Figure 3.2.4 Tertiary graduates by field in 2018 (OECD)
Source: OECD (2018a)

3.2.5 Pre-service and in-service education of teachers

According to the LDB, specific training and adaptation of competencies and skills are required for teachers of lower and upper secondary education, at the higher level, in a teaching degree course. The curricula of the training courses must include a minimum of 300 hours of teaching practice.

Higher education is offered free of charge by the Federal Government. To enter a course, it is necessary to pass the National High School Exam (ENEM), which has 180 objective questions on mathematics, languages, humanities and natural sciences, and an essay. Besides public universities, students can opt for private universities, which have their own entrance exams.

The Institutional Programme for Teaching Initiation Scholarships (PIBID) enables trainee teachers, already in the first half of the course, to teach in public schools. This is one way to ensure the insertion of the future teacher in the classroom, under the supervision and guidance of tutors. According to the Organization for Economic Cooperation and Development (OECD, 2020), the qualification of teachers is one of the factors that explain the positive performance, or lack thereof, of students, and should receive greater attention from public policies. It is therefore necessary to invest in the initial and further teacher training.

Although the law is clear as to the minimum amount of training and need for further training, the Brazilian reality is far from ideal. According to a report published by the National Education Council (Brazil, 2019), Parecer CNE/CP nº 22/2019, for every 100 teachers in upper secondary education, 29 do not have thetraining required to teach the subjects they are hired to teach; and in lower secondary education, this number rises to almost 38 (see Table 3.2.3).

Table 3.2.3 Proportion of secondary teachers without the appropriate teaching degree in 2018
Source: Ministry of Education of Brazil (2019)

Brazil and Regions	Lower secondary	Upper secondary
Brazil	37.8	29.2
North	50.2	29.5
Northeast	52.9	36.5
Southeast	27.1	26.1
South	23.3	20.8
Central-West	41.9	40.1

3.2.6 National policies directed toward improving teaching quality

Education is a right of all Brazilian citizens, and it is the responsibility of the public authorities (federal, state, or municipal) to guarantee the supply, access, and permanence to education. The extension of compulsory basic education (from the age of 4 to 17) is an indicator that the quality of education is improving, but this does not mean that education has reached a standard of quality in internal and external evaluations.

The quality of education in Brazil is affected by the country's political and socio-economic crises. Each new government is responsible for investing in schools and teachers and for formulating national guidelines and programs. Among numerous educational policies aimed at improving the quality of Brazilian education, the following stand out:

- Program for Innovation and Connected Education – to help schools get connected to the internet, giving teachers access to new educational content and providing students with contact with new educational technologies.
- Accessible School Program –promotes accessibility to didactic and pedagogical resources, and to communication and information in mainstream public schools.
- Fund for the Maintenance and Development of Basic Education and Valorisztion of Educational Professionals (FUNDEB) – a permanent instrument for financing public education through Constitutional Amendment No. 108 of 27th August 2020, regulated by Law No. 14.113 of 25th December 2020.

3.2.7 Specific, national policies directed toward improving Differentiation Instruction

The Brazilian Constitution (Brazil, 1988) guarantees the right to education. Subsequently, in 1994, Brazil, along with other countries, reaffirmed its commitment to Education for All at the World Conference on Special Education Needs in Salamanca. Two years later, by enacting the LDB, it established that students with disabilities should be enrolled preferably in the mainstream education network.

The country advanced in specific national policies aimed at inclusion and, in 2008, published the National Policy of Special Education in Perspective of Inclusive Education (Brazil, 2008), which aims for access, participation, and learning of students with disabilities in mainstream schools, guiding the education systems to promote responses to the educational needs, ensuring: 1) transversality of special education from early childhood education to higher education, 2) specialized educational care, 3) continuity of schooling at higher levels of education, 4) training of teachers for specialized educational care and other education professionals for school inclusion, 5) family and community participation, 6) urban, architectural, furniture and equipment, transportation, communication, and information accessibility, 7) intersectoral articulation in the implementation of public policies.

Another policy that deserves to be highlighted is the Decree No. 6571/2008, incorporated by Decree No. 7611/2011, establishing the public policy of funding under FUNDEB, establishing the double counting of the enrolment of students with disabilities. This Decree also defined the Specialized Educational Assistance (AEE) complementary or supplementary to schooling and the other services of special education, as well as other measures to support school inclusion.

Resolution CNE/CEB, 04/2009 determined the Operational Guidelines for Specialized Education Care in Basic Education, as well as the provision of multipurpose resource rooms or AEE centers in the public network or community institutions, religious or philanthropic non-profit, through agreements with specialized institutions, without prejudice to the inclusive education system.

Despite the country's progress in inclusion policies, it should be noted that inclusion goes beyond enrolling students with disabilities in mainstream schools, it must also address the diverse learning processes. Therefore, in addition to organizing the conditions of access to spaces, eliminating architectural and urban barriers in the building and school transport, ensuring support in hygiene, food, and locomotion activities, it is necessary to ensure pedagogical and communication support, in order to promote learning and valuing the differences of all students.

3.2.8 Current international examinations

Brazil takes part in the Programme for International Student Assessment (PISA), conducted every three years by the OECD. This is an information report on the performance of 15-year-old students. With this, it is possible to compare data collected and relate it to learning and the main factors that influence it, and to formulate educational policies and programs aimed at improving the quality and equity of learning outcomes (INEP/MEC, 2020).

PISA assesses three domains — Reading, mathematics and science. In Brazil, around 600,000 students took part in PISA, representing a portion of the total 32 million students from all countries involved. Brazilian students scored 413 in reading, 384 in mathematics and 404 in science, scores below the OECD average (see Figure 3.2.5).

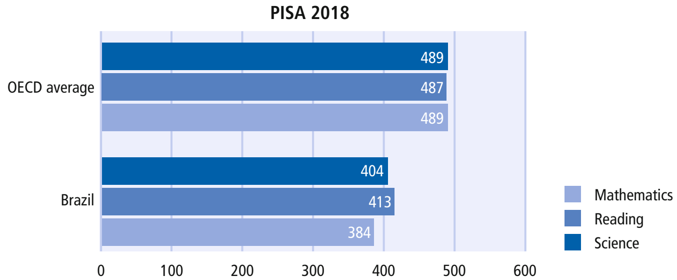

Figure 3.2.5 Brazilian results in PISA 2018
Source: PISA (2018)

3.3 China[3]

3.3.1 Socio-political context & implications for teaching/educational policy

As the largest state-run education system in the world, the Chinese education system has achieved considerable improvements in quality in the past decades due to continuous reforms as well as large-scale investments. Ever since mainland China opened up in the early 1980s, the government has attached great importance to institutional reforms, directing focus to the equal education of diversified personnel and production of the innovative knowledge China demands for its economic, scientific, political, and societal development. In addition to institutional reforms, public spending on education has increased substantially in recent years. Government's spending on education reached its official target, 4% of the GDP, in 2012 and has remained above this figure ever since. Meanwhile, per capita expenditure of Chinese households on education also increased considerably, indicating the general population's raising awareness of the importance of their children's education. However, in general, the educational inequality still exists, especially across both the regions illustrated in Figure 3.3.1 and between rural and urban areas.

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Figure 3.3.1 Regional categorization of Chinese cities
Source: UNICEF (2023)

The *Compulsory Education Law* was enacted in and has been enforced since 1986 (with the current version revised in 2018) to require 9 years of government funded compulsory school attendance, which includes 6 years of primary education (mainstream primary schools, 9-12 schools, external teaching sites, adult primary schools) and 3 years of junior secondary education (regular junior secondary schools, 912 schools, combined secondary schools, vocational junior secondary schools, adult junior secondary schools). The main purpose of compulsory education is to improve social justice and equity, and the quality of the population as a whole. The curriculum of primary education includes subjects such as Chinese, mathematics, English, ethics and rule of law, science, information technology (computer skills), PE, music, and fine arts. The curriculum in junior high school includes several additional subjects, such as history, geography, biology (from 7th grade), physics (from 8th grade), and chemistry (in 9th grade). In March 2021, the Ministry of Education released the primary results of the national education statistics for 2020, which reports that there are 158,000 general primary schools nationwide, with 18,080,900 newly enrolled students and 107,253,500 previously enrolled students. There are 6,434,200 full-time teachers in primary schools. The net enrolment rate of primary school-age children is 99.96%. There are 52,800 junior high school nationwide, with 16,321,000 newly enrolled students, 49,140,900 previously enrolled students, and 3,860,700 full-time teachers.

Senior secondary education

After completing 9 years of compulsory education, students can choose between 3 years of senior high school (including regular senior secondary school, combined secondary school, regular high school, 12-year school, adult high school; all general education) and secondary vocational/technical/regular schooling (regular specialized secondary school, adult specialized secondary school, vocational high school, skilled workers school, other institutions; vocational and professional education). Schooling of students in the former track is mainly focussed on preparation for higher education. Students on this track have to take 3 mandatory exam-oriented courses (i.e., mathematics, Chinese literacy and literature, foreign languages), 5 mandatory non-exam-oriented courses (i.e., physical education, music, fine arts, information technology, general technology), and selective exam-oriented courses (i.e., social sciences: politics, history, geography; and natural sciences: chemistry, physics, biology). In addition to the three mandatory exam-oriented subjects, students are given full autonomy to choose a further three subjects from the other two orientation pools as subjects they will be assessed on during the National Higher Education Entrance Examination (Gaokao). Nevertheless, certain majors at top-ranking Chinese universities do set specific constraints on the selection of Gaokao subjects during enrolment. In 2020, there were 14,297 senior high school nationwide (58.7% of all senior secondary education), with 8,764,400 newly enrolled students (58.3%), 24,944,500 previously enrolled students (60.4%), and 1,933,200 full-time teachers.

Students in the second track are trained to acquire vocational knowledge, skills, and professional ethics necessary for engaging in a specific occupation or in productive labor work. Their curriculum consists of seven public core subjects (i.e., Chinese literacy and literature, mathematics, foreign languages, basic computer application, physical education, mental health, moral education) and specialized professional courses (including professional theory and technical skills). So far, the shift between tracks lacks flexibility. In 2020, there was a total of 10,078 secondary vocational schools nationwide (41.3% of all senior secondary education), with 6,275,600 newly enrolled students, 16,281,400 previously enrolled students, and 849,500 full-time teachers in secondary vocational schools. The state has attached greater importance to vocational education in recent years and has successively issued the "Decision of the State Council on Accelerating the Development of Modern Vocational Education" and "National Vocational Education Reform Implementation Plan".

Higher education

Higher education in China includes state-/province-/city-run institutions providing degree and postgraduate programs (e.g., regular HEIs/universities, independent research institutes), those providing vocational education (e.g., applied/vocational colleges, adult colleges), and non-government HEIs. The second half of the 20th century saw a stage of immature expansion and qualitative change of Chinese higher education. The rapid growth of society's demand for specialized talents and the need for individuals to receive higher education has prompted Chinese higher education from elite education to mass education. In 2020, there were 2,738 regular colleges and universities nationwide. Among them, 1,270 undergraduate colleges (including 21 undergraduate level vocational schools), and 1,468 higher vocational colleges. The total number of enrolments in various forms of higher education was 41.83 million, and the gross enrolment rate of higher education 54.4%. Regular colleges and universities across the country counted 1.83 million full-time teachers.

All major educational tracks available in the Chinese education system are outlined in Figure 3.3.2, with school years and student average age ranges corresponding to the respective education levels.

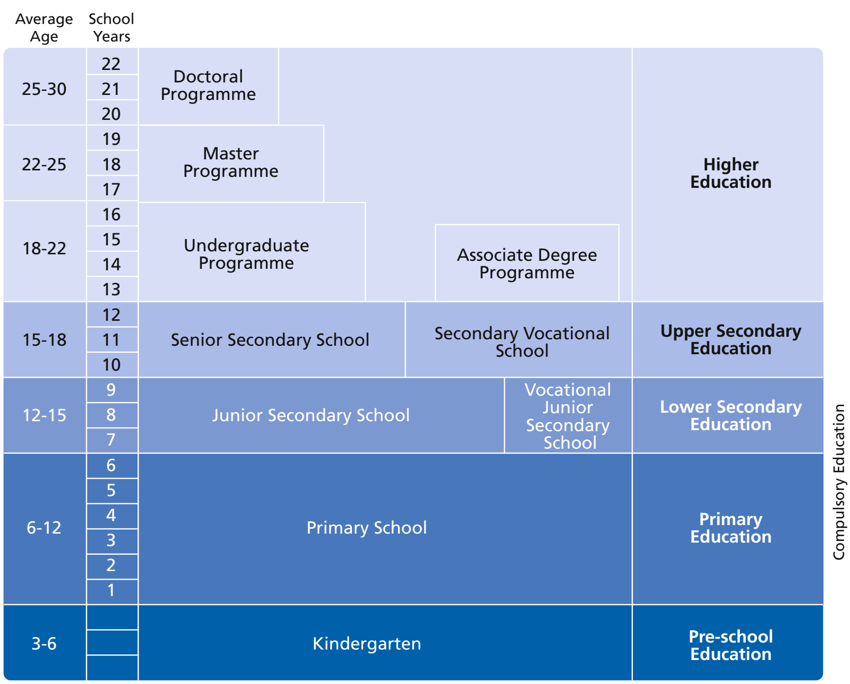

Figure 3.3.2 Chinese educational tracks
Source: National Center for Education Development Research (2018)

3.3.2 Current trends in educational policy and practice & regional differences

The General Office of the State Council recently issued the "Notice on the Implementation of the National Education System Reform Pilot Program". A batch of education reform projects with clear reform objectives and specific policies and measures have completed the filing procedures, marking the full launch of a national education system reform pilot work. This special reform includes 10 major pilot tasks: 1) to accelerate the development of pre-school education, 2) to promote the balanced development of compulsory education, 3) to explore ways to reduce the burden of schoolwork on primary and secondary school students, 4) to reform the talent training models in higher education, 5) to reform the school-running model of colleges and universities, 6) to build a modern university system, 7) to reform the school-running models of vocational education, 8) to improve the development environment of private education, 9) to improve the teacher management system, and 10) to improve the educational investment mechanism. Three of these are about general education, three about higher education, and four on vocational/private education and education management.

Compulsory education

As noted in the *Compulsory Education Law*, the 9-year compulsory education "implements the national education policy and strives to improve the quality of the whole nation". Its object and focus are all people, not some or a few people, and it emphasizes the cultivation of basic qualities, not the cultivation of professions or certain specialized talents. For this purpose, an education reform has been in the process of being implemented since 2014 to gradually replace the screening examination with "division/nearby enrollment"/"roll of a dice enrollment" (i.e., county-level education administrative departments either allocates students residing in specific communities to nearby primary schools and the counterpart junior high schools or randomly locate students to regional schools by using the "fair banding" lottery system).

In addition, the transition from "examination-oriented education" to "quality education" is also being implemented. It mainly aims at cultivating children's creativity, meta-cognitive skills, social morality, and appreciation for aesthetics, lifelong learning, and labouring, as well as developing a comprehensive philosophy of the world and human life. Specifically, schools of all levels and types place great emphasis on promoting moral education under the guidance of Marxism-Leninism, Mao Zedong Thought, Deng Xiaoping Theory, and the important thoughts of the *Three Represents*. Education in patriotism, collectivism, and socialism is carried out in a targeted manner, along with the education of "the excellent cultural and revolutionary traditions of the Chinese nation", of modern Chinese history and basic national conditions, and of domestic and foreign democracy and legal systems.

Senior secondary education

The "Decision on the Reform of the Education System" proclaimed in 1985 proposed a policy of "adjusting the structure of secondary education", that is, expanding the proportion of vocational education in secondary education levels and reducing the amount of general education. The country hoped to reduce the pressure of entering higher education through the diversion of students. Since the export of vocational education is direct employment, general and vocational secondary education have evolved into a "dual track system" of advancement education and employment education. Such a reform had some practical effects. However, with the popularization of China's 9-year compulsory education and the increase in the number of people in secondary education, the competition within general education has become more intense. Therefore, in 1999, the strategic decision of "largely expanding enrollment in colleges and universities" was made and implemented.

During the expansion, new challenges occurred. To ensure and promote educational equity, the "Decision of the Central Committee of the Communist Party of China on Several Major Issues of Comprehensively Deepening Reform" was made in 2014 to explore 1) the relative separation of enrollment and examination, 2) multiple selections of student exams, 3) autonomous enrollment of schools in accordance with the law and government's macro management, and 4) social participation and supervision, so as to fundamentally solve the shortcomings of a determining-lifelong exam. In 2019, 8 provinces and cities (including Hebei, Liaoning, Jiangsu, Fujian, Hubei, Hunan, Guangdong, and Chongqing) trialed the new model of "3+1+2" college entrance exam. In 2020, the new national college enrollment system is generally established. The old "one-in-a-lifetime" exam as the only enrollment criteria is being replaced by the comprehensive evaluation and multiple admission mechanism based on both Gaokao and high school level academic proficiency tests. Additionally, the number of Gaokao subjects are reduced and the orientation constraint is removed. Students are no longer forced to choose subjects from only one orientation (science or arts) in Gaokao. Exams on foreign languages become socialized and can be taken multiple times a year (with the highest score recorded).

Higher education

In recent years, to promote education equity and inclusiveness, the quality-based categorization of higher institutes (1st/2nd/3rd level) is gradually replaced by "key undergraduate universities" ("world-class universities and first-class disciplines") and "general undergraduate universities". No difference in quality is expected between the two groups. The former focus on theoretical research, while the latter focus on implementing theories into practice. Besides, the government is also vigorously developing higher vocational education to cultivate a large number of technical application talents with certain theoretical knowledge and strong practical ability. Great efforts are being made to 1) infiltrate higher vocational education with general education and entrepreneurial education, 2) organically combine pre-employment and post-employment education in the vocational education system to create a complete continuum of lifelong education, and 3) strengthen international cooperation and openness. In addition, a trial transfer of credits among regular universities, colleges, vocational colleges, and adult colleges is promoted to broaden life-long learning channels.

Despite the general improvement of the educational system in China, deeply rooted regional differences remain to be one of its major characteristics, as reflected in Figure 3.3.3. This is mainly the result of 1) the large population and rapid expansion of student population in all stages of education and 2) China's previous decision to allocate education spending according to excellence and designate a certain group of institutions as world class within a short period of time. Although education reforms implemented in the past decades have largely improved education equity across the country, regional differences of general and higher educational institutions still exist due to the gap of financial support and teaching supplies, particularly between rural and urban areas, as well as between the western and eastern (coastal) regions. The COVID-19 pandemic may also increase China's rural-urban education gap. Only 50% of students in rural regions have had undisrupted access to online classes, with one-third of those students being completely cut off from learning. On the other hand, only 5.7% of urban students have had zero access. The issue of households lacking computers and stable internet connections is a problem that hits rural children the hardest. For example, 40% of students in urban regions own a computer, compared to only 7.3% of students in villages.

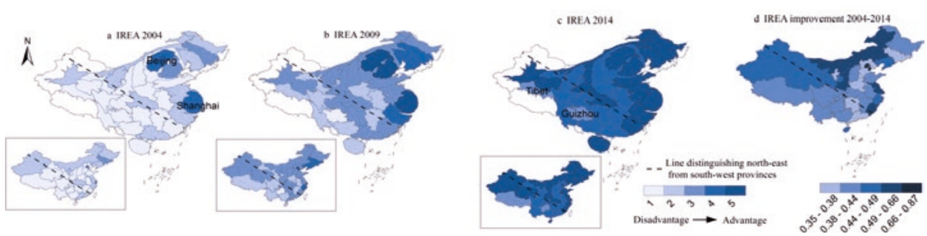

Figure 3.3.3 Index of regional Education Advantages (IREA) quintile distribution by provincial level units, 2004, 2009, and 2014
Source: Xiang et al. (2020)

3.3.3 The status of teachers & the teaching profession

The past decade has shown a nation-wide increase of teacher population at all educational levels (see CEIC, 2021). Currently, the teaching force of China consists of 17.9 million people working at various levels of the education system (especially primary schools), teaching 230 million students (see Figure 3.3.4). However, in poor and remote rural areas, the number of teachers keeps decreasing (see Li et al., 2020). The quality of schools and kindergartens is still constantly undermined by teacher shortage and attrition. The challenge of maintaining and enhancing teacher quality in the context of regional and urban-rural disparities is formidable for the teacher education sector, which is trying to find feasible ways to meet official and public expectations. As an area of professional work, teaching has been transformed by the injection of new knowledge and the alteration of pedagogical orientation to emphasize the all-round development of students. There are policies to rotate teachers between urban and rural schools to tackle the problems of quality disparities in the teaching force, and the practice of deploying auxiliary teacher educators in schools is designed to assure teaching quality. Reform of teacher education and teaching has mainly been driven by official policies that were imposed from above. As teachers at all educational levels are engaged in a new round of reforms, an examination of the implementation of policies in certain important areas of teacher education and teaching should benefit their further development.

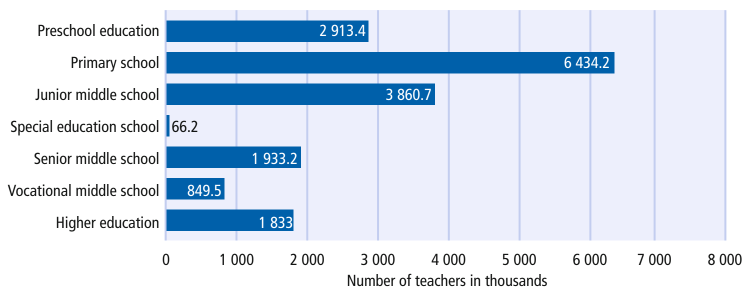

Figure 3.3.4 Number of full-time teachers in China in 2020
Source: Statista (2021)

3.3.4 Pre- & in-service teacher education and national policy to improve teaching quality

The reforms of teacher education and teaching have led to a structural transformation of the fields, such as system openness, expansion of learning opportunities, reorientation of curriculum and teaching, and other noteworthy changes. In general, the reforms have raised overall qualifications of teachers, established professional standards and formal procedures for teacher certification and registration, and diversified the mode of course delivery. It is argued that, as a project in progress, teacher education will be strengthened by further refinement of measures for accountability and a more equitable distribution of learning opportunities among urban and rural teachers.

Pre-service teachers

As a field of professional education, pre-serivce teacher education in China has addressed quality and relevance issues that are delineated in state policy directives. The re-emergence of tuition-free pre-service teacher education, the introduction of "master teacher studios" as a form of professional development, and the initiation of overseas study to instil a global outlook among pre-service teachers are measures taken to improve the overall quality of the teaching force through teacher education. Futhermore, to promote regional balance and education equity, factors such as financial incentives, institutional prestige of course providers, and promises of guaranteed employment attract student teachers to pre-service education programs targeting disadvantageous regions (especially in rural areas). However, the institutions have fallen short of cultivating positive perceptions of rural education among candidate teachers, as their preference for employment in urban schools remained prevalent.

In-service teachers

Chinese in-service teachers are continuously provided with professional learning and development opportunities, such as the school-level induction arrangement, mentor-apprenticeships, master teacher studios (organized by well-known teachers of all subjects to inpire teachers who strive for pedagogical excellence), and a system of continuous professional development. In addition, the Teacher Rotation Policy, a major policy initiative, is also being implemented in some rural and urban counties, aiming at narrowing the teacher quality gap by rotating "high quality" teachers to teach in hard-to-staff rural schools for certain periods of time. However, regardless of the substantial resources and efforts invested in nationwide in-service teacher training and management, outcomes remain uncertain. Regional and urban-rural disparities demand both a sufficient and balanced supply of competent teachers and maintenance of a healthy educational ecology nationwide.

3.3.5 Specific, national policies directed toward improving differentiation in teaching

The idea of Differentiated Instruction (yincaishijiao, 因材施教) is long embedded in the philosophy of Confucianism and the conception of Chinese educators. Offering student-centered education that is well-accommodated to students' characteristics and needs in regular primary and secondary classrooms has been a key element in recent curriculum reform. Over the past decades, several educational policies have been initiated in China to improve education equity and quality by encouraging Differentiated Instruction that taps into students' potential (Lou, 2018). For example, in 2019 the initiative "Opinions on Deepening

Education and Teaching Reform and Comprehensively Improving the Quality of Compulsory Education" was propoed: "To extensively promote and apply excellent teaching results, guide schools to focus on heuristic, interactive, and inquiry-based teaching; to focus on teaching students in accordance with their aptitude, accurately analyze student learning, and to conduct differentiated teaching and individualized guidance; to establish a support system for students who have learning difficulties and for students who have spare capacity for learning should expand their learning space."

Ahead of the trend, Hua introduced the concept of Differentiated Instruction to China in 2000. The proposal was to contextualize differentiation in the setting of Chinese primary and secondary education under the guideline of Education Fairness policies (Shi & Hua, 2007). Considering 1) the large class-sizes and the increasing diversity of students due to China's internal migration in the process of urbanization in eastern coastal and central urban areas, and 2) shortages in and the turnover of the teaching force in disadvantageous areas, keeping a balance between learning progress and differentiation is always challenging. Accordingly, to promote the implementation of Differentiated Instruction and to assist teachers in overcoming these challenges, policies were made on 1) initiating the rotation and exchange of teachers across regions, 2) improving living and working conditions of teachers working in disadvantageous regions, 3) underpinning the training of Differentiated Instruction in both pre-serivce teacher education and in-service professional development, and 4) clarifying the assessment of teachers and schools on the all-round formative development of students rather than merely examination-based scores and graduation rates.

3.3.6 Country report on current international examinations (PISA, TIMSS)

Chinese students from Beijing, Shanghai, Jiangsu, and Zhejiang reached the highest scores in the 2018 PISA assessment, and more and more Chinese universities entered global rankings of the best universities in the world. However, considerable disparities still exist between elite institutions in urban centers and average countryside schools.

Only Shanghai was selected as representative of China in PISA 2009 and 2012, which ranked at the top in all three domains tested. In 2015, students from Shanghai and three more regions (i.e., Beijing, Jiangsu, and Guangzhou), together called B-S-J-G China, were measured and ranked 10th. In PISA 2018, Chinese students regained the number 1 spot after Guangdong province was replaced by Zhejiang. As illustrated in Figure 3.3.5, B-S-J-Z students performed significantly better than the average of OECD on all three subjects. About 49% were among the top performers in at least one subject, compared to the OECD average of 16%. And only 2-5% of Chinese students fell into the group of low achievers compared to the OECD average of 24%.

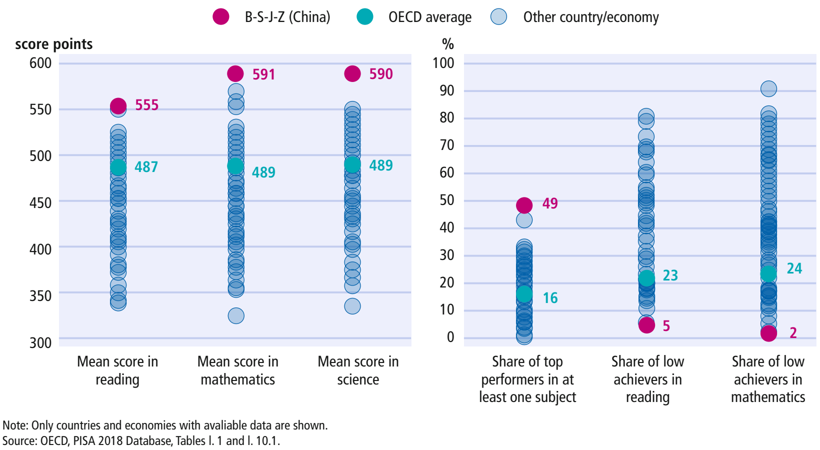

Figure 3.3.5 Snapshots of performance in reading, mathematics, and science
Source: PISA (2018)

Although Chinese students from the representative regions were found to outperform those in other countries in PISA 2018, it is questioned whether this result could be generalized into China's student population as a whole. B-S-J-G cities/provinces are all in eastern coastal regions with advantageous financial and educational resources. Given that students' socioeconomic background is closely associated with their academic performance (PISA, 2018), PISA-2018 results are very likely to overestimate the academic excellence of the general student population of China. Furthermore, as shown in Figure 3.3.6, despite the excellence of B-S-J-G students, their learning productivity is relatively low, ranked 14th from the bottom. And the comparatively heavier academic burden seems to lower their satisfaction in life, making their perceived life satisfaction 8th from the bottom of the list.

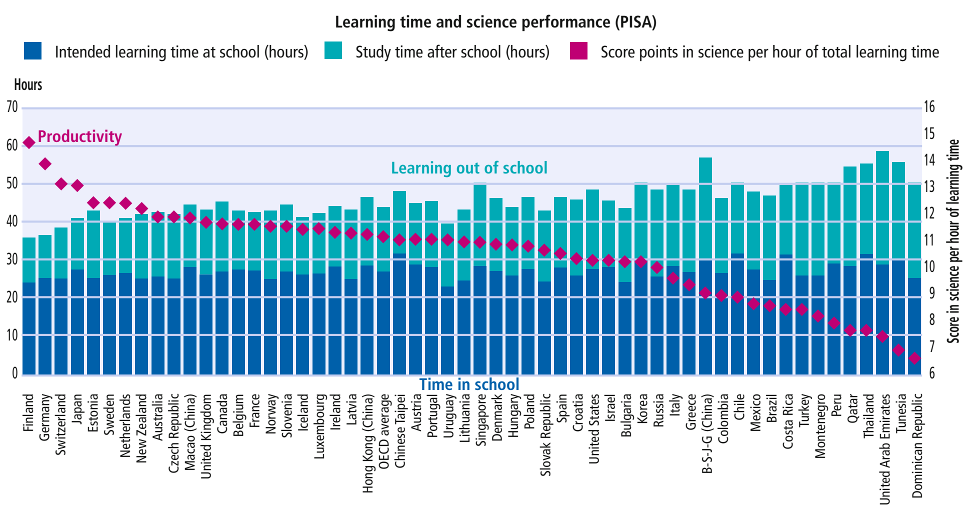

Figure 3.3.6 Learning time and science performance of different countries
Source: PISA (2018)

3.4 The United Kingdom[4]

3.4.1 Socio-political context & implications for teaching/educational policy

In the United Kingdom, education policy is specified for four different countries (England, Northern Ireland, Scotland, and Wales). Governance systems of each country differ from one another, but some features are similar. Policies are generally outlined within each of the four countries and aim to give schools and teachers a more prominent role. We mainly focus on England for contextual information for this report.

In each country of the United Kingdom, you will find five stages of education: early years, primary, secondary, further education, and higher education. For Early Years Education, the government publishes its policy, all 3-4-year-olds continue to be entitled to 15 hours of free early childhood education, which has been extended to disadvantaged 2-year-olds. Meanwhile, compulsory education covers age 5-18, including primary education (key stages 1-2) and secondary education (key stages 3-5). Further Education is non-compulsory and covers non-advanced education which can be taken at further education colleges (including tertiary) and Higher Education institutions (HEIs).

The basic school curriculum consists of the national curriculum, religious education, and sexual education. Unlike public schools, academies and private schools aren't required to follow a national curriculum (GOV.UK, 2014). The new national curriculum framework was published in September 2013 and implemented from September 2014. Likewise, in vocational education and training, England has set the new national strategy Rigour and Responsiveness in Skills (2013) to support the vocational education and adult training system, which offers a broad and complex qualifications' framework.

Ofsted (Office for Standards in Education, Children Services and Skills) conducts school evaluations. Two government departments are in charge of the education system: the Department for Education, which sets education standards and regulations, and the Department for Business, Innovation and Skills, which runs tertiary education. School funding is public for local authority schools; free schools and academies are not part of the local authority but have greater autonomy in areas such as staffing and curriculum (Roberts & Danechi, 2019).

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See Figure 3.4.1 for a visual representation of the educational settings of England, Wales and Northern Ireland.

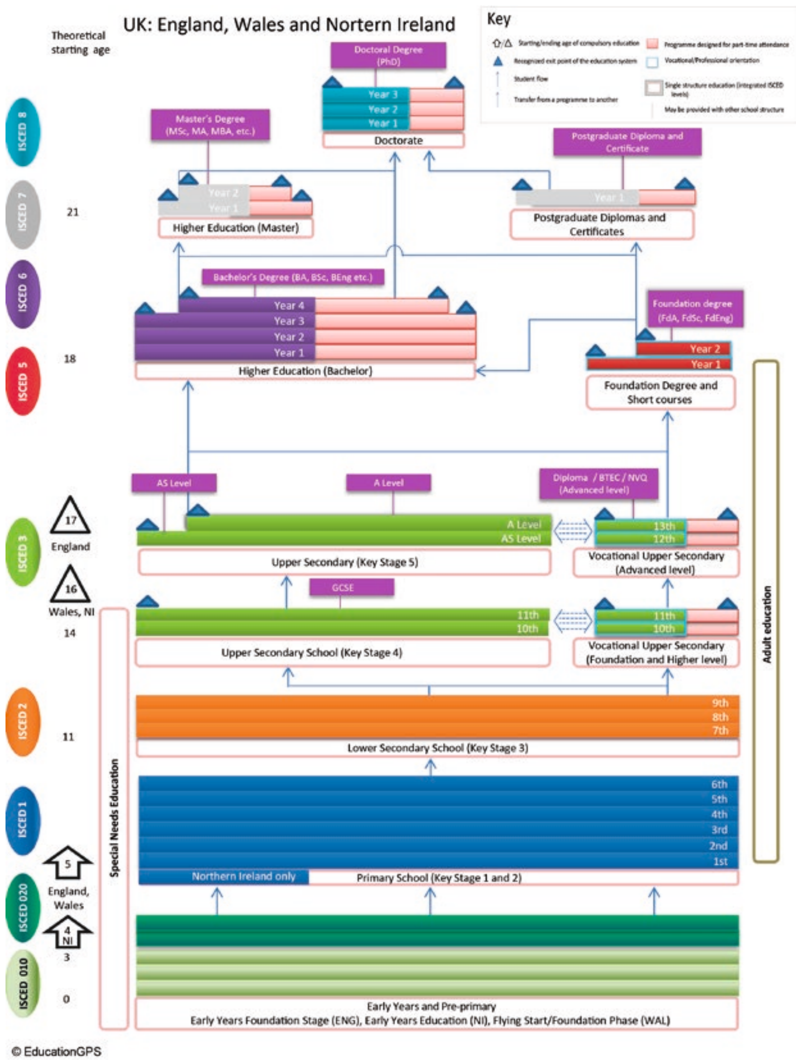

Figure 3.4.1 Structure of the education system in England, Wales and Northern Ireland
Source: OECD (2015b)

3.4.2 Current trends in educational policy and practice & regional differences

The Outcome Delivery Plan 2021-2022, published by the Department for Education on July15th 2021, replaces the Single departmental plan as guiding policy for education reform in England. The current policy focuses on "building back better" after coronavirus, rather than the previous emphasis on providing world-class education and training for all regardless of background. The plan sets out four priority outcomes, which are boosting economic growth, raising educational standards, supporting vulnerable groups through high-quality local services, and providing high-quality early education and childcare. The main strategies are as follows:

- Enhancing technical and higher technical education to meet the needs of the job market, driving the growth of apprenticeships, and giving adults and young people ample opportunity for re-education and retraining.
- Providing funding and support for schools to improve the quality of teaching and leadership in all areas. Support children to catch up on learning lost through COVID-19 disruptions.
- Improving the efficiency and effectiveness of local public services for children and young people, addressing the barriers that prevent vulnerable and disadvantaged children and young people, increasing participation and involvement in education and training, and creating safe and loving homes.
- Maintaining an adequate supply of local childcare markets and increasing the proportion of children who reach the expected level in all areas by the age of 5 so that every child can succeed (GOV.UK, 2021).

3.4.3 The status of teachers & the teaching profession

According to a survey on teacher status by the University of Cambridge, teaching in the UK is an attractive career. Considering different perceptions of teachers, associated groups and the general public, the status of the profession of teacher presents a positive view in terms of two factors: *reward and respect*, and *control and regulation* (Hargreaves et al., 2007). Teachers in the United Kingdom are well paid compared to other OECD countries (OECD, 2015b). At the same time, the media's positive images of teachers also contribute to the status of teachers.

A global survey of 19,587 participants from 28 countries run by the non-profit organization Ipsos on professional trust can also attest to this. Results show that teaching is the third most trustworthy occupation (see Figure 3.4.2).

	TOT	ARG	AUS	BEL	BRA	CAN	CHN	FRA	GB	GER	HUN	IND	ITA	JAP	KOR	KSA	MEX	POL	RSA	RUS	SPA	SWE	TUR	USA
Scientists	60%	74%	62%	56%	53%	58%	63%	59%	62%	52%	58%	67%	67%	40%	42%	53%	72%	59%	50%	76%	67%	56%	70%	55%
Doctors	56%	68%	69%	64%	48%	63%	56%	62%	67%	51%	38%	49%	60%	39%	28%	52%	68%	45%	64%	49%	69%	56%	61%	60%
Teachers	52%	61%	60%	51%	57%	57%	62%	48%	58%	39%	48%	63%	47%	18%	27%	48%	58%	44%	54%	72%	56%	44%	59%	61%
Members of the Armed Forces	43%	32%	58%	36%	39%	56%	72%	55%	52%	24%	39%	70%	47%	35%	18%	-	40%	35%	29%	55%	39%	39%	35%	60%
The Police	38%	26%	56%	44%	31%	52%	80%	53%	47%	49%	31%	33%	50%	33%	21%	-	11%	36%	12%	20%	45%	49%	39%	48%
Ordinary men/women	37%	47%	42%	37%	32%	37%	45%	35%	37%	32%	23%	49%	35%	18%	22%	45%	45%	44%	33%	64%	43%	26%	26%	42%
Judges	32%	12%	44%	38%	26%	40%	65%	36%	43%	41%	24%	42%	29%	31%	15%	-	18%	28%	33%	24%	23%	43%	32%	39%
Lawyers	25%	18%	22%	21%	20%	20%	53%	28%	26%	25%	16%	25%	20%	28%	14%	34%	17%	31%	21%	36%	23%	33%	23%	15%
Television news readers	24%	18%	22%	30%	18%	26%	50%	20%	30%	35%	14%	29%	17%	17%	17%	35%	17%	22%	31%	15%	19%	31%	13%	18%
Pollsters	23%	8%	24%	24%	23%	24%	28%	35%	26%	20%	15%	38%	15%	18%	13%	40%	9%	13%	21%	27%	22%	27%	31%	34%
Civil Servants	23%	25%	9%	21%	24%	16%	45%	35%	11%	26%	20%	23%	29%	10%	14%	39%	36%	23%	13%	39%	22%	19%	23%	14%
Business leaders	22%	18%	17%	23%	20%	19%	46%	26%	16%	13%	12%	34%	21%	15%	12%	40%	35%	21%	30%	21%	12%	19%	19%	19%
Journalists	21%	17%	23%	16%	25%	23%	33%	14%	24%	17%	18%	27%	16%	18%	24%	-	19%	17%	31%	37%	7%	28%	15%	32%
Clergy/priests	21%	17%	17%	22%	21%	29%	48%	19%	15%	23%	13%	28%	19%	11%	13%	31%	27%	22%	23%	27%	15%	16%	12%	23%
Bankers	20%	14%	13%	13%	13%	22%	43%	13%	13%	12%	8%	38%	13%	16%	23%	45%	23%	18%	28%	20%	7%	23%	23%	20%
Advertising executives	13%	16%	8%	7%	17%	10%	30%	10%	9%	9%	4%	22%	12%	8%	10%	31%	22%	10%	14%	9%	11%	6%	17%	12%
Government Ministers	12%	8%	12%	9%	10%	13%	50%	10%	11%	11%	8%	21%	15%	10%	12%	-	9%	13%	5%	10%	8%	22%	23%	11%
Politicians generally	9%	5%	10%	9%	8%	10%	22%	8%	11%	9%	5%	17%	8%	7%	8%	-	6%	5%	6%	10%	7%	11%	11%	9%

Figure 3.4.2 Trustworthy professions
Source: Ipsos (2019)

Put differently, it is because of the high recognition of the teaching profession in the UK that a large proportion of young people are willing to engage. It has the highest proportion of teachers under 30 among OECD countries (OECD, 2015b), which could make the career more dynamic and promising. But in recent years, faculty recruitment has failed to meet the rising number of students, and there has been a high rate of attrition due to long working hours and stress. According to the OECD survey, teachers in the UK work longer hours than in other European countries.

3.4.4 Pre-service & in-service education of teachers

Each of the four countries in the UK has its own independent teacher certification and training department, but the steps to becoming a teacher are virtually the same. Firstly, you must have a bachelor's degree, either in an education-related or unrelated field, refering to *concurrent model* or *consecutive model*. Secondly you must apply for certification with the relevant authorities to become a qualified teacher in order to teach in a maintained school. However, there are two exceptions, 1) academies and free schools and 2) private schools or independent schools outside of the English state school sector. Initial teacher training is mutually recognised in England and Wales, but teachers who have completed initial teacher training in Scotland and Northern Ireland will need to apply for QTS if they intend to teach in England. Pre-service and in-service education of teachers in each country are described in detail next.

England

A variety of routes lead to teaching: consecutive (undergraduate) and concurrent (postgraduate) routes are possibilities, and training can be provided by the school or by a Higher Education Institution (HEI). Each provider determines their own curriculums for initial teacher education. Obtaining Qualified Teacher Status (QTS) and passing a statutory induction period are the main components of becoming a teacher (European Commission, 2018). QTS standards and initial teacher training (ITT) criteria were published in 2013. In maintained schools, the qualification requirements are more comprehensive, namely, the appointment, pay, conditions of employment, working time, professional duties and recruitment processes are regulated by legislation.

Local authorities, school boards, and academy trusts employ teachers. The Chartered College for Teaching recognizes an open application process for specific teaching posts. After becoming a teacher, duties are not limited to teaching but also require the pursuit of continuous professional development (CPD) over the course of their career. CPD needs of each teacher are determined by the individual and their school, in the context of performance management and the school development plan (Roberts & Danechi, 2019). England has also introduced a new model of Teacher Appraisal and Capability (2012) to support teachers' professional development.

3.4.5 National policies directed toward improving teaching quality

All four countries in the UK have realized the significance of high-quality teaching and have taken actions that can be divided into the categories discussed below.

Firstly, the government strives to improve the efficiency and quality of School inspection through effective assessment of schools, so that schools can target improvements. For example, England's new framework for school inspection, released by Ofsted in 2012, focuses on improving the quality of teaching and learning. In addition, policy transfers to put learners at the center, meet their learning needs, and ensure they receive a quality education. For instance, Northern Ireland has also launched the "Every School a Good School" campaign, which aims to ensure that every school in Northern Ireland provides a child-centered education to ensure high quality teaching and learning. The Scottish Government also published the Literacy Action Plan (2010) to improve literacy and building leadership capacity, as well as The Literacy and Numeracy Framework (2013) in Wales. Moreover, it is to improve the quality of teaching by improving the profession of teachers. "Teaching Scotland's Future" (2011) aims to improve teaching conditions and teachers' education.

3.4.6 Specific, national policies directed toward improving differentiation in teaching

In the UK, policies at the national level to promote Differentiated Instruction are mainly manifested in providing more support to students with special needs and in enhancing more diverse developmental pathways for students with different characteristics and academic performance.

Since 2011, England has embarked on the reform "Support and aspiration", which aimed to provide more choice and improved services for children with special educational needs (SEN). In Northern Ireland, the most critical requirement in teacher training is to have a clear understanding of the needs of all students, including those with SEN. Scotland's long-term education program (Curriculum for Excellence), covering students aged 3-18, aims to improve student outcomes by providing learners with a range of personalized learning experiences and qualifications that meet their individual needs and aspirations (OECD, 2015b). In addition, the Scottish Government implemented a program titled "Opportunity for All" in 2012 which committed to providing a place in study or training for every young person aged 16-19 who was not at that time in employment, education, or training. In Wales, the Additional Learning Needs (ALN) system stems from Additional Learning Needs and Education Tribunal (Wales) Act 2018 ("the Act"), which is a new person-centered system for children and young people aged 0-25 in Wales with ALN that was due to come into force in September 2021 (Gov.wales, 2020).

3.4.7 Current international examinations (PISA, TIMSS)

Based on results of popular international testing studies such as the Programme for International Student Assessment (PISA 2018) developed by the Organization for Economic Cooperation and Development (OECD), across England ($M = 505$), Northern Ireland ($M = 501$), and Scotland ($M = 504$), there were no significant differences in reading scores, and all were significantly above the OECD average ($M = 487$). There was a significant difference in Wales' ($M = 483$) mean reading score compared to the other UK countries, but there was no significant difference from the OECD's average. England's mean scores in science ($M = 507$) and mathematics ($M = 504$) were significantly higher than in other parts of the UK, as well as higher than the average for the OECD ($M_{\text{mathematics}} = 489$; $M_{\text{science}} = 489$). In Scotland ($M_{\text{mathematics}} = 489$; $M_{\text{science}} = 490$), Wales ($M_{\text{mathematics}} = 487$; $M_{\text{science}} = 488$), and Northern Ireland ($M_{\text{mathematics}} = 492$; $M_{\text{science}} = 491$), as well as in the OECD's average, no statistically significant differences were observed. The attainment gap between high and low achievers was largest in England (262 score points) and lowest in Scotland (244 score points). Wales (250) and Northern Ireland (255) lie between the other UK countries.

In reading, PISA scores have remained stable over time, with the only statistically significant change being an increase in reading scores in Scotland (compared with 2015), following a similarly sized decline in 2015 (Department for Education, 2019).

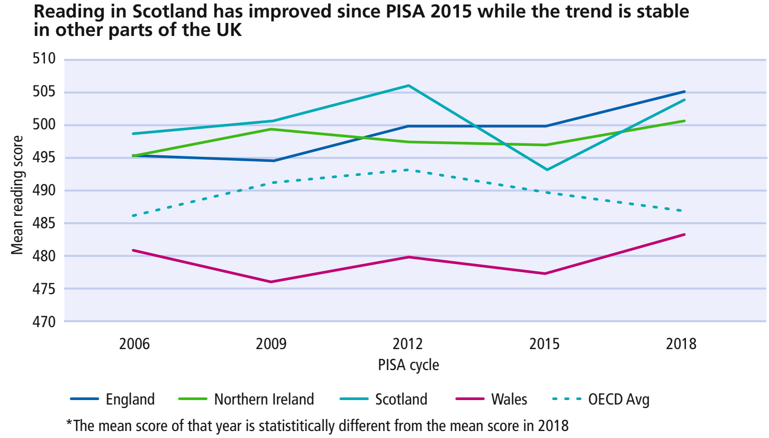

Figure 3.4.3 Trends in reading scores across the UK
Source: PISA 2018 database; Bradshaw et al. (2007); Bradshaw et al. (2010); Jerrim et al. (2016)

As for science, in Scotland, Wales, and Northern Ireland, the mean scores in 2018 were significantly lower than they were in 2006. That explains the large gap between England and the rest of the UK. In Scotland, where science scores in earlier PISA cycles were close to those in England, the downward trend has been pronounced (Department for Education, 2019).

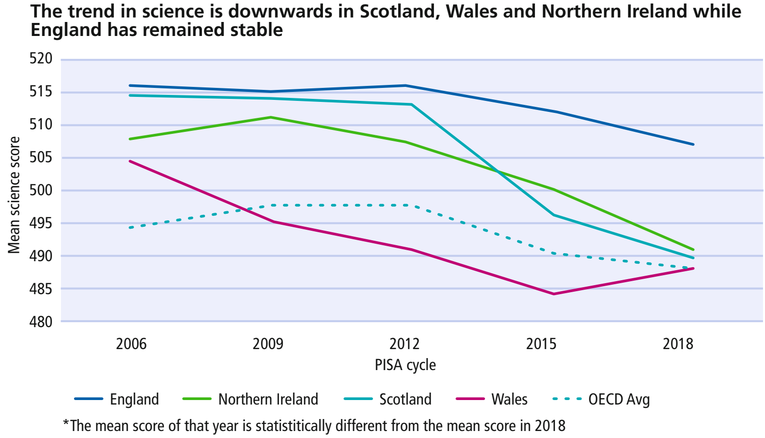

Figure 3.4.4 Trends in science scores across the UK
Source: PISA 2018 database; Bradshaw et al. (2007); Bradshaw et al. (2010); Jerrim et al. (2016)

In mathematics, the picture is more mixed. Since PISA 2006, when Scotland outperformed the rest of the UK, Scotland has shown a decline that is not as pronounced as that in science.

Welsh math scores have improved after declining in earlier cycles of PISA, while scores in Northern Ireland have remained largely unchanged. England, on the other hand, improved considerably in mathematics in PISA 2018, after successive cycles with stable scores (Department for Education, 2019).

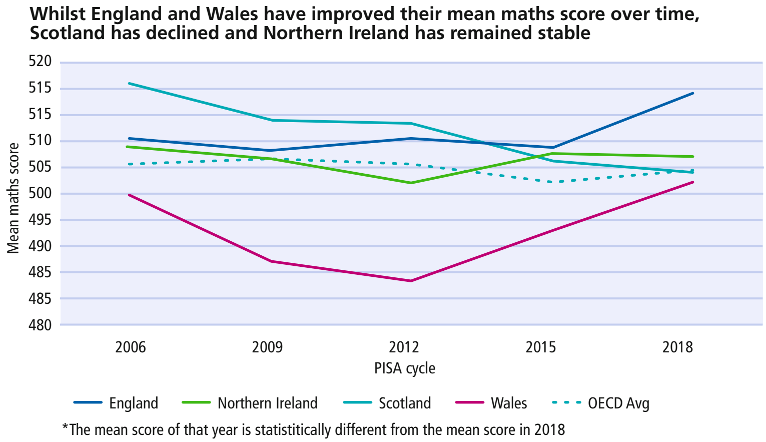

Figure 3.4.5 Trends in math scores across the UK
Source: PISA 2018 database; Bradshaw et al. (2007); Bradshaw et al. (2010); Wheater et al. (2014); Jerrim et al. (2016)

The Trends in International Mathematics and Science Study (TIMSS) is a four-yearly cycle survey of the educational achievement of pupils in years 5 and 9 developed by the International Association for the Evaluation of Educational Achievement (IEA). In England, pupils' average performance goes significantly above the TIMSS CenterPoint (500) in mathematics and science in both years 5 and 9 in 2019 TIMSS. Compared to 2015, England's performance significantly improved in mathematics for year 5 (M = 556), decreased significantly in science for year 9 (M = 517), and remained stable in mathematics for year 9 (M = 515) and science for year 5 (M = 537) (Richardson et al., 2020).

In Northern Ireland, mathematics (M = 566) and science (M = 518) attainment for 9-10-year-old students (Northern Ireland participated only at the younger age range) in 2019 TIMSS remains high, and scores were not significantly different from those in 2015 ($M_{\text{mathematics}}$ = 570; M_{science} = 520) or 2011 ($M_{\text{mathematics}}$ = 562; M_{science} = 517). In mathematics, Northern Ireland ranked 6th out of 58 participating countries but performance in science remained significantly weaker, although significantly above the international average. Scotland and Wales did not participate in the 2019 TIMSS test.

3.5 Hong Kong – China[5]

3.5.1 Socio-political context & implications for teaching/educational policy

Although Hong Kong is a part of China, education in Hong Kong is based on the educational system of the United Kingdom, more specifically the English. Prior to the implementation of the new educational system in the 2009-2010 academic year, the Hong Kong education system followed the British (6-5-2-3 structure). The current educational system is organized in a 6-3-3-4 pattern, which means six years in primary school, three years in junior (lower) secondary school, three years in senior (upper) secondary school, and four years in university, a pattern consistent with that in mainland China. The Education Bureau (EDB) is responsible for the education system and the government has very minimal intervention in education. Unlike other cities in China, the government doesn't rank Hong Kong schools. Most schools in Hong Kong are public schools, regulated by government, while private schools have complete autonomy over their curriculum, teaching methods, fees, and admission procedures. They are not required to follow the Hong Kong Education Department's recommendations. Hong Kong education adopts a multilingual approach in instruction: Chinese (Cantonese), Mandarin Chinese (Putonghua), and English in primary and secondary education; Chinese (Cantonese) and English in higher education.

Students attend public schools (6-18) for free. It is compulsory for children to attend primary and junior secondary schools between the ages of 6 and 15. Hong Kong also host international schools, that have their own admission requirements. As in other parts of the world, the so-called elite schools in Hong Kong are concentrated in several "good" and expensive districts, and admission to these schools is initially contingent on whether a family can afford to relocate to those districts. Students have had to take the HKDSE exam (Hong Kong Diploma of Secondary Education) to enter higher education since 2019. Higher education in Hong Kong is divided into 2 levels: Sub Degree Level: 2 years and professionally-oriented, and Degree Level: including bachelor, masters, and doctorate (PhD) (Nuffic, 2018).

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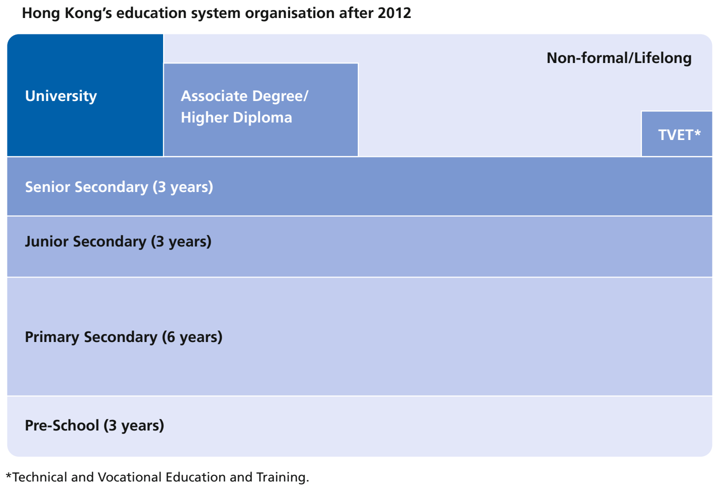

Figure 3.5.1 The Educational System of Hong Kong
Source: OECD (2010)

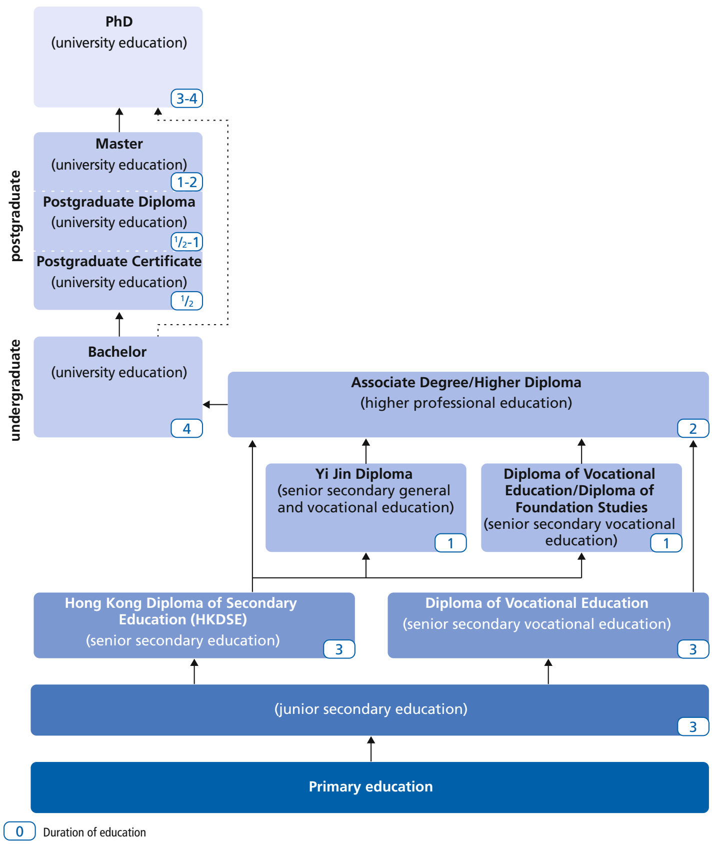

Figure 3.5.2 Educational System of Hong Kong
Source: Nuffic (2018)

3.5.2 Current trends in educational policy and practice & regional differences

In Hong Kong, there has been a call for a change in the local goals of education to meet the global needs of the 21st century (Education Commission, 2000). Proposed measures of education reforms aimed at student-focused teaching, broadened learning experiences and opportunities to pave the way for lifelong learning, catering for the diverse needs of students, and improving the assessment mechanism to supplement learning and teaching. The proposed aims and measures, if successful, were expected to change teaching and learning fundamentally. However, despite an educational, social, and economic context that called for innovation and an improved performance in the 2009 PISA results (OECD, 2010), international comparisons indicated that the pedagogy of Hong Kong teachers was not particularly innovative at the classroom level (OECD, 2014). These results justified the Education Bureau (EDB) to put forward a key strategy to enhance teacher capacity and quality education through professionalization and continuous professional teacher development (Ko, Cheng & Lee, 2016). However, such effort takes time and money and inevitably increases teacher pressure and workload. The EDB has been criticized for implementing too many top-down education reforms without sufficient negotiation and communication with practitioners (Cheng, 2009; Cheng & Walker, 2008). Disillusioned local teachers described the pressure to compete was strengthened instead of weakened (Choi & Tang, 2009). Apart from pressures of education reforms and professionalization, the school place allocation system, streaming and setting, medium of instruction policy, and examination-oriented culture are regarded as the major system-wide structural challenges affecting teacher and school effectiveness in Hong Kong (Ko, 2010). Various models of teacher effectiveness (e.g., Campbell, Kyriakides, Muijs & Robinson, 2003; Creemers & Kyriakides, 2008; Marzano, 2003) indicate that consistency and variation in teaching practices may affect individual teacher effectiveness and collective teacher effectiveness but have not received enough attention in practice thus far.

In China, waves of curriculum reform for quality-orientated education since 1999 (Dello-Iacovo, 2009) indicate a strategy to enhance education quality through strengthening curriculum management and teaching practices (Marton, 2006; Wong, 2008). Eager to shift from a traditional teacher-centered pedagogy, Chinese educators have imported approaches of Western pedagogy, such as inquiry-based learning, collaborative learning, and other methods that emphasize greater student-teacher interaction (Dai, Gerbino, & Dailey, 2011). These changes have led to discussions and trials of student-centered instruction at both the central government and school levels to promote teacher effectiveness in the classroom (Guan & Meng, 2007). Professional development of teachers is clearly wanting, as teachers are the main agents of instructional change (Paine, 1997; Wang, 2011; Wang & Li, 2010). At the school level, teachers have been used to work collaboratively in collective lesson preparation, classroom observation and mentorship programs ever since the system of teaching and research was built in the 1950s (Hu, 2005). With an increasing demand for teaching effectiveness, strategies to promote pedagogical practices have focused on more collaborative work that can help teachers to develop innovative instruction methods (Wong, 2012). Teachers have gradually employed and used appropriate methods of evaluation and assessment to keep records of classroom interaction and improve their methodological competencies, such as problem-solving methods and individual teaching methods.

3.5.3 The status of teachers & the teaching profession

Hong Kong is impacted not only by Chinese culture, but also by Western concepts, and it is particularly touched by globalization (Lam, 2014). Teachers in Hong Kong face substantial challenges and stress. The percentage of the teachers who suffer from anxiety and depression is almost two or three times than that of the general public (Tsang, 2018). Anyone who wishes to teach in a school must be on the teacher register or be a permitted teacher under the EDB's Education Ordinance. Registered teachers have the required teaching qualifications and experience as specified in the ordinance. Permitted teachers have academic credentials but no teacher training or qualifications, and are granted permission to teach a specific subject or subjects in specific schools. There is no requirement for either type of candidate to pass a test in order to be registered which means teaching in Hong Kong is deprofessionalized. Teaching is a well-respected profession in Hong Kong. Teachers are also paid according to the Master Pay Scale of the Civil Service Bureau, and usually receive a good salary.

3.5.4 Pre-service and in-service education of teachers

Two types of teacher education programs ar found: 1) five-year undergraduate Bachelor of Education programs, and 2) one-year full-time (or two-year part-time) postgraduate diploma in education programs for university graduates. In total, there are four institutions that offer teacher education programs: the University of Hong Kong, the Education University of Hong Kong, Hong Kong Baptist University, and the Chinese University of Hong Kong. Each institution offers a teacher education program and sets its own admission requirements. These requirements generally include practical tests and at least one interview to assess aptitude for teaching and fluency in both English and Chinese. In 2003, a general framework for teacher competencies was introduced, and in 2018, a new set of Professional Standards for Teachers was released. Students enrolled in full-time teacher preparation programs gain practical teaching experience in local schools under the supervision of mentor teachers. When teachers are hired by schools, they are given a year of support from experienced teachers who have been trained as mentors by the EDB. The Teacher Induction Scheme is used to accomplish this (Ncee, 2021).

The Committee on Professional Development of Teachers and Principals (COTAP) advises the government on policies and measures related to the professional development of teachers and principals at various career stages to improve teacher professionalism. The two main programs are 1) courses to enhance overall professional knowledge, and 2) courses in key learning areas or subject-specific courses. Participation in these courses is voluntary (Mullis et al., 2016).

Every three years, Hong Kong teachers are required to complete 150 hours of professional learning. In 2003, the Teacher Competencies Framework (TCF) was published and it was updated in 2018.

3.5.5 National policies directed toward improving teaching quality

Hong Kong shows excellent performance in various international examinations, which has attracted international attention. This is a consequence of the Hong Kong Government's strong commitment and support for education, which is demonstrated in the fact that education has been the largest area of total government expenditure, and in priority given to ensuring quality of education (EDB, 2013). To improve teaching quality, EDB formed the Liaison Committee on Quality Assurance by engaging the Quality Assurance Council (2013) and implement measures to raise the stability and profession of teaching force.

Apart from these approaches, the EDB has also implemented several initiatives to improve the quality of education for Non-Chinese Speaking Students, including the provision of the "Supplementary Guide to the Chinese Language Curriculum for NCS Students" and the development of extra-curricular Chinese language learning activities (EDB, 2013). Furthermore, the Chief Executive announced in 2007 that Small Class Teaching (SCT) would be implemented for public Primary One students as from the 2009-2010 school year. The gradual introduction of whole-day primary schooling since 1993 has over time proven to be effective.

It is worth noting the EDB's emphasis on information technology (IT) in Hong Kong, hoping to improve the efficiency and quality of teaching and learning through the practice of e-learning. In the Legislative Council Panel on Education released in 2017, it was proposed that cash grants should be given to all public sector primary and secondary schools (including special schools) for IT-related education initiatives (EDB, 2017). For example, $2 billion is reserved in the Quality Education Fund to provide e-learning support facilities for schools and students (EDB, 2021a).

3.5.6 Specific, national policies directed toward improving differentiation in teaching

In 2002, a document on educational reform, "Learning to Learn", was published in Hong Kong (Curriculum Development Council [CDC], 2002). It shifted the focus of education from teaching to learning, from factual memory to the development of learning skills, and from economic needs to personal needs (OECD, 2010). On this premise, catering for individual differences became a central topic of common concern in education, including whole-school approaches and inclusive education (Wan, 2016), which is also promoted and highlighted by the government educational policy (Education Bureau [EDB], 2008, 2010). As for inclusive education, the EDB coordinated with other departments to support students with Special Educational Needs (SEN) in a variety of ways, including providing additional scholarships and funds, improving school infrastructure to facilitate student mobility, providing professional training for teachers, providing guidance for parents, and providing additional services for students to participate in ordinary examinations or setting up special examination channels for them. There also is a strong focus on the mental development of these students, with intensive psychological counselling and a commitment to eliminate discrimination and bullying in schools (EDB, 2021b).

With regards to the Whole School Approach (WSA) to Integrated Education (IE), schools are required to adopt a 3-tier support model to provide students with appropriate support according to four principles, which include encouraging teachers to use a Differentiated Teaching Approach to meet the learning needs of students (EDB, 2014). The Operation Guide encourages teachers to vary the requirements and complexity of learning content, products and environments to provide sufficient challenges and flexibility. Differentiated Instruction can be achieved through several teaching strategies such as higher-order questions, tiered assignments, course compression, individual projects and mentorship, for which related resources can be found on the EDB website.

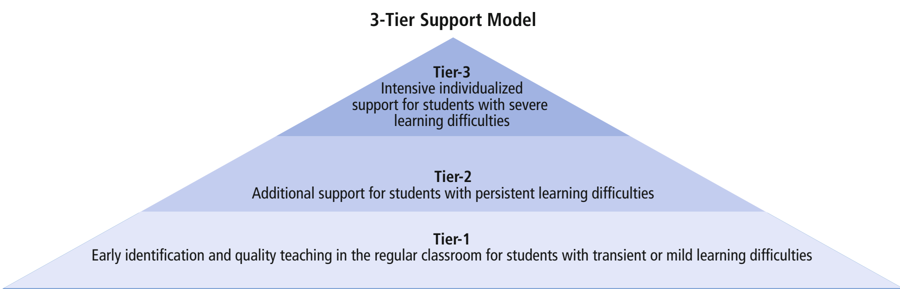

Figure 3.5.3 The 3-Tier Support Model of Integrated Education in Hong Kong
Source: EDB (2014)

3.5.7 Report on current international examinations (PISA, TIMSS)

Compared to other participating countries in PISA, Hong Kong –China's performance on international examinations has been consistently high, particularly in mathematics and reading. However, a longitudinal comparison reveals a downward trend in Hong Kong – China's performance.

Hong Kong –China has participated in PISA+ since 2002 as the first Chinese region to do so, and results were outstanding: Hong Kong – China ranked 1st in mathematics (M = 560), 3rd in science (M = 541), and 6th in reading (M = 525) out of 43 countries and territories (HKCISA, 2003). However, in 2018, 15-year-olds in Hong Kong – China scored 551 points in mathematics, 517 in science, and 524 in reading literacy. Compared to the OECD average score ($M_{mathematics}$ = 489; $M_{science}$ = 490; $M_{reading}$=487), math and reading both ranked 4th out of 77 participants, while science ranked 31st out of 34. The study showed that Hong Kong – China's science average showed one of the largest declines in performance (OECD, 2018b). It is also worth noting that there were significant gender differences. Girls performed significantly better than boys in all three dimensions of reading (35 points higher), mathematics (6 points higher) and science (9 points higher). Nevertheless, differences in reading achievement (5.1 %) due to the economic, social, and cultural circumstances of students and schools (ESCS) were among the smallest in all participating countries and regions, and the same can be said for the percentage (12.7 %) of immigrant students with low reading achievement (below proficiency level 2) (OECD, 2018b).

Hong Kong – China continues to perform well in mathematics in another international examination; TIMSS 2019. In mathematics at both 4th grade (M = 602) and 8th grade (M = 578), Hong Kong SAR was the top performer, as well as other East Asian countries – Singapore ($M_{4th\ grade}$= 625; M_{8th} grade = 616), Chinese Taipei ($M_{4th\ grade}$ = 599; M_{8th} grade = 612), Korea ($M_{4th\ grade}$ = 600; M_{8th} grade = 607), and Japan ($M_{4th\ grade}$= 593; M_{8th} grade = 594). However, performance in science at both grades, which is in line with the above-mentioned PISA results, has prompted the education system to reflect on Hong Kong. In science, the mean scores for Year 4 and Year 8 were 531 (ranking 15/58) and 504 (ranking 17/39) respectively (TIMSS, 2019), which compares very favorably with other East Asian countries. Since participating in 1995, there has been occasional improvement but a general downward trend.

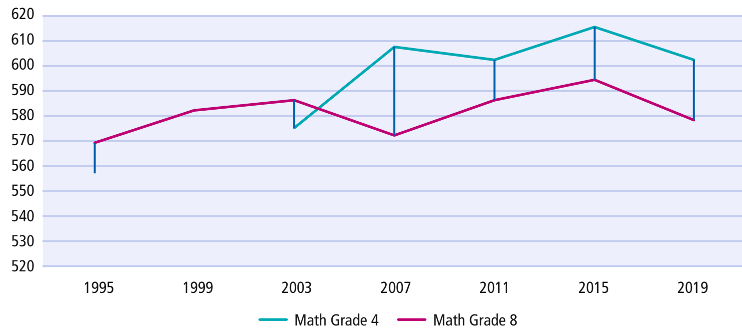

Figure 3.5.4 Trend of TIMSS math mean score in Hong Kong
Source: Mullis et al. (2020)

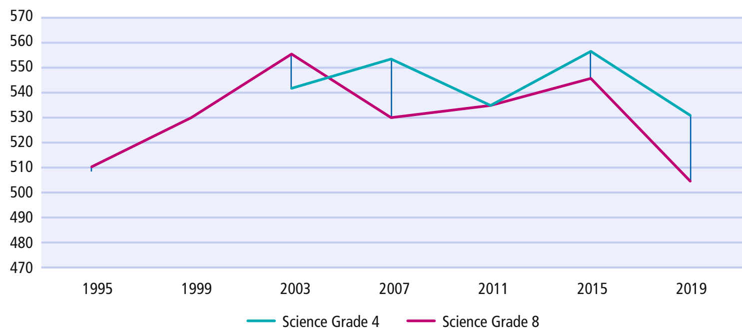

Figure 3.5.5. Trend of TIMSS science
Source: Mullis et al. (2020)

3.6 Indonesia[6]

3.6.1 Information about the current national educational system

Indonesia is the 4th most populous country in the world and is also the largest archipelago on the globe (2017, World Bank). About 87% of Indonesia's population is Muslim, making Indonesia the largest majority Muslim country in the world. Some 10% of the population identify as Christians and about 1.7% as Hindu. Indonesia's cultural and regional diversity is as vast as the number of its islands. Despite these marked differences, Indonesia is viewed as having a promising economic future in the 21st century.

Indonesia had declared its independence from the Netherlands on August 17th, 1945. Four years after Indonesia's independence, the aim of Indonesian early-stage education was to introduce Indonesian language as the language used in education. A year later, in 1950, the

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educational policy developed into a 6 years' period of compulsory education. In 1994, the compulsory education program was developed further for 9 years, which includes six years in primary school and three years in junior high school. The education system in Indonesia has been rooted in the culture of Indonesia based on Pancasila and the 1945 Constitution. In Act No. 2 of 1989, the national education system aims to produce capability and improve the standard of living and the dignity of the people of Indonesia to achieve the goal of national development.

Indonesia has the status of as a developing country, which is difficult to regulate and is still marked by various socio-economic problems. To overcome its economic problems, Indonesia needs to improve and develop quality in various sectors, one of which is to improve the quality of education and skillset of its population. As of now, Indonesia struggles to provide inclusive, high-quality education to its citizens. The country has much lower literacy levels than other Southeast Asian nations. Tertiary attainment levels are very low; the percentage of Indonesians over the age of 25 that had attained a bachelor's degree in 2016 was just under 9%, which wasthe lowest of Southeast Asian nations. Since the mid-2000s, Indonesia has implemented a broad range of education reforms, however remains well below recommended levels for emerging economies (at 3.6% of its GDP in 2015).

The character of Indonesia's educational system reflects its diverse ethnic and religious heritage, its struggle for a national identity, and the challenge of resource allocation in a developing archipelago nation with a young and rapidly growing population. Although a key government goal is to provide every Indonesian with at least nine years of basic education, the objective of universal education has not been reached. In 1973, the government issued an order to set aside portions of oil revenues for the construction of new primary schools. This act resulted in the construction or repair of nearly 40,000 primary schools by the late 1980s, a move that greatly facilitated the goal of universal education.

The Indonesian education system is immense and diverse. With over 60 million students and almost 4 million teachers in some 340,000 educational institutions, it is the third largest education system in the Asia region and the fourth largest in the world (behind only the People's Republic of China, India, and the United States). The education system in Indonesia under the Minister for Research and Technology and Higher Education, the Ministry of Education and Culture as well as the Ministry of Religious Affairs. The Ministry for Research and Technology and Higher Education is responsible for Higher Education in Indonesia, while the Ministry of Education and Culture is responsible for mainstream primary and secondary schools (84%), and the Ministry of Religious Affairs (MORA) oversees Islamic primary and secondary schools (16%).

The development of Indonesia's educational system today continues to reflect aspects of its past. Before the modern educational system was introduced by the Dutch, the pesantren was the only educational institution available in Indonesia. The current structure of Indonesia's educational system presents an interdependent series of cycles (primary school, SMP, SMA/SMK/STM, and college) which should accommodate the needs of a very diverse population, geographically, socio-economic status, and opportunities.

3.6.2 Socio-political context & implications for teaching/educational policy

In contrast to the colonial period, during the Orde Lama and Orde Baru periods, the teaching profession was arguably classified as "a second-class profession" (Sudarwan Danim, 2010). During the Orde Lama period, the profile and identity of the teaching profession in the eyes of society, especially among academics and the world of labor, is beginning to change now. The recognition of teaching as a professional position has been increasingly strong since the adoption of the Presidential Decree No. 87/1999 on the Functional Groups of Civil Servants (PNS); The law (UU) Number 20/2003 on the National Education System; UU Number 14/2005 on Teachers and Lecturers; Government regulations (PP) No. 74/2008 on Teacher; Regulation of the Minister of State for Administrative Reform and Bureaucratic Reform No. 16/2009 on Teachers Functional Position and Credit Figures; and the Joint Regulation of the minister and the head of BKN Number 03/V/NT/ 2010, Number 14 Year 2010 on Implementation Guidelines Teachers Functional Position and Credit Figures.

The Ministry of Education's strategic plans or RENSTRA (Rencana Strategis) for periods 2005-2009 and 2010-2014 have consistently focused on three main pillars: 1) increasing access to education, 2) improving the quality of teaching and learning, and 3) strengthening governance, management, and accountability. Law 14 of 2005 on Teachers and Lecturers increased the minimum teacher academic qualification from D2 (two years' education after completion of senior secondary education) to an academic bachelor's degree (S1) or D4, a four-year diploma. It also requires teachers to have successfully completed the certification process, a requirement all teachers had to meet by 2015. Further, the law sets minimum competency standards in the areas of professionalism, pedagogy, social skills, and personal behavior. The law not only specifies what teachers should be able to do and how to behave, but also addresses the issue of teacher welfare by introducing a set of new professional allowances for teachers who have successfully completed the teacher certification process and for those who work in remote areas.

The Director General of Teachers and Education Personnel, Ministry of Education and Culture, reported that in Indonesia, 3,015,315 teachers are recorded at the ministry. Of that amount, a total of 2,294,191 teachers are civil servants and Foundation's Permanent Teachers (GTY= Guru Tetap Yayasan), and as many as 721,124 teachers cannot be certified because of the Temporary Teacher's Status (GTT= Guru Tidak Tetap). Teachers who are civil servants, and the GTY, who certified after 2005, form a number of 547,154, through the PPG programs (Pendidikan Profesi Guru) funded by the teachers themselves or the affirmation of government programs. Meanwhile, the number of teachers that have been certified before 2005 was around 1,580,267. A number of 166,770 teachers previously weren't certified. By 2015 94,688 teachers were certified, and in 2016 72,082 teachers were taking a college program. If graduated in 2016, they will have followed the certification through the PLPG (Pendidikan dan Latihan Profesi Guru) program.

In the previous strategic planning period, educational activities focused on improving teaching and learning, but in the 2015-2019 RENSTRA, the aim was to increase human resources who could compete at a regional level. The focus of the 2015-2019 RENSTRA was on improving teaching and learning. The output of educational development is focused on human resources and the launch of education funds for Indonesian citizens in marginalized areas in terms of geographic environment and economic conditions, through various programs such as the Smart Indonesia Program (PIP = Program Indonesia Pintar), Revitalization of Vocational Education and Skills, and Strengthening Character Education (PPK = Penguatan Pendidikan Karakter). The results of the strategic plan of the Ministry of Education and Culture during the period of 2015-2019 showed an increased growth of access to education for all citizens, equalizing quality of education, increasing the relevance of graduates, and advancing the governance of Indonesian culture and language. RENSTRA's achievements include a certified teacher addition program, wich is still related to the quality and relevance of graduates (output). The program is based on Government Regulation Number 19 of 2017, concerning Amendments to Government Regulation Number 74 of 2008 concerning teachers, where the pattern of teacher certification in positions is changed to Professional Teacher Education (PPG). This pattern of certification takes longer and unit costs are higher. Implementation of PPG involves the Educational Personnel Education Institute, LPTK (Lembaga Pendidikan Tenaga Kependidikan) and is accompanied by the National Written Test (UTN: Ujian Tulis Nasional), in the hope for a guaranteed level of teacher professionalism. The Smart Indonesia Program (PIP: Program Indonesia Pintar) is the government's flagship program and provides educational cash assistance to finance the education of elementary school, junior high school, and senior high school/vocational high school students from poor or vulnerable families. Financial assistance is a service that enables access to education until completion of secondary education. Increasing the relevance of graduates cannot be separated from improving the quality of learning, and revitalizing vocational high schools (SMK = Sekolah Menengah Kejuruan) in accordance with Presidential Instruction Number 9 of 2016. The graduates produced are expected to be of high quality and relevant to the business world or industry.

Entering the RENSTRA period (2020-2024), the Ministry of Education and Culture again manages the higher education sector, which focuses on making Indonesian people who can compete at the international level independent. The RENSTRA plan focuses more on strengthening the nation's character education. Based on Presidential Regulation Number 87 of 2017 concerning strengthening character education, it is a guide for the Ministry of Education and Culture in carrying out character education strengthening programs (PPK: Penguatan Pendidikan Karakter) in schools and families/communities. Human resource development under the authority of the Ministry of Education and Culture will consider global trends related to rapid technological advances, socio-cultural shifts, environmental changes, and differences in the world of work in the future. Rapid technological advances, driving the Industrial Revolution 4.0 along with accompanying breakthroughs affect all sectors of life. Socio-culturally, technological advances have caused a shift in the demographics and socio-economic profile of the world's population.

The direction of policies and strategies for education and culture in the period 2020-2024 through the Free Learning Policy (KMB= Kebijakan Merdeka Belajar), is expected to be able to provide high-quality education for all Indonesians, with quality learning outcomes, and equitable quality education both geographically and throughout socio-economic statuses. KMB involves participation and support from all stakeholders, such as families, teachers, educational institutions, the world of work/industry, and the community. Teachers must adapt to the achievements of RENSTRA for the 2020-2024 period and be able to compete at an international level. The paradigm shift in the teacher's teaching role as a transmitter of information must change: teachers must act as facilitators in learning activities. This makes the teacher in control of the implementation of teaching and learning activities in their classroom.

3.6.3 Current trends in educational policy and practice & regional differences

The aim of Indonesia's national education in the preamble to the 1945 constitution is to educate the nation. This means that education had to become a main concern of the Indonesian people, especially the government as a policymaker and decision-maker in every sphere of education. The World Bank states that quality of education in Indonesia is still low, even though access to education has increased significantly for the community. In 2014 Pearson's global index of cognitive skills and educational attainment, Indonesia ranked 40th, which is the last position on the list. This shows just how low classroom teaching quality was, as teaching quality is one of the benchmarks determining the success of the learning process. Quality of teaching is related to the effectivity of teachers' teaching behaviors in the classroom. The low quality of Indonesian education is reflected in the 2013 PISA results, where Indonesia was ranked 64th out of 65 countries. The 2011 TIMSS survey in the field of science in Indonesia ranked 40th out of 42. Cases of illiteracy in Indonesia are ranked 108th in the world with a score of 0.603, which also indicates the low quality of Indonesian education (Fauzie, 2018). In general, Indonesia ranks below the State of Palestine, Samoa, and Mongolia. Only 44% of its population finished secondary school, while as many as 11% of students failed to complete their education or were unable to finish school and quit (Sahroji, 2017). Indonesia is a developing country, but its educational condition is still below that of Palestine, a state at war. The Indonesian Education Monitoring Network (JPPI = Jaringan Pemantau Pendidikan Indonesia) conducted a Right to Education Index (RTEI) study to measure the fulfillment of this right in various countries. JPPI results show that the quality of Indonesian education is below that of Ethiopia and the Philippines (Rahayu, 2017).

To achieve educational goals in accordance with Stranas KEMENDIKBUD for the 2020-2024 period, the quality of human resources able to compete at the international level needs to be increased, so a curriculum is needed. The curriculum should be strategically arranged and composed into programs. The curriculum should continually be updated in line with changes to keep it relevant to a changing society. Curriculum development should consider aspects such as child development, the development of science, the development of society's needs and employment, et cetera (Prihantoro 2015). The Indonesian government introduced a curriculum for all levels of schooling in 2013 called Kurikulum 2013. The content of this curriculum is related to human-environment interaction and environmental sustainability but neglects the interrelationships of economic development and environmental sustainability and frames the environment within a creationist, religious worldview. Fast developments cause education to face a daunting challenge, especially in efforts to prepare the human resources that are able to compete at regional and global levels. This is the goal of the RENSTRA KEMENDIKBUD period 2015-2019 and the period 2020-2024. All levels of education have a duty to prepare the next generation to a high standard. Therefore, the curriculum also needs to be developed according to the needs.

Indonesia's education development index has increased from year to year. Indonesia claims that 98% of the population aged 7-12 years attends primary school, with 90% aged 13-15 years attending junior high, and a further 61% aged 16-18 attending senior high school (BPS, 2014). This is a great attainment, especially for a country with such an extensive and diverse population, dispersed around an archipelago. Considering that Indonesia has such a low economic, education, and literacy starting point this is an extraordinary achievement. The quality of education rather than the quantity is its cruial concern (Suryadarma and Jones, 2013). Sebayang (2020) argues that although there is an increase in the numbers achieved in the field of education, there are obstacles in its policy. Education policy issues focus more on the quality and competence of teachers instead of on the number of qualified teachers (Kusnandar, 2010). According to Rahayu (2017) the three main issues at play are 1) the availability of quality teachers (availability), 2) the lack of child-friendly schools (acceptability), and 3) education and access for marginalized groups (adaptability). The availability of qualified teachers is not evenly distributed in frontier, outermost and remote areas, and the government budget spent or allocated for teacher salaries is not proportional to the availability of qualified teachers. This is the cause of the low teacher quality score in PISA. The low distribution of quality teachers relates to the lack of equitable distribution and improvement of teacher understanding of the impact of new policies on education regulations (Sebayang, 2020).

Generally, secondary and vocational high schools fall under the supervision of the Ministry of Education and Culture. Islamic senior high schools (MA) use the same curriculum and have the same national examinations as non-religious schools for secular subjects, but 30% of their curriculum consists of Islamic subjects and those fall under the supervision of the Ministry of Religion (Jackson and Parker 2008). Since their independence in 1945, national curricula have been in place. Different regimes at different times have had different emphases, but the twin objectives of national unity and good citizenship have been a constant in the education system (Raihani 2007; Fearnley-Sander and Yulaelawati 2008). The 2013 Curriculum is the second major curriculum change since the downfall of the authoritarian New Order regime of President Suharto (1966–1998). The 2013 curriculum is a revised competency-based model. Concerns about Indonesia's poor performance on international tests like PISA and TIMMS are frequently mentioned in government documents about the 2013 Curriculum. But although the PISA tests assess students in reading, math and science, the Curriculum strangely enough does not directly address these weaknesses (Parker, 2017).

Implementation of the 2013 curriculum, which is still ongoing today and is still part of the Ministry of Education and Culture's Strategic Plan for the 2015-2019 and 2020-2024 periods. The 2013 curriculum must be adaptive to environmental conditions and developments and accommodate diversity, even during the Covid-19 pandemic. The Ministry of Education and Culture has not targeted any curriculum changes. One of the reasons is the current pandemic situation, with the entire educational community still unable to carry out optimal learning. Another reason is the fact that there are still no known outcomes of the evaluation of the implementation of the 2013 curriculum, which means that the strengths and weaknesses of the curriculum are still unknown. Nevertheless, the Ministry of Education and Culture has implemented the Free Learning Policy in different levels of education. In 2021, the Ministry of Education and Culture set a target for the implementation of a simplified curriculum.

3.6.4 The status of teachers & the teaching profession

The profile and identity of the teaching profession experienced tremendous change throughout its history. In contrast to the colonial period, during the Orde Lama (Old Order) and Orde Baru (New Order) period, the teaching profession was arguably classified as "a second-class profession" (Sudarwan Danim, 2010). The profile and identity of the teaching profession in the eyes of society, especially among academics and the world of labor, is beginning to change now. The recognition of teaching profession as a professional position has become increasingly strong since the adoption of the Presidential Decree No. 87/1999 on the Functional Groups of Civil Servants (PNS); The law (UU) Number 20/2003 on the National Education System; UU Number 14/2005 on Teachers and Lecturers; Government regulations (PP) No. 74/2008 on Teacher; Regulation of the Minister of State for Administrative Reform and Bureaucratic Reform No. 16/2009 on Teachers Functional Position and Credit Figures; and the Joint Regulation of the minister and the head of BKN Number 03/V/NT/2010, Number 14 Year 2010 on Implementation Guidelines Teachers Functional Position and number of credits.

Law no.14 of 2005 on Teachers and Lecturers shows there are changes in the academic status of teachers from academic qualification from D2 (two years' education after completion of senior secondary education) to an academic bachelor's degree (S1) or D4, a four-year diploma, also required teachers to complete the certification process. Further, the law also set minimum competency standards, which meant to become a teacher, you must comply to standards on professionalism, pedagogy, social skills, and personal behavior. The law not only specifies what teachers should be able to do and how to behave, but also addresses the issue of teacher welfare by introducing a set of new professional allowances for teachers who have successfully completed the teacher certification process and for those who work in remote areas. So, from 2015, all teachers must be qualified teachers.

The Director-General of Teachers and Education Personnel, Ministry of Education and Culture, Sumarna Surapranata reported that in Indonesia, the number of teachers recorded by the ministry is 3,015,315 teachers. Of that amount, a total of 2,294,191 teachers are civil servants and the Foundation's Permanent Teachers (GTY) and as many as 721,124 teachers cannot be certified because of the temporary teacher's status (GTT). The teachers who are civil servants, and the GTY, who already certified after 2005 are 547,154 people, through the PPG programs funded by the teachers themselves or the affirmation of government programs. Meanwhile, the number of teachers that have been certified before 2005 was around 1,580,267 teachers. The rest, which previously has not been certified are 166,770 teachers. In 2015 there were 94,688 teachers who have been certified and in the year 2016 there are 72,082 teachers are taking college programs. If they could graduate in 2016, they will follow the certification through the PLPG program. Although the teaching profession in Indonesia is starting to increase, still, the teaching profession is not becoming their first choice.

The majority of teachers across the world have the status of civil servant across all levels of education (82%), even more so at primary school level (90%) than at secondary (83%). The social status of teachers based on union perceptions across the world shows that the profession ranks lower than professions such as engineer, doctor, nurse, or policeman. The ranking seems to reflect the deference grant to professionals and can affect well-being (Stromquist, 2018). Only a few countries in the world identified teaching as the most respected of the professions, among them African countries (the Ivory Coast, Lesotho, and Kenya), country in Asia/Pacific (Sri Lanka and Korea), and in Latin America (only Argentina). The highest status and prestige are attached to those who teach in universities (60%), and secondary school teachers (31%). The teaching profession in Indonesia is perceived most like social work, while in other countries (China, Russia, and Malaysia), the teaching profession is seen as most similar in status to being a doctor (Dolton et al., 2018). However, according to the Global Teacher Status Index 2018 (GTSI) teachers in Indonesia are highly valued and well respected by members of the public. The Global Teacher Status Index also focused on the desirability of teaching as a profession. Unsurprisingly, in countries with a higher level of respect for teachers (China and Malaysia), the public is more likely to pursue the teaching profession. In Indonesia, even though the teaching profession is generally well respected, the profession is not likely to be the first choice.

Career prospects of recently graduated (preservice) and in-service teachers are bleak. Although there are many reasons, government statistics of 2015 show that each year around 250,000 university-trained teacher candidates enter the labor market, and only 50,000 teachers retire each year; which makes the labor market for teachers saturated and it will be hard to find a teaching job. Based on the NUPTK teacher census (Nomor Unik Pendidik dan Tenaga Kependidikan = Unique Identification Number of Teachers and Teaching Personnel) show that over 60% of teachers below the age of 30 are contract teachers who don't have much job security and are on low salaries. Additionally, graduates who do eventually find a job, often spend years to obtain a permanent position with civic servant status (De Ree, 2016).

3.6.5 Pre-service and in-service education of teachers

The government set a minimum standard of teacher qualification as mandated by Law No. 14 Year 2005 as an effort to improve the quality of education in Indonesia to be able to gradually have a qualified population. Most important is the reinforcement of the implementation of Act. No. 14/2005, which enables standardization of teacher candidates' education, all output will have the same quality, wherever someone studies and graduates. Institute of Teachers' Education or Manpower Education Institute of Teacher Training (LPTK = Lembaga Pendidikan Tenaga Kependidikan/Keguruan) was appointed as the agency to prepare prospective teachers. The Institute was created with the aim to improve teacher qualifications to a minimum of an undergraduate (S1), can be entrusted with the education of the nation's children. The Professional Certificate replaced the Teaching Certificate of the past. LPTK will provide teacher education with two models, the concurrent model (integrated model) and consecutive model (continuous models), to accommodate both candidates who were in teacher training from the start and a lateral entrants. Prospective teachers who have graduated and already are in possession of a certificate (akta IV) are still a way from professional expectations, therefore the Professional education of Teachers (PPG) is given to all prospective teachers in full. Professional education of teachers will be strictly monitored by state LPTK to ensure correctimplementation. A good PPG is hoped to generate professional teachers.

Indonesia's economic growth rates not aligned with the increase of education quality in the country, as seen in international assessment studies such as PISA and TIMSS. We assume that the main problem facing educational systems in Indonesia is a lack of qualified teachers.

The teacher education system in Indonesia is established and managed by the government. Since 1963, the institution which holds the responsibility to produce teachers is an institute for Teacher Training and Education (IKIP). However, in line of development, there are many problems related to the quality of teachers that produce from IKIP. Therefore, since 1992 there has been a change in regulations. Based on PP No. 38/1992, the special institution appointed to produce education personnel is the Educational Personnel Education Institute (LPTK = Lembaga Pendidikan Tenaga Kependidikan). The aim of designating IKIP and other LPTK as institutions producing teachers is to enable them to produce better quality teachers. As regarding LPTK graduates, there are various basic problems, especially mismatch and irrelevant of the number and quality of graduates at the primary and secondary education levels. Several steps were taken to deal with this problem, a number of study programs were shortened, merged, and closed, a flexible curriculum was implemented by giving more flexible authority to LPTK graduates, IKIP changed its function to become a university, and distributed LPTK graduates to non-educational government instance based on the provisions and regulations applicable legislation, with the aim of maintaining a balance between the number of LPTK graduates and the real needs of education personnel in the field. The government also opening a D-III educational program in a number of non-LPTK universities, but the program's ineffectiveness in producing high-quality secondary school teachers, so the program was discontinued (Mutrofin, 2007).

Through Law (UU) No. 20/2003 on National Education System and Law no. 14/2005 concerning Teachers and Lecturers, there is no requirement that prospective teachers must have academic qualifications from the LPTK, but also can base on non-LPTK academic qualifications as long as they meet the requirements determined by the applicable laws and regulations. It means that education for pre-service teacher to become a teacher have been determined through Teacher Professional Education (PPG). This PPG is an educational program organized for non-educational undergraduate and postgraduate education graduates (pre-service teacher) who have talent and interest in becoming teachers, who are professional, and possess various competencies in accordance with national education standards, as evidenced by a teacher certificate. In-service teachers, who have not met the academic qualification requirements as teachers, can be fulfilled through education, or recognition of independent learning outcomes as measured by an equivalence test carried out through a comprehensive exam by an accredited institution. The education referred to, includes teacher training, recognized academic achievements, teaching experience with a certain period of service, and achievements. In-service teachers, who take part in education and equality tests, whether financed by the government or local governments, or at their own expense, are carried out while still carrying out their duties as teachers. The learning burden is regulated in curriculum structure by universities providing professional education that refers to national education standards. The content of the national education standard includes pedagogic competence, personality competence, social competence, and professional competence. The burden of the learning content is adjusted to the educational background. The undergraduate and D-IV education programs are focused on strengthening professional competence. The undergraduate and D-IV of non-education programs are, emphasis is on development pedagogical competence. Development and coaching of professional and career of teacher carried out through functional positions. The career development of teachers such as assignments, promotions, and promotion. Professional development is the development of teacher competencies that is carried out according to needs, gradually, continuously, and can improve their professionalism as teachers.

3.6.6 National policies directed toward improving teaching quality

Many approaches have been tried to improve quality of teaching in Indonesia. The Ministry of Education's Strategic Plan for the periods 2005-2009 and 2010-2014 have consistently focused on three main pillars: 1) increasing access to education, 2) improving the quality of teaching and learning, and 3) strengthening governance, management, and accountability. In the Strategic Plan of the Ministry of Education and Culture in 2015-2019, six priority programs for education and culture were set up. One of the relevant programs that is associated with the improvement of quality of teaching is the strengthening of educational actors by increasing the competence, performance and appreciation of teachers and education personnel.

From 2005 to 2014, a variety of programs aiming to improve teaching quality was set up, such as a teacher training program (PPG) and education and training for teaching profession (PLPG) program. To start with, prospective teachers should follow a teacher training program (PPG). They are required to follow the SM3T program to teach in leading, outermost, underdeveloped regions for a year.

There are at least 77 policies and programs related to teacher reforms across 43 regencies and cities. Approximately 62% of the policies or programs are policies related to local allowances for teachers. About 9% of local government policies are aimed at improving the quality of teachers (Bima & Yusrina, 2018). Most policies aimed to improve the quality of teaching and teachers are in the form of giving incentives improving infrastructure.

3.6.7 Specific, national policies directed toward improving differentiation in teaching

More than 60% of the national education budget in Indonesia is used to improve teachers' welfare, and some of that may be used to improve the quality of teachers. This budget is used in almost 100% of all regions in the country. However, raising salaries and providing teacher allowances do not necessarily improve the quality of learning or the number of school graduates. This is evident from the results of an international survey, in which Indonesia's educational performance was categorized as poor (OECD, 2018). In the Program for International Student Assessment (PISA 2018), Indonesia ranked 73rd in mathematics, 74th in reading and 71st in science of 79 countries, far below other Southeast Asian countries. The low performance of education in Indonesia is suspected to be caused by the generally low teaching quality. Of all countries in the world, Indonesia has one of the largest and most diverse teacher communities. With reaching almost 3 million teachers, it is a significant challenge to try and manage them. Of 1,250,000 primary school teachers in 2006, only about 200,000 teachers held a bachelor's degree. The majority of them only had a senior secondary school education and were a Diploma 2 graduate (Jalal, et al., 2009). Indonesia has national policies related to improving the teaching quality but doesn't have a specific policy aimed to improve differentiation in teaching.

3.6.8 The country report on current international examinations (PISA, TIMSS)

Indonesia is ranked 37th out of 40 countries in the world, in the categories of educational attainment and cognitive abilities (Pearson Global Index, 2014). The report of the OECD's Program for the triennial 2018 PISA report, which measures the ability of 15-year-olds in the three categories shows that Indonesia ranked 73rd in mathematics, 74th in reading and 71st in science out of 79 assessed countries and territories. They rank far below other Southeast Asian countries. Indonesian students' mean reading score of 371 in 2018 marks a 21-point decrease from the 2015 score and puts Indonesians far below the OECD average of 487. In mathematics, the study gives Indonesian students a score of 379, a 7-point decrease from 2015, while the mean science score decreased slightly, dropping to 396 points from 403 achieved in 2015. Both scores were also significantly below the OECD average of 489. The PISA findings showed three main drawbacks in Indonesia's education system, which include a large percentage of students with low achievement, a high percentage of students repeating classes and high absenteeism. The results of the Progress of International Reading and Literacy Study (PRILS) in 2015 showed that the average score of Indonesian students with indicators of science performance, math performance, student engagement, and reading performance was below the OECD average score and classified as low (OECD, 2019a). One way to address this problem is to reform the assessment of student's academic performance. This is in line with a plan of the ministry (Nasional Plan Strategic) announced in December 2020. The Ministry plans to replace the national exam in 2021 with a competency assessment and character survey. The national exam uses local standards, while the new competency assessment uses international standards. Another measure is transforming school leadership, improving teacher education, introducing a flexible curriculum that is adjustable to the needs and learning progress of each student. The ministry argued that the previous syllabus and policy are so rigid they prevent teachers from adjusting the learning material based on the student's ability.

Based on TIMSS and PISA, Indonesia has been consistently ranked amongst the lowest performing educational systems (Mullis et al., 2016). The cause of the low quality of education is thought to be the low quality of teaching. The study of Andrea et al. (2020) shows that perceived teaching behavior was the highest in South Korea and the lowest in Indonesia. Differences in student performance as documented by the international testing studies demand explanations in terms of teaching behavior. The effectiveness of teaching can be seen from teaching behavior in the classroom. These behaviors can be used as indicators of teaching quality. Teachers who have good teaching behavior are teachers who contribute 15%-25% to student achievement (Van de Grift et al., 2014).

3.7 Malta[7]

3.7.1 The Maltese educational system

The Maltese Islands, geographically situated in the middle of the Mediterranean, are spread over an area of 316 square kilometers and have a population of around 400,000 inhabitants. The Ministry for Education and Employment (MEDE) is responsible for the administration, organization, and the financial resources in state schools at all levels of education. Moreover, the Ministry is empowered to monitor the functioning of schools within all three sectors – that is, state, church and independent. There are currently 158 schools in Malta, of which 68 are primary state schools, 32 secondary state schools, 33 church schools, and 25 are private/independent schools. The number of teachers teaching at the compulsory school level amounts to around 6,700 (National Statistics Office, 2011).

Compulsory education comprises six years of primary and five years of secondary education. It is offered full-time and free in all state schools, but parents can opt to educate their children in independent or church schools. Around 39% of Malta's primary and secondary school students are enrolled in independent and church schools. Education in church schools is free, while parents sending their children to independent schools enjoy several tax-relief measures. All schools are obliged to follow the same National Curriculum Framework (NCF) that was launched in 2012, and to abide by all regulations as listed in the Education Act. At the end of their compulsory schooling, students can further their education and training in higher post-secondary and tertiary educational institutions. There are several post-secondary and higher education institutions in Malta, including the Malta College of Arts, Science and Technology (MCAST), the Institute of Tourism Studies (ITS) and University of Malta (Eurydice, 2023).

7 Principal investigator: Christopher Bezzina. Email: christopher.bezzina@um.edu.mt.

One of the most recent changes experienced by students and teachers stems from the launch of the policy document "For all children to succeed" (Ministry of Education, Youth and Employment, 2005). By October 2005, a school network system was set up wherein each state school forms part of a network with other schools, depending on their locality, and the whole network is called a College. The schools work in partnership with one another, share resources and create new practices within the specific context of their college. Each college (ten in all) has a legal and distinct personality, which is guided and administered by a College Principal (Eurydice, 2022). On considering this reform initiative, and others which took place in the last few years, one acknowledges that the Government has placed education as one of its highest priorities. These changes undeniably influenced the continuing professional development of teachers. There is increasing pressure on teachers to develop learner-centered pedagogies focused on learning through experimentation, systematic thinking, problem solving, critical thinking and skills to effectively navigate in knowledge networks.Teachers are also expected to develop new responses to evolving social and community needs.

To join the teaching profession, candidates must be professionally qualified and hold a teachers' warrant awarded by the Council for the Teaching Profession. Those intending to teach at the primary or secondary level of compulsory education need to follow a tertiary level course at the Faculty of Education at the University of Malta. The University of Malta provides two teacher education courses: the degree of Bachelor of Education (Honours) and the Postgraduate Certificate in Education (PGCE) for those who have a first degree unrelated to education and wish to take up teaching. Students of these courses will receive education and training specific to the area they intend to teach. Since September 2016 the Faculty of Education runs a two-year master's degree course for those who want to pursue a career in teaching.

Teachers at the pre-primary, primary and secondary level of state education and in church schools are required to regularly engage in continuous professional development. They are bound by a collective agreement between the Government and the Malta Union of Teachers (MUT) obliging them to attend three-day sessions annually, for a total of twelve hours. Teachers in independent schools are not bound by this agreement but may still choose to attend sessions organized by the Directorates should they wish to. The In-service Education and Training (INSET) courses could also be held throughout the school year, for a few hours each week, not exceeding twelve hours per school year. Teachers may also opt to attend voluntary courses organized by the Directorates for Education. Teachers can engage in professional education by undertaking postgraduate courses, organized by the University of Malta or other institutions that offer distance education opportunities. Options for further qualifications have been significantly widened in recent years, particularly thanks to an increase in the number of agencies for foreign universities, as well as academies and tuition centers for higher education.

3.8 Mongolia[8]

3.8.1 Information about Current National Educational System

Mongolia proclaimed education as a priority sector and, therefore, implemented policies to increase access to and quality of education in a phased manner (Education and Social Development Center, 2019). The following strategic documents related to the education sector have been adopted and implemented since 2000:

- Education Sector Master Plan (ESMP) 2006-2015[9];
- MDG based Comprehensive National Development Strategy of Mongolia 2007-2021[10]; and
- State Policy on Education 2014-2024.[11]

These documents define the policies and strategies for development of the education sector during two development phases: 2006-2015 and 2016-2021. The policy on teachers constitutes an important part of these phases. The MDG based Comprehensive National Development Strategy of Mongolia defines six targets: three targets each for two phases of education development. The following two targets are directly related to teachers:

- Comprehensive resolution of the issues by ensuring the professional and methodological development, remuneration, allowances and social safety of teachers, and drastically increase of investments in these areas; and
- Development of school-based management and revision of school mapping, including structure, type, and location of schools.

The following strategic documents approved and implemented the teacher targets:

- National Program for Basic Education for All 1995-2000[12]
- National Program for Pre- and In-Service Teacher Training for Primary and Secondary Education 2001-2010[13];

8 Principal investigator: Ulziisaikhan Galindev. Email: olzii_05@yahoo.com.
9 Government Resolution No. 192 of Mongolia, 2006
10 Parliament Resolution No.12 of Mongolia, 2008
11 Parliament Resolution No.12 of Mongolia, 2015
12 Government Resolution No. 19 of Mongolia, 1995
13 Government Resolution No. 120 of Mongolia, 2001

- National Program for Pre- and In-Service Teacher Training for Preschool, Primary and Secondary Education 2009-2015[14]; and National Program for Education 2010-2021.[15]

The following national targets have been identified in the above-mentioned national programs:
- Reform a pre-service teacher training into a demand-driven, flexible and stable system.
- Develop a flexible, decentralized, optional and sustainable professional development system for teachers.
- Create a mechanism to improve teachers' performance evaluation and to encourage and promote their productivity.
- Comprehensively resolve issues related to teachers' professional and methodological development, remuneration, incentives and social safety, and drastically increase investment and results in these areas.

3.8.2 Socio-political context & implications for teaching/educational policy

Based on the analyses of the policy documents produced by the UNESCO (2019), the teachers' policies are categorized into four phases: 1) disintegration phase of a previous system (1990-1995); 2) beginning of policies, programs and plans on provision of professional teachers in support of a new education system (1995-2006); 3) creation of new legal environment of teaching based on the principle of constructivist theory of learning (2007-2011); and 4) restoration of institutionalized systems of teachers professional development (2012-2018). During these phases, many legal documents in support of teachers' workplace and development have been revised and newly approved in a phased manner (UNESCO, 2019).

During the transition to a new socio-economic system, there was a shortage of teachers in primary and secondary schools due to the increased number of teachers leaving education because of its fiscal constraints. Therefore, as discussed above, the policy documents placed great importance on supply of professional teachers to schools between 1995 and 2005. Compared to that period, the supply of teachers has greatly improved. The provision of secondary teachers has reached above 98% since 2006. Between 2009 and 2015, the supply of teachers were estimated at 99-100%, but this indicator has been falling since 2016.

14 Government Resolution No. 136 of Mongolia, 2008
15 Government Resolution No. 31 of Mongolia, 2010

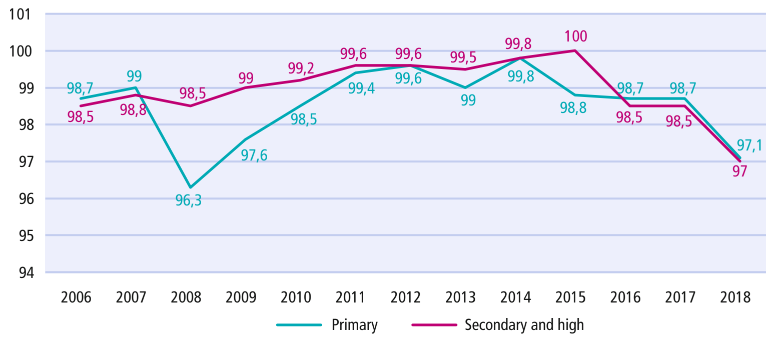

Figure 3.8.1 Supply of professional teachers at schools, by schools and by education level
Source: Mongolian Institute for Education Research (2019: 388)

3.8.3 Current trends in educational policy and practice & regional differences

The education reform of 2012 emphasizing "developing each and every student" changed the concept of "skilled" or "good" teachers. Critiques that teachers only focused on promising students competing in olympiads and ignored others changed the requirements. The current teacher evaluation system assesses teachers' performance by five criterion which are: students' academic achievement, character development, student's talent, health, and parents' satisfaction.

Mongolia changed its strategy and has been repeating education reforms learning from international systems and experiences for the last three decades. As mentioned before, teachers whose students participated in subject olympiads or competitions successfully were considered to be "good teachers" in the socialist period and after that. The main critique that forced the education reform of 2013 was the teachers' focus on strong students and those with potential, leaving the masses behind. A new government established in 2012 initiated the program "Upright Mongolian child" that brought primary and secondary education reform. The concept of the reform "developing each and every child" from whole-child approach led teachers to work in a different way. Subject competitions were prohibited in primary education and many schools stopped providing subject intensive programs that were targeted for olympiads. Instead, more inclusive principles such as providing equal opportunities for every student, referring to students' developmental differences, developing each student's talent, interest, and characteristics, equipping students with learning strategies were required from schools and teachers. Educational goals and objectives integrated more 21st century skills and placed more emphasis on learning skills in primary and secondary education. The curriculum concept defines what teachers' behavior is expected in the classroom.

3.8.4 The status of teachers & the teaching profession

Teacher recruitment

The authority to hire and fire teachers in Mongolia lies with school principals according to the law (Education Law, Article 20, Clause 20.1.2). As with any profession, the recruitment of teachers should be effective (selecting the right person), and with an open and objective principle (International Labour Organization, 2012). However, there are no rules and regulations in Mongolia for principals on how to recruit teachers. Therefore, teacher recruitment varies by location and school.

34,073 Teachers (11,467 in primary, 14,694 in lower secondary, and 7,912 in upper secondary) work in 839 schools, of which 19,584 are in Ulaanbaatar (the capital). Female teachers comprise 95.6% of staff in primary and 81.3% in secondary education. Of all teachers, 3,690 work in private schools.

Table 3.8.1 Number of teachers
Source: MEDS (2021)

Teaching experience	Sex		Total
	Male	Female	
< 1 year	394	1,619	2,013
1-5 years	1,947	7,332	9,279
6-10 years	1,637	5,936	7,573
11-15 years	1,049	4,637	5,686
16-20 years	516	3,320	3,836
21-25 years	242	1,751	1,993
> 25 years	559	3,134	3,693
Total	6,344	27,729	34,073

On average, the pupil-teacher ratio (PTR) in primary education in rural areas is 34:1 compared to 34:6 in the capital. However, there are also rural schools with a PTR as low as 15:1, and urban schools with a PTR as high as 60:1 due to the ongoing trends of in-country migration.

Teacher norms and workload

Laws relating to the duties and standards of teachers have been approved by the relevant authorities.[16] The General Law on Education regulates rights and duties of teachers by fifteen (seven rights and eight duties) clauses. This is further illustrated in detail in the Sample Job Description for Teachers. Tasks 13 and 15, two basic objectives in the job description, are to implement education standards and to conduct other activities.

Regulations on calculating remuneration and allowances for general secondary education and kindergarten teachers were approved by the Joint Order № 307/91/237 of the Minister of Education, Culture and Science, Minister of Social welfare, and the Minister of Finance in 2007, and determined the norms and structure of teacher's job as follows:

- The workload for school and kindergarten teachers is 40 hours.
- Teachers work for 34 hours on implementing the education standards, and the remaining 6 hours are spent on other tasks. Teaching hours consist of 19 of the 34 hours for the implementation of education standards.

Table 3.8.2 Basic Duties and Key Tasks in the Teachers' Sample Job Description
Source: UNESCO (2019)

Implementation of Standards	Other Activities
Planning and curriculum development	*Supporting teaching activities*
1. To collaborate with other teachers in the subject department.	1. Upgrade classrooms, cabinets, and the general school environment.
2. To study education standards and follow training in the curriculum on all levels.	2. Making training documents (journals, surveys, personal records, and articles).
3. To study the learners' needs and interest.	3. Organize and participate in olympiads and competitions.
4. Content selection, planning, and development.	4. Work as teacher on duty.
5. To choose a teaching style and develop the corresponding methodology.	*Ensuring teacher professional development*
6. To study learning tools and select and prepare relevant options.	5. Conduct research.
7. To select and develop evaluative assignments and implement methods and forms to assess the students' learning.	6. Develop presentations, books, manuals, and recommendations.
8. To plan and organize monitoring and evaluation of progress and stages.	7. Organize and conduct training sessions, and teaching seminars to ensure professional development.
To conduct lessons in accordance with the curriculum	8. Improve the profession, methodology, at the workplace on regular basis.
9. Lesson preparation	*Contribute to the learners' community and student's education and manners*
10. Lesson organization	9. Working with students staying in dormitories.
11. Note taking for observations	10. Collaboration with parents and the wider community.
Evaluating and improving the curriculum	11. Implementing the school's administrative and election works.
12. Analyze both own lessons and those of other teachers.	12. Provide the necessary information, reports and works of research.
13. Analyze and advise students on their learning and maturity.	13. Organize and participate in cultural and sports activities and events.
14. Evaluate and diagnose student learning progress and outcomes.	
15. Analyze the curriculum.	
16. Improve the curriculum.	

16 (a) Joint Order of Ministers No 307/91/237, 2007. Procedure on setting the norms for teachers in kindergartens and general secondary schools; (b) Order No. 179 of Minister of Education, Culture and Science, 2007 Sample Job Description A; (c) Order No. A/293 of Minister of Education, Culture and Science, 2013. Procedure to evaluate the performance of the general secondary education teachers; (d) Order No. A/299 of Minister of Education, Culture and Science, 2013. Directions to be used in evaluating ЕБС-ийн the performance of the general secondary education teachers; (e) Order No. A/243 of Minister of Education, Culture and Science, 2018. Ethical bylaws of Teachers, Managers and Other Staff of General Secondary Education Schools, Kindergartens and Non-formal Education Centers.

Teacher salary and benefits

Teachers who work in state-owned schools hold a civil servant status in Mongolia, however this is not the case for private school teachers. Teachers' salaries are in the civil servant salary system accordingly. A teacher's salary consists of a base salary, and supplements and bonuses. The base salary is solely based on a teacher's experience. Salary supplements I, introduced in Mongolia in 1995 (World Bank, 2006), are earned by tasks such as being as a homeroom teacher/classroom teacher, additional teaching hours/incentives for overtime, remuneration for a teacher's professional degree, being in charge of a cabinet, leading the subject department, remuneration for skill levels, and remuneration for residing in a rural area. Salary supplements account for approximately 41% of a teacher's income (UNESCO, 2019) and supplements for teaching additional hours makes up for the largest percentage of a teacher's monthly income outside of base salary.

The teaching profession is low paid in Mongolia. Both the lower and the upper limits of a teacher's salary are lower than that of the national average salary. The lower and upper limits of teachers' salary is 0.5 and 0.7 in 2005 compared to the GDP per capita of Mongolia. However, this ratio has increased to 1.0 and 1.3 respectively in 2008 and 2009 but then it has dropped to 0.7 and 0.8 in 2017.This means that the salaries of teachers are lower than the GDP per capita (Ulziisaikhan & Delgersaikhan, 2019).

One of the factors retaining skilled and experienced teachers in the industry long-term, is the wage increase attached to years of experience. The gap between minimum and maximum salaries of teachers in Mongolia is estimated at 13%, which is considered to be low.

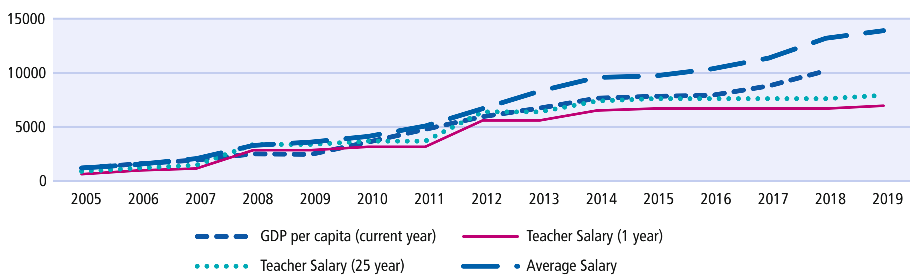

Figure 3.8.2 National Average Salary, Teacher's Salary and GDP per capita
Source: Ulziisaikhan & Delgersaikhan (2019)

3.8.5 Pre-service & in-service education of teachers

Pre-service teacher training

Anyone with a completed secondary education or the equivalent can take part in the entrance exam for a bachelor's program at the teacher training university. There are state-owned and private universities that provide teacher-training programs, as well as higher education institutions. A total of 48 colleges and universities offer a four-year teacher program, but most focus on a single program, e.g., primary education teacher. The Mongolian National University of Education, the only and the largest teacher training university, prepares most of the teachers nationwide (UNESCO, 2019).

Based on the concepts, theoretical, and methodological solutions of teacher's specialists, the standards of professional teachers of the Mongolian language, literature, social sciences and art and design subjects were adopted in 2004 and the standard of general secondary education teachers was adopted in 2009. The actual implementation was started in 2010. The purpose of this education standard is to ensure the overall requirements of the educational content, assessments, training duration, and training environment of the bachelor's degree program (UNESCO, 2019). However, regulations are not being followed and the standard is ignored, which means that teacher training universities and programs have an insufficient comprehensive policy and consolidated curriculum. Thus, a gap between teacher education programs occurs, which leads to unequal ability of novice teachers (UNESCO, 2020).

Professional development of teachers

In 2012, the ministry-affiliated Institute for teachers' professional development (ITPD) was re-established, which meant a shift back to a centralized professional development system with mandatory teacher trainings in their first, fifth, and tenth year of teaching. Research has been conducted on the needs of continuous professional development for teachers ((Institute of Professional Development (ITPD), Education for Sustainable Development (ESD) Project, 2016)) and the needs and requirements of teachers with regard to schools, local ECD and ITPD activities have been identified. The diagram in Figure 3.8.3 has been drafted to show the roles and responsibilities, and work coherence of subjects such as schools and teachers, local ECDs and ITPDs and their roles in meeting the needs and requirements of continuous teacher professional development.

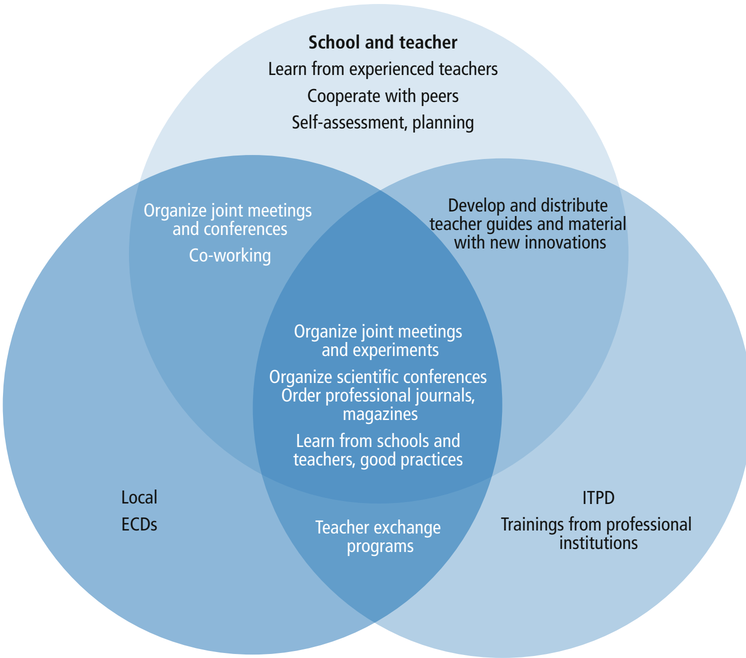

Figure 3.8.3 Roles, involvement and work coherence of subjects such as schools and teachers, local ECD and ITPD
Source: UNESCO (2019)

The focus of the courses is on learning, collaborating, and sharing knowledge and experience for first, fifth, and tenth-year teachers. All expenses related to mandatory trainings are paid for by the government. Centralized training for forty hours that consists of four hours of policy and legal, four hours personal development, eight hours of ICT skills, and twenty-two hours of professional knowledge and methodology. The system provides all teachers an equal opportunity to improve their knowledge, methodology, and skills and it is important from a point of fair treatment.

Teacher and staff in-service trainings are regulated by Teacher in-service training Rules (see Figure 3.8.4).

Local and school-level professional development

The most recent regulation 'Promoting teacher development law' of 2018 encouraged the decentralization of professional development of teachers. Even though the centralized trainings remain the same to ensure equal opportunity to all teachers, local units (provinces and districts) and schools must establish 'teacher development centers' for teachers to allow them to develop their knowledge and skills sustainably.

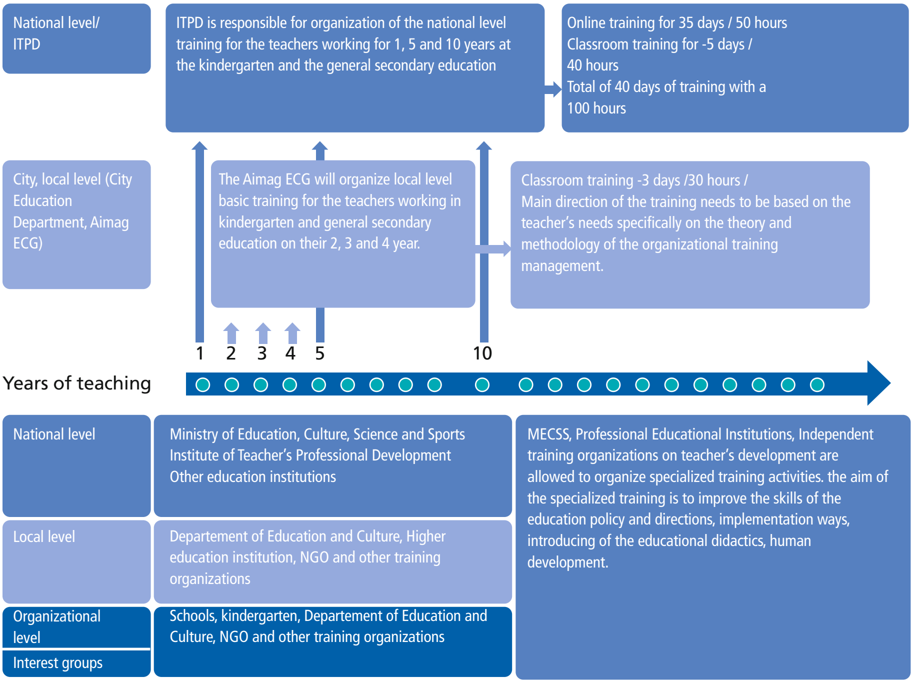

Figure 3.8.4 Forms of organization of the teacher's professional development training (as of 2019)
Source: UNESCO (2019)

School level supervision is organized by groups of subject teachers in secondary schools, and grade teacher units in primary schools. The school instructional manager (the school vice principal in charge of instruction) is in charge of the implementation of the curriculum, the professional development of teachers, and students' academic achievements. District level groups also share their knowledge and experience, but the practice heavily depends on initiatives of the officials in a district's education department.

Professional degrees

The law on pre-school, primary and secondary education has guaranteed the teachers three professional degrees such as methodologist teacher, leading teacher and advising teacher. Regulation on issuing, extending, and revoking teaching licenses and professional degrees has been adopted and implemented in 2007, and refined and approved by the Minister's Order in 2013. Since 2014, the criteria in Figure 3.8.5 apply to professional teachers.

Table 3.8.5 Criteria and requirements for teacher degree, GSE school and kindergarten (2014-2018)
Source:UNESCO (2019)

	Methodologist	Leading	Advising
Common criteria			
To hold a teaching license for teaching in kindergartens and general secondary schools Follow the teacher's ethics Learners should have the methods and techniques to discover the learner's talent and support the learner's development Be able to conduct research, to have knowledge and skills of foreign language and information technology in appropriate level			
Special criteria			
Number of working years as a te-acher of pre-school and general secondary ecucation	5 years and more	10 years and more	15 years and more
It has been achieved by implementing the methodology and technology to develop each student in training activities		Not less than 2	Not less than 4
To conduct research under the frame of the development of each student	Conduct research	Conducted research and reached a result	To have offered advising services to at least 4 schools

Rules for granting and revoking the professional degree have been renewed and got approved on December 20th, 2018 (MECSS Order A/812, 2018). In prior regulation, teaching year was the main criteria in practice. In the new regulation, the criteria focuses on student learning achievement and teacher professional development.

With the new ruling, the following general requirements are to be fulfilled:

- Student learning achievement
- Teacher profession, methodological skill
- Satisfaction of learners, teachers and peers, parents, and caretakers
- Self-development situation

Of the 59.8% of the general secondary education teachers, 28.1% were methodologists, 14.8% were leading teachers, and 0.6% had an advisory teacher's degree in the 2020-2021 academic year.

3.8.6 National policies directed toward improving teaching quality

Many factors influence the quality of teacher education, but probably most influential is the quality of entrants to teacher training colleges and universities.

The reason that the teaching profession does not attract better students, is that teacher is not as prestigious a profession as it was in the previous social system. To overcome this situation, the government is implementing measures to attract new graduates to the teaching profession.

One effective measure to attract good students taken by the Mongolian government since 2015 is the provision of "Entrance high score scholarships". This score-based scholarship is provided to students of state-owned universities and institutes. An entrance score between 650 and 750 will give new entrants 70% of their tuition fee as a scholarship, a score above 751 means full coverage of the tuition fee.[17] This has had a positive impact in attracting good students.

Teaching is a low-paid profession in Mongolia. This made the provision of rural allowances[18] to teachers since 2001, and allowances for long-term postings[19] in rural areas since 2007 important incentives to attract and retain teachers in rural areas.

3.8.7 Specific, national policies directed toward improving differentiation in teaching

Differentiated Instruction in the classroom has been encouraged strongly for the last ten years. Integrating Differentiated Instruction principles and practices, providing differentiated learning tasks by students' ability or learning levels in the daily classroom practice was introduced through the Mongolia-Cambridge Education Initiative, a curriculum reform prior to the 2013 reform. Formative assessment was another new strategy systematically introduced to Mongolian teachers through the same initiative prior to the 2013 reform.

Increasing humanistic views in society also affects the Mongolian education system in terms of differentiation. Regulations on inclusive education allow up two students with special needs in a class. As teachers were expected to gain wider and deeper knowledge of inclusive education, including Differentiated Instruction, inclusive education became one of the mandatory content in centralized in-service teacher trainings.

Differentiated Instruction is a complex teaching skill. Most teachers admitted that they needed professional development to devise differentiated activities for different learner levels and new strategies on classroom management (ADB, 2017).

Research on the implementation of curriculum, showed that 40+% of teachers wanted more professional development trainings on how to teach the new curriculum, update their knowledge and understanding of their specialist field, improve the teaching methodology

17 The Regulation of Provision of Students' Scholarships. The Decree No71, 07 March 2014 of the Government of Mongolia.

18 Government Resolution No. 90 of 2001. The additional 10% of the monthly salary of teachers in the soum center and 8% in the *aimag* center.

19 Law on Education. Article 43,Clause 43.1.7. "The cash allowances equivalent to the six month of base salary is paid every five years by the state budget through the working organization to the directors of soum, village and *bagh* schools and kindergartens, school principals, managers, social workers, dormitory teachers, non-formal education teachers, kindergarten methodologists, school librarians".

for their field, on formative/summative assessments, on classroom management and individualizing learning, and on catering to learners with special needs (ADB, 2017).

3.8.8 Country report on current international examinations (PISA, TIMSS)

Mongolia planned to participate in PISA for the first time in 2021 (or 2022). Although Mongolia attended TIMSS in 2007, the achievement result was excluded from comparisons because of insufficient documentation of the samples and data.

3.9 Nicaragua[20]

Country context not added because data was not included in this report.

3.10 Norway[21]

3.10.1 Socio-political context & implications for teaching/educational policy

In Norway, the most important values of the education system are securing equal access to and equal opportunities to complete education, which are realized in two ways: inclusive and free of charge. Two government departments are involved in education: the Ministry of Education and Research, and the County Authority and Municipality, both with different responsibilities. This reflects a long-established tradition of decentralization. Norway's overall education expenditure was among the highest in the OECD in 2016 (OECD, 2020a).

Compulsory education (ages 6-16) includes primary School (*barnetrinnet*) and lower secondary school (*ungdomstrinnet*), which implements a common national curriculum (including Sami curricula), but within this framework, municipal and county authorities, schools, and teachers have the flexibility to design education and training. In addition, municipalities are obliged to provide daycare facilities for children in Grades 1-4 and for children with special needs in Grades 1-7. Before compulsory education starts, children are entitled to a place in a kindergarten from the age of 1. About 50% of kindergartens are private, but they are government funded. Fees are the same for public and for private institutions (Eurydice, 2021e).

After finishing lower secondary education, pupils can choose academic education programs (three years) or vocational education programs (two years in school and two years of apprenticeship). Higher education (ISCED levels 6-8) follows the Bologna Process, with a standard bachelor's program of three years, a master's program of two years, and a doctoral program of three years. In ISCED levels 4 and 5, vocational colleges offer courses ranging from six months

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to two years in length. The Norwegian government also ensures the viability of lifelong learning through various training opportunities. There are very few private schools in Norway, most likely due to the strict government approval conditions. And the government also states that children may not be selected based on ability or other subjective criteria (Eurydice, 2021e).

See Figure 3.10.1 for a graphic representations of the educational setting of Norway.

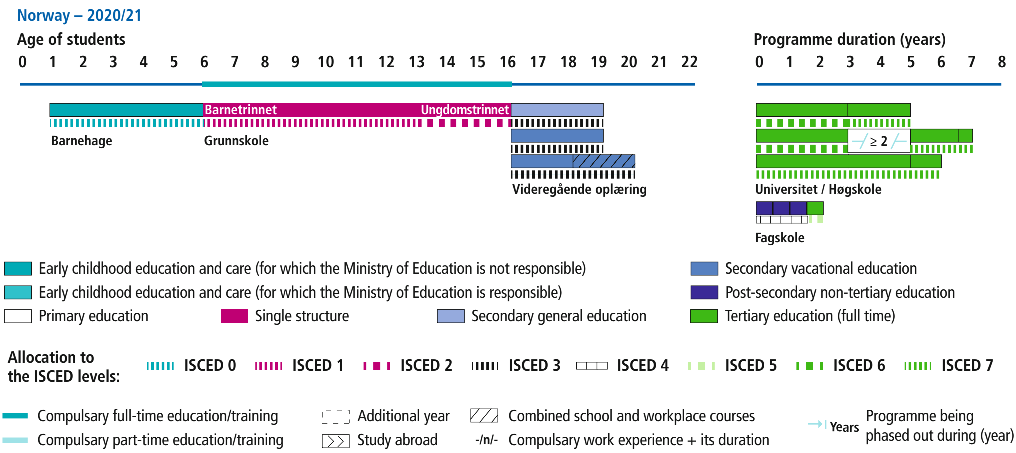

Figure 3.10.1 Structure of the Education System in Norway
Source: Eurydice (2020/21)

3.10.2 Current trends in educational policy and practice & regional differences

Norway's recent national education policy reform is primarily aimed at addressing new challenges arising from the coronavirus epidemic and creating an inclusive and knowledge-based society characterized by diversity and cohesion. For Early childhood education and care (ECEC), the government between 2009 and 2019 has implemented several measures to reduce and overcome barriers and increase participation. However, new regulations in Act of Kindergarten §42 (1st, Jan, 2021) shifts the focus to kindergarten safety and a positive environment, which state that the kindergarten cannot accept any violations, such as bullying, discrimination, or harassment (Eurydice, 2021f).

For school education, in August 2020 a new core curriculum replaced the old one from 1994, which was based on the goal provisions of the Education Act and describes how schools should promote the formative development of students. Meanwhile, new subject curricula (Subject Renewal *lk20*) are also put into effect gradually over a period of three years, which is to form a better link between the core curriculum and each subject curriculum. These changes are designed to give students sufficient time to study a topic in-depth and thoroughly (Eurydice, 2021f). In order to better prepare young people for the labor market and increase employment rates after high school, Norway has also made changes in vocational education, such as increasing the number of available apprenticeships (OECD, 2020a). The Norwegian education system has made corresponding responses in reaction to the COVID-19 pandemic.

3.10.3 The status of teachers & the teaching profession

Because of the high quality of teacher pre-service requirements, Norwegian teachers have a positive social status and professional recognition in public. Likewise, teachers benefit from lower-than-average instructional time, lower student-to-teacher ratios, and collaborative professional development practices, which means that despite lower salaries compared to similarly educated workers, teachers and principals also report relatively good job satisfaction and feelings of being valued by the community (OECD, 2020a). Teaching and Learning International Survey (TALIS), developed by OECD in 2018, reported that 93% of Norwegian teachers are satisfied with their job (OECD average 90%), 66% of teachers are satisfied with the terms of their teaching contract (apart from salary) (OECD average 66%), and 48% of teachers are satisfied with their salary (OECD average 39%).

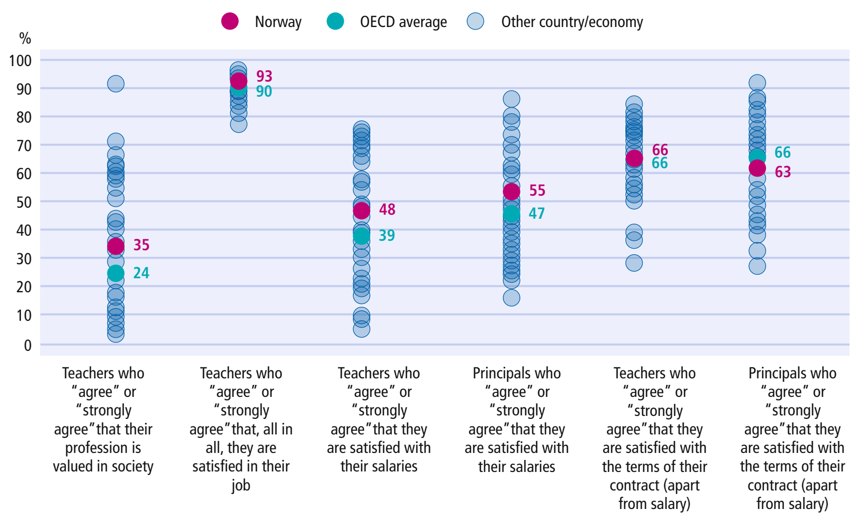

Figure 3.10.2 Teachers' and school leaders' satisfaction with their jobs in Norway
Source: OECD (2020a)

Since 2012, the weekly working hours for teachers at the different levels up to and including upper secondary school have been as follows: Pre-primary education (33.5 hours), Primary education (19.5 hours), Lower secondary education (15.9 – 18.7 hours), and Upper secondary education (12.2 – 16.9 hours). Primary and secondary education's administrative tasks occupy approximately just 10% of the total workload. Teachers' salaries depend largely on the type of position and seniority (Eurydice, 2021d).

3.10.4 Pre-service & in-service education of teachers

Norway has its own distinctive and highly qualified initial teacher training, which is provided by seventeen higher education institutions. Thirteen of these universities and colleges offer bachelor's degrees (3 years) in Kindergarten Teacher Education. The "framework plans" developed by the Ministry of Education and Research regulates all types of initial teacher education (ITE) programs. In addition, the National Association for Teacher Education (NATE) is responsible for developing national guidelines for each type of teacher education program, down to the specific subjects. Six types of teacher education courses are offered to primary and secondary school teacher candidates, all of which require a master's level except Type 6 (vocational teacher education) which consists of three years of bachelor education.

The Norwegian government also has a specific policy regarding the Sami's cultural education. The Education Act and its regulations describe the qualifications for obtaining a permanent position as a teacher in Norway (Eurydice, 2021e). On the national level, in-service training for teachers is shared by the Ministry of Education and Research, the Directorate for Education and Training, as well as universities and other teacher education institutions. At the school level, schools and kindergartens are required to develop an in-service competence development plan for teachers. The national strategy "Competence for Quality – until 2025" (CFQ) defines the framework and resources for further education, which gives school owners the opportunity to apply for teachers to attend courses in prioritized subjects. While taking the training, teachers are released from various duties, but keep their salaries (Eurydice, 2021a).

3.10.5 National policies directed toward improving teaching quality

In Norway, the Ministry of Education and Research has the overall responsibility for quality in kindergartens, and primary and secondary education on a national level. The Norwegian Directorate for Education and Training is in charge of the development and implementation of quality assessment, which includes responsibility for the Quality Assessment System (QAS), replaced the former National Quality Assessment System (NQAS) in 2013. The County Governor is responsible for guidance and inspection on a local (municipal) level and on a regional level (Eurydice, 2021b).

The most distinctive feature of Norway's policy on improving quality of teaching is the knowledge base, which means approaches and methods for quality assurance are based on research and statistics. For instance, the Directorate for Education and Training collects data from kindergartens and carries out a mapping survey as well as other surveys each year, which are used both nationally and locally in the assessment to improve the well-being and development of children. As for primary and secondary education, data presented on the School Portal are divided into five domains: learning outcomes (Examination results, National tests, Mapping tests), learning environment, completion of upper secondary education and training, resources, and school facts, which is used for school improvement and to identify students in need of extra support (Eurydice, 2021b).

3.10.6 Specific, national policies directed toward improving differentiation in teaching

Inclusion is the basic principle and goal of the Norwegian government's educational policy. The specialist provision (The Kindergarten Act Chapter 5A, The Education Act Chapter 5) is to adapt to the circumstances and abilities of each child and pupil, which ensures their right to any special needs support. For example, in the National Support System for Special Education (Statped), resources are produced specifically for deaf and visually impaired children, as well as children who need alternative communication channels. In addition, pupils from language minorities are also entitled to mother tongue instruction, bilingual subject teaching, or both.

Apart from the above-mentioned special needs provisions supplied to students, every municipality also provides educational and psychological counselling services. It is responsible for providing educational-psychological and subject-related advice for children and pupils to help them develop individual learning plans and explore different pathways for career, based on student characteristics. However, it is because providing equal opportunities is a central idea of educational policy, that the law effectively prohibits distinctions based on academic ability. Furthermore, Norwegian society holds firmly to "the Law of Jante," which declares "you are not to think that you are better than us" (Wolfensberger, 2015). Thus, it seems impossible to implement Differentiated Instruction in the classroom within the Norwegian system. But the worrying results of the PISA reports in recent years, as well as changes in opinion in other Nordic countries, are likely to lead to a change in this situation in the near future (Wolfensberger, 2015).

3.10.7 Country report on current international examinations (PISA, TIMSS)

Norway's PISA scores have remained stable on a high level across PISA cycles in the three main domains assessed (Jensen et al., 2019). However, despite relatively high spending on education, there is still room for improvement in the Norwegian education system, especially on the gender gap and for immigrant students.

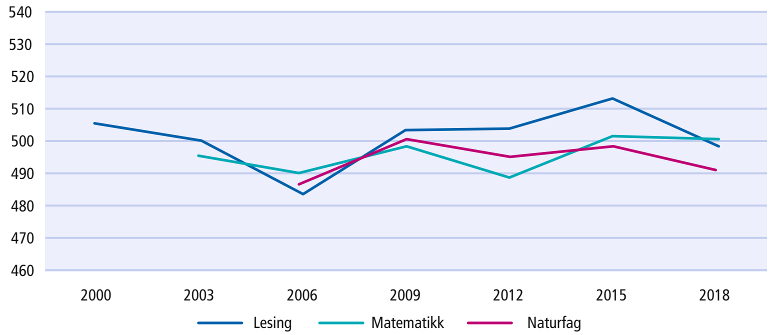

Figure 3.10.3 Trend of PISA score in reading (*Lesing*), mathematics (*Matematikk*) and science (*Naturfag*)
Source: OECD (2019a)

In PISA 2018, 15-year-old students' performance in reading literacy (M = 499), mathematics (M = 501) and science (M = 490) was above the OECD average ($M_{reading}$ = 487; $M_{mathematics}$ = 489; $M_{science}$ = 489). The lowest performance gaps relating to students' socio-economic background was lowest across OECD countries. In reading, 19.3% of the students showed a level 2/below 2 (OECD average 22.6%), 11% obtained level 5/higher than 5 (OECD average 9%). The socio-economic status explained 7.5% of the variance in reading scores, which was well below the OECD average of 12%.

However, the gap between genders is more pronounced, with girls performing better than boys in all three domains. Girls' performance is higher than boys with 47 points in reading (OECD average: 30 points), 7 points in math (OECD average: 5 points higher for boys), 11 points in science (OECD average: 2 points). Furthermore, students from immigrant backgrounds scored 33 points lower in reading than their peers from non-immigrant backgrounds, which is larger than the OECD average gap of 24 points.

In another international examination (TIMSS) held in 2019, Norway also performed well. Students from 5th grade scored 543 points in mathematics over the TIMSS CenterPoint (M = 500), ranking 11th among 64 participating countries. The best mathematics results have been obtained by Singapore (M = 625), Hong Kong SAR (M = 602), Republic of Korea (M = 600), Chinese Taipei (M = 599), and Japan (M = 593) (Mullis et al., 2020). At the same time, achievements at the 5th grade in science (M = 539) ranks 8th. Since participating in TIMSS in 1995, the performance of 4th and 5th graders in math and science has fluctuated, but an overall improvement has been seen.

For 9th grade, the performance in mathematics (M = 503) and science (M = 493) was lower than that in 5th grade; they were ranked 15th and 20th, respectively. The science score was lower than TIMSS CenterPoint (M = 500), which means the Norwegian government needs to take measures to improve the performance of 9th graders in science.

3.10.8 Examples of Good Practices

There are, at least, two examples related to good teaching practices.

- *Making Use of ict: Glimpses from Norwegian Teacher Practices*
  https://www.idunn.no/dk/2014/01/making_use_of_ict_glimpsesfromnorwegian_teacher_practices
  This paper presents the practices of six Norwegian teachers using ICT and the results of related research. It concludes with the identification of nine ICT-supported assessment methods that are being used in Norwegian classrooms.
- *How do Norwegian second-grade teachers use guided reading?*
  https://doi.org/10.17239/L1ESLL-2021.21.01.02
  This paper documents how teachers use guided reading practices in Norwegian 2nd-grade classrooms. Findings indicate that guided reading is a common practice of Norwegian 2nd-grade teachers and that discussing word meaning, text, and images are the most frequently addressed literacy components. Findings also illustrate that teachers regularly make optimal use of the before-reading phase, while the after-reading phase is relatively lacking.

3.11 Pakistan[22]

3.11.1 Socio-political context & implications for teaching/educational policy

Pakistan is made up of four provinces, Islamabad as the capital, and the two autonomous areas of Azad Jammu and Kashmir and Gilgit-Baltistan. Baluchistan, Punjab, Sindh, and Khyber Pakhtunkhwa (KPK) are the four provinces. Education in Pakistan is overseen by The Federal Ministry of Education and the provincial governments, with the federal government primarily assisting in curriculum creation, accreditation, and research and development funding. The state is required by Article 25-A of the Pakistani Constitution to offer free and mandatory quality education to children aged 5 to 16.

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Preschool (for children aged 3 to 5 years), primary (grades 1-5), middle (grades 6-8), high (grades 9-10, leading to the Secondary School Certificate or SSC), intermediate (grades 11-12, leading to a Higher Secondary School Certificate or HSSC), and university programs leading to undergraduate degrees are the six levels of education in Pakistan. The two types of higher education institutions are universities and degree-awarding institutions. Around 60% of pupils in Pakistan attend public schools, with the remaining 40% attending private schools. Students in public schools are largely from low-income families, whereas students at private schools are primarily from middle- and upper-income families (TIMSS, 2019).

There is a huge gender divide in Pakistan's educational system, with males outnumbering females. Pakistan was ranked the second-worst country in the world in terms of gender inequality in the 2016 Global Gender Gap Report (Moin et al., 2018). Pakistan's literacy rate remains poor. Pakistan has the second largest out-of-school population in the world, following Nigeria (16.8 million children). The literacy rate differs by location. In the capital Islamabad, the literacy rate is 82%, while in Torghar, it is 23%. And more importantly, literacy rates differ by gender. Female literacy is 9.5% in tribal areas, while Azad Jammu and Kashmir have a literacy rate of 74%.

Furthermore, English is rapidly gaining popularity in Pakistan, with over 92 million people (or 49% of the population) speaking the language. Pakistan also produces 445,000 university graduates each year, as well as 10,000 computer science graduates (source: Wikipedia – Education in Pakistan). Pakistan, as a South Asian developing country, is facing real challenges in terms of didactical strategies improvement and implementation of student-centered approaches by secondary school teachers (Khalid & Khan 2006; Memon, 2007). The quality of schools is based on personal attributes, teaching beliefs, and the quality of each teacher. Pakistan has around 70 languages, including Punjabi, Pashto, Sindhi, and Balochi, but Urdu and English are the official languages. Since colonial times, English has been the primary medium of teaching in elementary and secondary schools. Higher education is also primarily taught in English; however, some programs and institutes also are taught in Urdu.

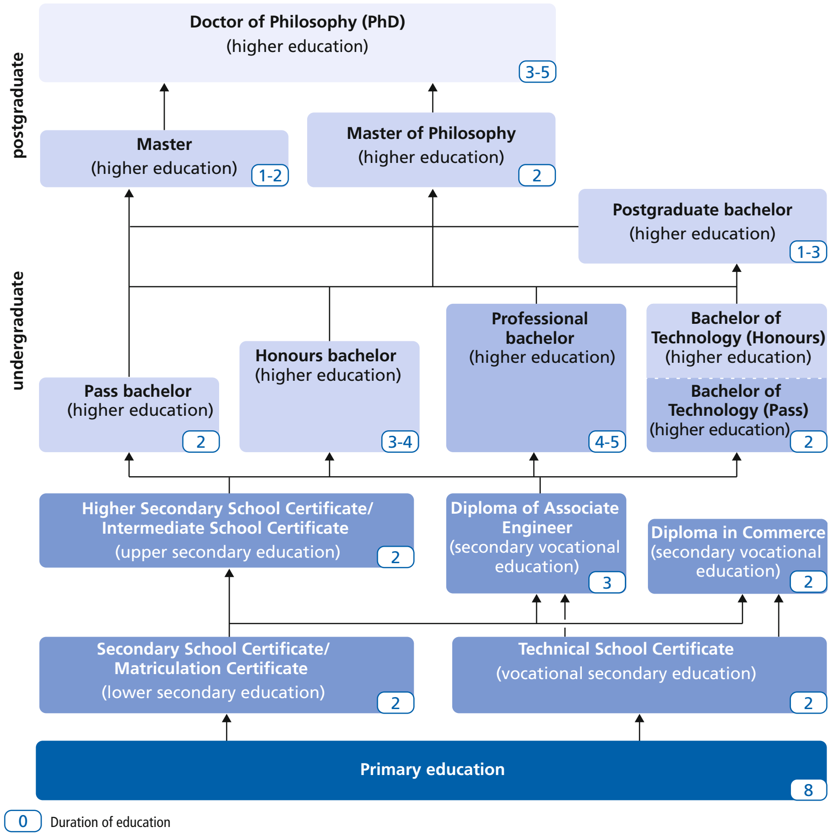

Figure 3.11.1 Structure of the educational system in Pakistan
Source: Nuffic (2022)

3.11.2 Current trends in educational policy and practice & regional differences

The quality of education in Pakistan is declining. Due to a shortage of teachers and inadequate laboratory facilities, the curriculum has become out-of-date and irrelevant to current needs. When students graduate from an institute, their education is focused solely on memorizing information by heart, and they lack both professional and communication skills. Furthermore, the universities in this country are prohibitively expensive, preventing Pakistani students from pursuing further education at these institutions. Numerous education projects have been launched to improve Pakistan's education system since 1947, but not a single one has been properly implemented.

The following education policies have been set up in Pakistan: The Pakistan Educational Conference 1947, Commission on National Education 1959, New Education Policy 1970, Education Policy 1972-80, National Educational Conference 1977, National Education Policy and Implementation Program 1979, National Education Policy 1992, National Education Policy 1998-2010, Education Sector Reform 2001-2005, National Education Policy 2009, Single National Curriculum 2020-2021, and National Education Policy 2017-2025.

All these policies were focusing on the following: access to education, educational quality, the eradication of gender imbalances in education, educational administration, educational system, science and technology, and technical and vocational education (Suhag & Khan, 2020).

More specific programs were:

1. Pakistan's 1973 Constitution – contained a state duty to offer free and compulsory secondary education.
2. Education Sector Reform (ESR) in 2001 – set seven main goals with an effort to significantly increase the national literacy rate. A special focus of the ESR named "Education for All" also was launched to fund education substantially (Kronstadt, 2004).
3. National Plan of Action for education – Projected to fund $7.2 billion on education in the pediod 2001-2015 (Kronstadt, 2004).
4. A new National Education Policy in 2009 – revealed the country's public education system's dire flaws and offered a broad list of solutions to remedy them.
5. Pakistan's eighteenth constitutional amendment, in 2010 – mandated free and compulsory education for all children aged 5-16.
6. A Single National Curriculum (SNC) – Aims to shift the focus of mathematics and science away from teachers and toward students. Phase I of the SNC will be implemented simultaneously in public and private schools across the country at the primary level during the 2021–2022 school year (TIMSS, 2019).

3.11.3 The status of teachers & the teaching education

Teacher preparation courses in Pakistan to a large extent have failed in the professional development of novice and in-service secondary school teachers (Kanu, 2005). Research stresses that the vast majority of secondary school teachers in Pakistan are not able to implement what they learn during teacher training in their daily practice (Sawada & Lokshin, 2009). Therefore, the quality of teaching in Pakistan is poor. Studies indicate that Pakistan secondary school teachers rather adopt traditional methods of teaching (Andrabi et al., 2013). Several studies reveal that secondary school teachers in Pakistan encounter hurdles from school administration and colleagues, resulting in poor adoption of didactical strategies. This unfriendly environment also lowers the Teaching Beliefs and Self-Efficacy Beliefs of secondary school teachers (Khamis & Sammons, 2004).

The low-level adoption of didactical strategies is not only observed in Pakistan but also a characteristic of many developing countries. Secondary school teachers' weak adoption of didactical approaches has gained worldwide importance and has become an issue of the global debate. In relation to this, authors also study teachers' Teaching Beliefs and their Self-Efficacy Beliefs. These are considered important indicators given the adoption of innovative didactical strategies (Walkington, 2005). With this consideration, Thomas (2013) studied the Teaching Beliefs of secondary school teachers and revealed that a majority of Pakistan teachers do not reflect on Teaching Beliefs associated with student-centered didactical approaches. Researchers point at the potential negative impact by stating that conventional and teacher-centered approaches might not be able to tap the potential of learners in the teaching-learning environment (Westbrook et al., 2009).

In Pakistan, there is a teacher shortage. Defective teaching materials and content, inadequate and underqualified teachers, and overcrowded classrooms are all problems in Pakistani education. Due to an outmoded teacher education curriculum, Pakistani teachers have deficiencies in their knowledge of human rights. Many Pakistani teachers maintain conservative views on education, believing that policies should be aligned with national Islamic philosophy, which places little emphasis on human rights. Religion has a strong influence on education in Pakistan. There is a huge misunderstanding and evolution science is wrongly interpreted. Even though many of the teachers oppose the idea of human evolution, "all agreed that there is 'no contradiction between science and Islam' in general" (Asghar, 2013).

Female teachers, like female students, are also denied proper instructional spaces. Males dominate the education field because of this early prohibition of girls attending schools. Males outnumber females in the teaching profession by 2:1, with females either unable to teach or forbidden from doing so. If they do, they are constrained by cultural expectations and constraints. In reality, there are 1,100 males for every 1,000 females. Furthermore, there is no female university president in the entire country. (Source: Wikipedia – Education in Pakistan.)

3.11.4 Pre-service & in-service education of teachers

Teacher education has traditionally been seen as a provincial issue. For teacher education, each province has its own centralized organizational system (Tahira et al., 2020).

Pre-service

In recent years, Pakistan has drastically increased the academic standards for schoolteachers. Until recently, elementary and middle school teachers (grades 1-8) could teach after completing short training programs that resulted in the Primary Teaching Certificate (SSC+1) or the Certificate in Teaching (HSSC+1). Today, Pakistan's national statutes expressly mandate that a four-year bachelor's degree in education or its equivalent is the minimum prerequisite for teaching in Pakistani schools, from primary through secondary. However, because teachers are employed at the provincial and regional levels, current hiring methods vary widely, owing to both teacher shortages and a lack of competent candidates (WENR, 2020).

The University of Education, established in 2002, is the first specialized university in the field of education in Pakistan. Universities' teacher education programs are insufficiently competent. Almost a third of Balochistan's institutions lack professors in teacher education departments and none of the universities offer a PhD in education. The new associate degrees in education are being offered at associated colleges of education and community colleges. These new degrees have taken the place of the former Primary Teaching Certificate and Certificate in Teaching in various provinces, and currently serve as an interim credential. While the system moves to the new bachelor's degree requirement, those who have achieved it are permitted to teach at the primary school level. Lower secondary (grades 9-10) teaching positions continue to recognize postgraduate Bachelor of Education (BEd) certificates achieved after one year of study following a two- or three-year bachelor's degree in another area.

In-service

According to policy, every teacher should have the chance to participate in in-service training at least once every five years. However, a primary school teacher typically receives in-service training after thirteen years in the classroom. Elementary school teachers are eligible for in-service training after eight years, whereas secondary school teachers are eligible after sixteen years.

Teachers receive in-service training in all provinces; but, due to lack of money, most provinces do not offer a regular program. In the Punjab province, the directorate of Staff Development (DSD), established in 2014, initiated the program Continuous Professional Development to offer activities teacher's professional development. In the Balochistan, Sindh and Khyber Pakhtunkhwa provinces, the Provincial Institutes of Teacher Education (PITE) are in charge of in-service teacher training. On a federal level, The National Institute of Science and Technology Education oversees in-service teacher education. The length of in-service varies from one week to one month, and differs per province (Tahira et al., 2020).

3.11.5 National policies directed toward improving teaching quality

Pakistan has one of the largest out-of-school populations in the world and approximately 40% of the country's population (aged 10 and over) cannot read or write. Therefore, the education policy aims to provide a uniform and quality education for all children (MoFEPT, 2018). In the National Education Policy Framework published in 2018, the Ministry of Federal Education and Professional Training (MoFEPT) has highlighted four priority actions for immediate implementation in education. The third of these priorities is to improve the quality of teaching, which is planned to be achieved through the following measures:

- Improving teacher management
- Lead National action and development of political will for teacher certification and licensing reforms by the provinces
- Increasing equity in teacher placement
- Improve learning in Early Grades
- Strengthening student assessments
- Improving the school environment
- Improving nutrition and health outcomes

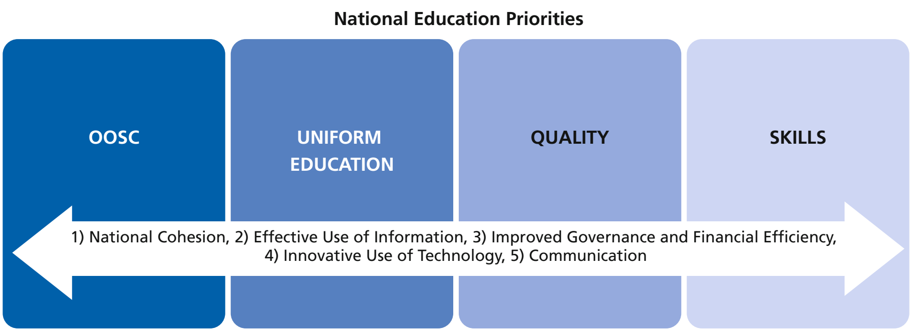

Figure 3.11.2 Four education priorities in Pakistan
Source: MoFEPT (2018)

In addition, Pakistan has attempted to ensure that children across the country receive the same quality of education through policies such as setting up a National Curriculum Commission to develop a common national curriculum framework, unification of common national teaching standards, and the establishment of a National Education Assessment System (NEAS). It is also noteworthy that Pakistan is experimenting with the use of ICT to improve teaching and student learning outcomes. For instance, the provision of free content online and offline, adult literacy programs, virtual classrooms in remote areas, et cetera.

3.11.6 Specific, national policies directed toward improving differentiation in teaching

Given the current situation in Pakistan, there is a huge disparity in education. The quality of education in the public sector and low-cost private schools is significantly lower than in high-fee private schools for families from middle-class and above backgrounds. The drop-out rate for girls is significantly higher than that for boys. Direct differences between regions are also evident. Consequently, education policy is focused on ensuring a uniform quality of teaching and improving the completion rate of compulsory education for pupils, and policies on differentiated teaching are very rare. The latest Single National Curriculum (SNC) refers to inclusive education and respect for people with special needs, but there is no specific policy in place (MoFEPT, 2020).

3.11.7 Country report on current international examinations (PISA, TIMSS)

According to OECD records, Pakistan has not taken the PISA exam. However, 4th graders in Pakistan took the TIMSS math and science tests for the first time in 2019. The results showed math (M = 328) and science (M = 290) scores significantly below the CenterPoint (M = 500), with the lowest scores except for the Philippines (TIMSS, 2019). There are no previous data for longitudinal comparison, making it difficult to understand the changes over the years. But a horizontal comparison with other participating countries is sufficient to show the current educational plight of Pakistan. It is also noteworthy that the differences between genders were prominent among all participants. The difference between boys and girls ranked 4th in mathematics (girls scored 19 points higher than boys) and 3rd in science (girls scored 38 points higher than boys) (TIMSS, 2019).

3.12 Portugal[23]

3.12.1 Information about current national educational system

Portugal is a semi-presidential republic divided into eighteen continental districts (from five regions) and two autonomous regions. Since the Carnation Revolution, which ended the Portuguese dictatorship in 1974, the country has been led by the Social Democratic Party (PSD) of current President Marcelo Rebelo de Sousa, and the Socialist Party (PS) of current President Eduardo Ferro Rodrigues and current Prime Minister António Costa. During the dictatorship, in 1970, around 26% of Portuguese were illiterate. After the return of democ-

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racy and the establishment of the Basic Law of the Educational System in 1986, there was a significant improvement in Portuguese education. Basic school, lasting nine years, became compulsory, and pre-school education and special education were introduced in the public sector. According to the 2011 Census, only 5% of the population could not read and write at that time.

3.12.2 Current trends in educational policy and practice & regional differences

Although Portugal has improved the quality of education over the years, the development was different in each region. Pereira and Reis (2012) found regional differences in the 2009 PISA, as well as in the national exams, and pointed out that these were related to the regional socioeconomic differences. While coastal regions like Lisbon, Vale do Tejo, Centro Litoral, and Porto had the best scores, others like Norte Interior, Baixo Alentejo, Algarve, and the Islands performed poorly. As a possible solution to improve education, the authors suggested policies to strengthen the autonomy of schools. With Decree-Law No. 55/2018, the government made the curriculum more flexible and allowed greater school autonomy.

Currently, education, regulated by the Ministry of Education, is universal for all citizens between the ages of 6 and 18. Basic education lasts nine years and is divided into three cycles: the first cycle lasts four years; the second, two; and the third, three. Secondary education lasts three years and, unlike basic education, is adapted to the choices of each student on their academic or professional future. Students have around nine months of classes per year with around twenty-five hours per week. According to the curriculum of the third cycle, students have classes in Portuguese, English, another foreign language, history, geography, mathematics, natural sciences, physical-chemistry, visual education, Information and Communication Technologies, and physical education. In secondary education, general education includes only Portuguese, physical education, philosophy, and a foreign language. The other subjects vary according to the specific training chosen by the learner.

To enter higher education, students take the National Secondary Education Examination (ENES) tests required for the degree they wish to pursue. Higher education is regulated by the Ministry of Science, Technology and Higher Education and is divided between university and polytechnic education. As shown in the graphs in Figures 3.12.1 & 3.12.2, Portugal was still below the OECD average in the educational level of citizens aged 25-64 in 2018, with only 25% of adults having graduated from tertiary education. Of these, only 4% studied in the field of education.

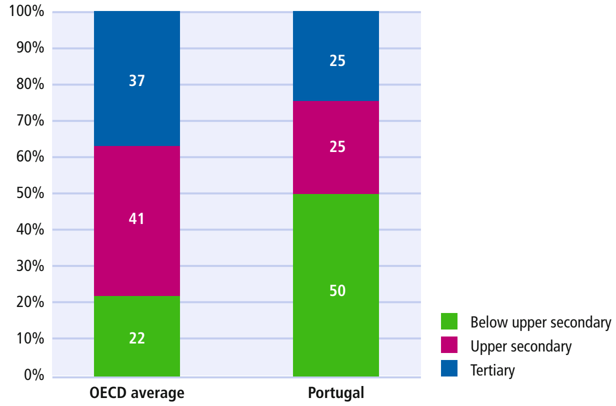

Figure 3.12.1 Education levels of 25-64-year-old adults in 2018
Source: OECD (2018a)

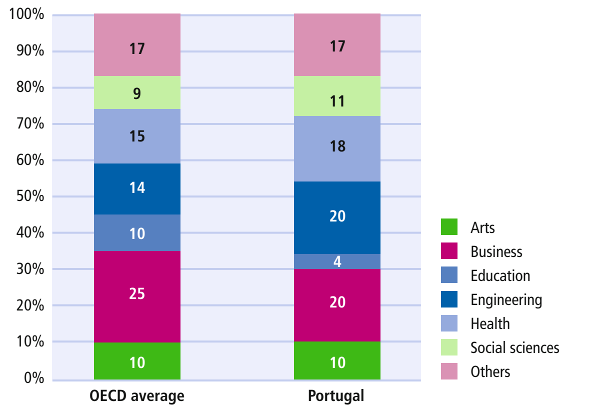

Figure 3.12.2 Tertiary graduates by field in 2018
Source: OECD (2018a)

3.12.3 The status of teachers & the teaching profession

According to the Portuguese National Education Council (2019), few young people intend to become teachers, as they see certain downsides to the profession, such as the long career time, the emotional wear and tear, the initial precariousness of the job and little social valorization.

In addition to requiring a master's degree to work as a teacher, one must pass a national competition assessment to work in public schools and has a one year probationary period. By centralizing teacher recruitment, the process becomes more objective and transparent, but, according to Neves (2020), the low salary (around 33,000 dollars per year in 2018, according to the OECD) and high housing costs in some regions lead to a shortage of teachers for certain schools.

3.12.4 Pre-service & in-service education of teachers

After the Bologna Process was signed in 1999, the training of teachers for the third cycle of basic education and secondary education changed in Portugal. The licentiate course (first cycle of studies) became three years long and focused on the scientific training of each specialty. To become a teacher, however, a master's degree (second cycle) was required, which took two years and focused on pedagogical training.

3.12.5 National policies directed toward improving teaching quality

Since Law 31/2002, the National Education Council started to participate in the school evaluation system, committing itself to improve the quality of education in Portugal. The evaluation, which was initially carried out internally by each school, also became external, since 2007 coordinated by the General Inspectorate of Education (IGE).

3.12.6 Specific, national policies directed toward improving differentiation in teaching

Leite, Morgado, and Seabra (2013) compared the reports of the first cycle of External School Evaluation (AEA), which began in 2006, and the second, which began in 2011. The authors explained what was successful and what could improve in the four regions of the country: North, Center, Lisbon, and Alentejo and Algarve. In Lisbon, in the first evaluation it was pointed out how much schools needed to improve on differentiation and pedagogical support, and in the second evaluation their performance on this criterion almost doubled. In the other regions, performance worsened in the second evaluation, and it was then pointed out that it needed to improve.

3.12.7 Country report on current international examinations

In recent international exams, Portugal has remained close to the average. In the 2019 TIMSS, the average was 500, Portugal achieved 500 in mathematics and 519 in science. In the 2018 PISA, the international average was around 489, and Portugal reached 492 in the reading, mathematics, and science tests.

3.13 South Africa[24]

3.13.1 Information about current national educational system

In South Africa behaviorist strategies have preserved prevalently in classes where students are not exposed to real-life situation knowledge re-enforced by textbook content. Significant

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attempts to change the education system have been made. After the country becam independent, South Africa explicitly formulated education policies aimed at promoting access to educational opportunities for previously disadvantaged groups. In the 1990's Bloom's behavioral objectives (mental, cognitive, and science processes) and Piaget's theories (reasoning patterns) have guided much of the South African National Curricula. Moreover, South Africa spends 18.5% of its annual budget on education. Yet, the education system remains in a poor state. Statements, such as "South African schools are indeed dysfunctional' (Wilkinson, 2015, p. 2); "South Africa's education crisis" (Spaull, 2013b, p. 1); and "schooling in South Africa is a national disaster" (Bloch, 2009, p. 58) are not uncommon when academics or laypersons talk about schooling in South Africa.

Education restructuring in the new South Africa is a long-term challenge. Currently, education policy proposals risk favoring the more privileged sectors of the educational community and a more vigorous critical dialogue and pedagogical debate is needed. Above all, more strategic policy thinking and interventions in the appropriate areas of the education system are urgently needed to empower the more disadvantaged education communities and to ensure that the policy change process benefits them.

3.13.2 Current trends in educational policy and practice & regional differences

Since 1994, various reform policies were implemented with the aim to teach curricula based on students' own socio-economic environment and equip them with skills they will need to apply in real-life situations. These policies included the Revised National Curricula Statements (2005) and the Curricula Assessment and Policy Statements (CAPS) (2013), which indicate a period of rapid transformation and democratization. These political and social changes created opportunities for the inclusion of indigenous knowledge and dialogue of different sociocultural views.

The post-apartheid education policies established a single education system for all national cultures, new education managers were appointed, and curricula revised (Lekgoathi, 2010). Despite these radical changes and curriculum revisions, in 2003 South Africa scored the lowest of fifty countries in the *Trends in International Mathematics and Science Study* (TIMSS) that tested Grade 8 mathematics and science proficiency of students (Spaull, 2013b). The Department of Basic Education (2013) realized that effective education commences in early childhood education, where students are instructed in English and not their home language. Therefore, the Annual National Assessments (ANA) were implemented in 2014 to test students' language and numeracy skills (Department of Basic Education, 2018). The ANA tests, managed by the schools themselves, include standardized home language, first additional language and mathematics tests and are taken by all students in Grades 1 to 6, and 9. The 2013 results showed the following average percentage marks: home language = 44.0%, second home language = 38.1% and mathematics = 15.9% (Department of Basic Education, 2013). The tests indicated that mother tongue instruction could contribute to students' effective learning.

3.13.3 The status of teachers & the teaching profession

South African policies and structures are in place to enhance the professional status of teachers: the minimum point of entry into the profession is a four-year qualification. Ample opportunities have been created since the beginning of the new millennium to help un- and under-qualified teachers to obtain qualifications adhering to the REQV 13 benchmark. The 2011 Minimum Requirements for Teacher Education Qualifications specified requirements and guidelines for teacher qualifications and learning programs to address the poor conceptual and content knowledge among teachers. The importance of mentoring, induction and CPTD are acknowledged by education authorities. The establishment of the SACE and the publication of the Code of Professional Ethics are important milestones on the road to professionalize teaching in South African. Despite these important milestones in reclaiming and restoring teaching as a profession, there are still un- and under-qualified teachers, as well as teachers who lack subject and pedagogical knowledge in front of classes. Whereas mentoring and induction programs are either lacking in some schools or informal and unplanned in other schools, CPTD is in its infancy.

3.13.4 Pre-service & in-service education of teachers

In the context of these rapid and often substantial changes to the curriculum in South Africa, teacher training both pre- and in-service has been affected. Rural and under-resourced schools have been affected by changes in the curriculum and the changing requirements in terms of the knowledge, concepts and skills that need to be taught. It is clear that the way the education system of a country carries out the professional development of its teachers, both pre-service and in-service is crucial. In South Africa, particularly in rural areas, classroom and context-bound realities require attention. Integrating IKS within South Africa's schooling system will contribute to providing context-relevant education that is accessible to learners and their caregivers in rural and under-resourced settings.

3.13.5 National policies directed toward improving teaching quality

In the following link, information about some national policies can be found: https://libguides.wits.ac.za/c.php?g=145345&p=952509 (includes all policies).

3.13.6 Current international examinations (PISA, TIMSS)

In the following document, information about the current results of international examinations can be found:

Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). *timss 2019 International Results in Mathematics and Science.* Retrieved from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/timss2019/international-results/

3.14 South Korea[25]

3.14.1 Information about current national educational system

In 1950, the Korean War broke out. After the war, both socio-politics and the economy fell into chaos. Military dictatorship began in Korea and the economy developed rapidly, but the people's demand for democratization continued. Eventually, the military withdrew, and a civilian president was installed to start democratization. Economically, Korea managed to overcome the difficulties that arose from the IMF crisis and is continuing to develop. Korea has experienced the economic development as well as democratization since 1990.

The current government regime claims fairness and non-authoritarian policies for educational equity. As the present Moon administration is implementing progressive policies, it is striving to strengthen the public nature of education from infant care to university, expand the national responsibility of early childhood education through innovation, establish an all-day day care system, realize free high school education, reduce the burden of university tuition and housing costs, provide free meals to elementary, middle, and high schools, and create a future educational environment. However, controversy arose due to the breach of the five-principle commitments and the appointment of weak personnel.

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3.14.2 Current trends in educational policy and practice & regional differences

Korean government updates the national curriculum periodically and the last version was developed in 2015. The distinctive characteristics of the 2015 national curriculum are understanding based curriculum and the presentation of the core competences. In order to provide students' enduring understanding, the big idea was established, and the structure of the contents are developed focusing on the big idea using the backward design model. The implementation of the national curriculum has three layers: the central government's national curriculum, regional government's practical curriculum to cope with the regional needs, and the school curriculum based on the teachers' redesign. Teachers can redesign the school curriculum up to 20% in each subject.

The team developing the national curriculum consists of education experts, entrepreneurs, teachers, parents, students, and a representative from the region. Several public hearings are held before the curriculum is updated, and the final version is confirmed by the president of the country as Presidential Law. The update of the national curriculum involves many interest groups and negotiation among them is a long and tedious processes.

The purpose of a curriculum is to ensure students' deep thinking. To establish this, the national curriculum tried to provide diverse learning experiences without limiting the students' career path; examples include exploring domains of humanities and natural science and have both an academic and a vocational pathway. When the educational policy 'high school credit system' is in action, flexible career path for high school students is supported. Students study ten core subjects from the 1st grade of primary school until 10th grade of high school, and in 11th & 12th grade, students can choose the options they want to study. Vocational and academic education are separated from junior high school, where students decide on their options in 9th grade.

To recruit highly motivated and academically competent students, educational policies such as "job first and study later" were introduced. However, vocational high schools still have difficulty to recruit talented students as lately, it has become difficult for vocational high school graduates to find decent jobs because of changes to the industrial structure of society.

3.14.3 The status of teachers & the teaching profession

The high level of teaching skills in Korea were supported by a variety of variables and highly qualified teachers have an impact on Korea's excellent academic performance. As the OECD report reveals every year, it is certainly one of the most enviable jobs that not only have the highest salary level in the world but are also employed for life until the age of 62, and have a high social status and are respected as a public officer.

A teacher's life in Korea moves from four years of pre-service teacher training, to school allocation, in-service professional development, promotions, and job appointments at schools as a public officer, to finally retire at the age of 62 with an honorary award of the Order of Service Merit and a generous pension. But teaching is not an easy job in Korea: teachers must deal with parents who are overly enthusiastic about their children's academic performance, and students who are treated like princes and princesses at home, and a lot of administrative paperwork.

3.14.4 Pre-service & in-service education of teachers

South Korea manages to recruit the best human resources for its pre-service teacher training. Only the very best high school students can apply for university, and the school of education, and graduates with a teaching certificate go through very competitive examinations for a public school allocation. This means teachers at schools all went through these competitions successfully and are a talented group of people. This is not common in other countries: both developed and underdeveloped countries often lack qualified teachers.

When the Korean education system was set up in the past, the student population grew very rapidly, and teacher supplies could not meet the needs. Soon after the industrialization, Korean society became successful and the job market required a lot of talented young people. Teaching was at that time not paid well enough to recruit enough smart young people, and working conditions were very poor. But the Korean society is based on Confucianism, with a high respect for education. Government incentives for the teaching job were given, such as free tuition for the national school of education, and teachers were given the social recognition as nation builders. Soon the economic conditions in Korean society changed, and both the stable job with sustainable pay and the generous pension became very attractive on the job market, attracting talented young people.

Before novice teachers starts teaching at a public school, as well as during their teaching career, teachers are often invited to in-service teaching whenever there are new educational policies that should be implemented. And teachers can form learning community group activities which are supported by schools by offering both time and expenses.

In the field, the quality of teachers' expertise is widely supervised to ensure quality education and improve teaching quality. In Korea, this view on supervision as providing guidance to teachers has existed since the beginning of the new education system in the nation-building time. Supervision activities in school enabled teachers to achieve their educational objectives, to continue research on education, and enhance professionalism.

However, in recent years, supervision has not been as much help in improving classes and has been criticized for its bureaucratic control from the higher offices of education, and even from school principals. Many alternative approaches such as consulting, coaching, and mentoring were proposed to upgrade traditional supervision.

Supervision in South Korea has been conducted in two ways: in-school supervision and off-school supervision. In-school supervision refers to activities conducted within the school under the leadership of the principal, and off-school supervision refers to activities conducted under the supervision of the Office of Education and the Ministry of Education, which has higher levels of education authority than the school. In-school supervision is conducted rather informally within the school among peer teachers as formative evaluation, where the off-school supervision is conducted through formal processes by outside experts.

3.14.5 National policies directed toward improving teaching quality

Preparation of lesson plans: At the core of in-school supervision activities is the preparation and execution of lesson plans. Writing lesson plans was compulsory to teachers, particularly novice teachers. After the legalization of the National Teachers' Union in 1999, mandatory preparation of lesson plans was abandoned after collective negotiations. Before 1999, teachers were asked to submit lesson plans one week in advance and obtain approval from the principal. In fact, it was not easy at all to prepare a lesson plan for each class, although it was also difficult for teachers to implement it in the classroom instruction. Evidently, it was a tremendous burden to prepare them and develop and prepare instructional materials alongside them. The testimony of a teacher who was an elementary school teacher in the 1960s:

> *"How would I have written it all by myself? At that time, there were more than ten class groups per grade. Then, each group teacher is in charge of one subject. Korean language for group 1, mathematics for group 2, music for group 3 … And when it comes to Friday, I just collected, copied and updated them little by little. Even if you copy it, you can learn from copying and it can be a lesson plan of your own. And before leaving work on Friday, the grade group leader needs to give approval, and on Saturday (when it was not a five-day system a week yet), it went to the vice-principal and then to the principal for approval. I was really busy. But, well ... I did it every year, so it was worth doing afterward as it became a habit." (Teacher X, 70 years old, used to be a teacher and an elementary school principal, and a former superintendent of a school district).*

Since the 2000s, lesson plans haven't been written for everyday classes. It lessened the burden on teachers but at the same time, teachers didn't have the opportunity to learn from experienced colleagues and strengthen their teaching skills in this way. Writing lesson plans remains, however: teachers must prepare a lesson plan once or twice a year for the "open class" or "research class". Lesson plans are also required to be submitted in various teacher competitions. Naturally, it is a necessity to learn how to develop a lesson plan at pre-school training college. A well-designed lesson plan is the first step for a successful lesson, the core expertise of teachers.

"Open class" and research presentation of instructional methods: To improve teachers' teaching skills, schools are required to open classes to parents and peer educators out of the school, and to present new ideas for teaching to people from outside of the school. This policy is to strengthen teachers' teaching skills. The details of the execution of this policy differ from school to school, but all schools regularly have to coordinate an open class day for parents, school district supervisors, and fellow teachers. During this event, research presentations of instructional methods are also open to the public. Not all teachers are asked to have the open class each time, but a teacher should have an open class at least several times throughout their teaching career. Criticism on the "open class" states that it is just for show, and not for real learning.

Teachers' group meetings: In-school supervision activities are based on teachers' group meetings. In general, teachers conduct meetings once a week by grades and subjects; for example, teachers for 3rd grade will have group meetings at an elementary school, and secondary school teachers will have meetings by subject. These teachers' group meetings will have a joint discussion in which teaching tips and instructional ideas for research are shared. However, most important on the agenda is how to develop test items and score the academic evaluation for formative and summative tests. Under the standardized national curriculum and textbook system, the results of formative evaluation conducted every month became a key tool for students' learning management. The test results are of the biggest concern to parents who can be very sensitive to the results. Therefore, among teachers who teach the same subject in the same grade, keeping the reliability and validity of test items is critical, and this type of collaboration keeps as much fairness as possible. Since the establishment of KTU (Korea Teachers Union) in 1999, all types of paper-delivered evaluation in the school were limited or abolished in the name of "procrustean or uniformed exam" and "competitive learning". This circumstance made the core agenda of student evaluation disappear and gradually the teacher's group meetings lost their liveliness. At any rate, this collaborative culture of teachers' group meetings has made a significant contribution to maintaining and enhancing the professionalism of the Korean teacher community.

Off-school supervision: The Minister of Education and the Superintendent of Education have established supervision guidelines every year to deliver the direction and focus of educational activities to schools and provide necessary support. Although standards for educational activities have already been established through the standardized national curriculum and textbooks, when new educational needs arise in the country, those higher authorities can add special educational activities, and spread new ideas for instructional methods may arise.

For meeting special educational goals, the Ministry of Education and the Office of Education used the research school system to conduct an experiment at schools and promote this nationwide. In addition, when new textbooks are published to implement the revised national curriculum, a research school system is adopted for pilot application before the new textbook is distributed for nation-wide use. In recent years, policies from higher-level authorities have been transformed into various educational institutes.

3.14.6 Specific, national policies directed toward improving differentiation in teaching

Homeroom teacher system: The homeroom teacher system is unique to Korean education. Many OECD countries do not have a classroom teacher system in middle and high schools. Instead, students move from one classroom to another to take classes. South Korea has homeroom teachers for all students and those homeroom teachers are responsible for the students' school life and they serve as mentors to help students grow. This means that homeroom teachers take care of not only the student's learning but also their personal growth, which has played a major role in the growth of education in Korea. But the homeroom teacher's role is demanding and recently it has become difficult to attract teachers to the role.

School rotation system: In Korea, teachers in public schools rotate from one school to another every 4-5 years. The purpose is to provide teaching services evenly and the incentive for teachers to work in remote areas is to give more points for promotion and a larger monetary compensation. This system does not exist in most countries except Korea and Japan, especially not in countries with a strong tradition of educational autonomy. This rotation system was introduced during the industrialization period in the 1970s as a device to reduce the educational gap between regions by exchanging teachers from preferred and non-preferred regions, and for teachers to experience different learning environments. The rotation system recruited young and ambitious teachers, and it has contributed to the level quality of education in South Korea.

Promotion system: In many countries, a teacher is a person that teaches in the classroom and the principal is a someone who takes care of general administrative matters in to run and manage the school. In Korea, however, teachers and principals are on the same career track, they are all classified into the same group called teachers. For teachers, becoming the principal is a promotion and the final goal of their teaching career. For the school, the most important job is teacher, so it is though that the head of school should come from the teacher pool. After experiencing the classroom teaching, teachers can become vice-principal, principal, and then have scholarship/research positions.

3.14.7 Country report on current international examinations (PISA, TIMSS)

Students from South Korea scored highly in most of international comparative studies. Korean students have been ranked high in the PISA study which is conducted by OECD in 2018. PISA 2018 was conducted by about 71 million students from 79 countries, 37 OECD member countries and 42 non-member countries. In Korea, 6,876 students from 188 schools (917 students of 34 middle schools, 5,881 of 917 high schools, and 78 of 2 miscellaneous schools) participated. As Table 3.14.1 shows, 1) South Korean students ranked 2nd to 7th in reading, 1st to 4th in mathematics, and 3rd to 5th in science out of 37 OECD countries.

Table 3.14.1 Results of PISA 2018 (OECD) – member countries by area
Source: OECD (2019a), PISA 2018 results

Reading			Mathematics			Science		
Country	Average	OECD Country ranking	Country	Average	OECD Country ranking	Country	Average	OECD Country ranking
Estonia	523	1-3	Japan	527	1-3	Estonia	530	1-2
Canada	520	1-4	Republic of Korea	526	1-4	Japan	529	1-3
Finland	520	1-5	Estonia	523	1-4	Finland	522	2-5
Ireland	518	1-5	The Netherlands	519	2-6	Republic of Korea	519	3-5
Republic of Korea	514	2-7	Poland	516	4-8	Canada	518	3-5
Poland	512	4-8	Switzerland	515	4-9	Poland	511	5-9
Sweden	506	6 -14	Canada	512	5-11	New Zealand	508	6~10
New Zealand	506	6~12	Denmark	509	6~11	Slovenia	507	6~11
United States of America	505	6-15	Slovenia	509	7~11	UK	505	6-14
UK	504	7-15	Belgium	508	7~13	The Netherlands	503	7-16

Academic achievements of Korean students seen through TIMSS

The International Association for the Evaluation of Educational Achievement (IEA) conducts the Trends in International Mathematics and Science Study (TIMSS) to compare students' mathematics and science achievements internationally every four years and identifies the relationship between educational context variables and achievement.

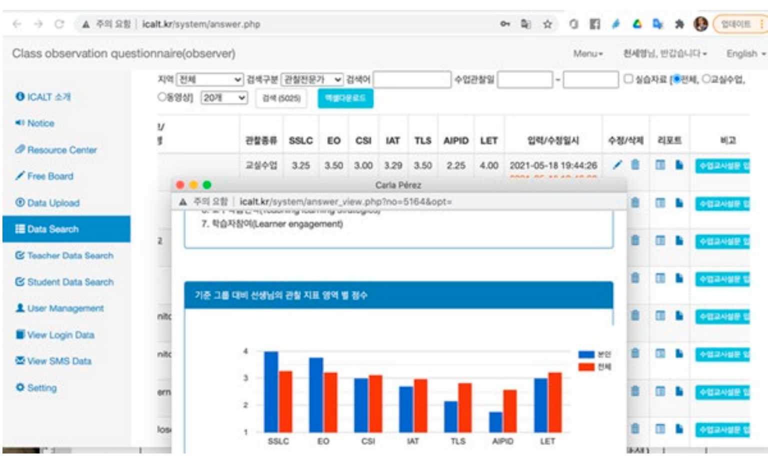
In 2011, among participating countries, Korean 4th-grade students ranked 2nd in mathematics and 1st in science. Korean middle school 2nd-year students ranked 1st in mathematics, and 3rd in science achievements compared to other participating countries. In TIMSS 2015, Korean students showed similar results. In 2015, 4th-grade students increased slightly from 605 points to 608 points in mathematics and from 587 points to 589 points in science compared to TIMSS 2011. In TIMSS 2015, middle school 2nd-year students' achievements decreased slightly from 613 points to 606 points in mathematics and from 560 points to 556 points in science compared to TIMSS 2011. The percentage of students in Korea that don't perform at the basic level of mathematics and science is the lowest among participating countries (TIMSS 2011). However, although their achievements were high, their confidence in math was low.

Project data information and activities

Table 3.14.2 Data collection by school levels and years

	2014-15	2016	2017	2018	2019	2020
elementary	-	167	183	375	277	86
lower secondary	164	126	246	417	442	146
upper secondary	229	29	92	229	321	85

- An average of 7 times a year of observer training workshops and seminars.
- Observer qualification and certification system development and 97 trained expert observers produced together with a couple of hundreds general attendees.
- Building a Big Database data collection and analysis: http://icalt.kr



- A series of International seminars co-hosted together with the University of Groningen team (2016, 2018, and 2019).
- Attending international conferences in partnership with the University of Groningen team (2018 ICSEI, 2018 EARLi, 2019 ICSEI, 2019 AERA, 2020 ICSEI).
- Submission and publications of international and national journals.

3.15 Spain[26]

3.15.1 Information about current national educational system

The Spanish education system has adopted a decentralized model. This means that the Spanish Ministry of Education, Culture and Sports establishes the basis of the education system, and the Autonomous Communities and local authorities can adapt some of these criteria to their particularities as far as they do not interfere with the national regulations.

The Central Administration (Ministry) oversees the following tasks (Martínez-Usarralde, 2015): promulgation of the basic norms, the ordering and arranging of the education system, decisions on the minimal requirements of teaching centers, the general teaching program, the minimal teaching contents, and the regulation of academic and professional titles that apply to Spain. To sum it up, its main function is to assure a globally coherent education system and to guarantee the equity of all Spanish citizens in the educational field (Aragón, 2013). The autonomous administrations can develop these national regulations further in their territory. Local authorities are responsible for the provision, repair and maintenance of buildings and assure school attendance, which is compulsory.

3.15.2 Current trends in educational policy and practice & regional differences

The Spanish Education system has gone through a multitude of reforms in the last decades. These transformations were intended to give the system a new direction. Global changes in the economy, society, and politics required a modernization of the Spanish system to make it more efficient, and comparable to other European education systems. The most relevant acts to understand its essence and main principles are:

- *Ley General de Educación* (L.G.E.)/General Act of Education in 1970
- *Ley Orgánica del Derecho a la Educación* (L.O.D.E.) / Right to Education Act in 1985
- *Ley de Ordenación General del Sistema Educativo* (L.O.G.S.E.)/ General Organization of the Education System Act in 1990

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- *Ley Orgánica de Participación, Evaluación y Gobierno de los Centros Educativos* (L.O.P.E. G.C.E.)/ Participation, Evaluation and Governance of Educational Centers Act in 1995
- *Ley Orgánica de Calidad de la Educación* (L.O.C.E.)/Quality of Education Act in 2002
- *Ley Orgánica de Educación* (L.O.E.)/ Education Act in 2006
- *Ley Orgánica para la Mejora de la Calidad Educativa* (L.O.M.C.E.)/ Improvement of the Quality of Education Act in 2013
- *Ley Orgánica por la que se modifica la Ley Orgánica 2/2003 de Educación* (L.O.M.L.O.E.)/ Modification of Education Act 2/2006 in 2020

The actual structure of the Spanish Education system is based on the structure proposed by the *Ley de Ordenación General del Sistema Educativo* which established in 1990, a structure of ten years of Compulsory Education which includes Primary Education (6-12 years old) and Lower Secondary Education (*Educación Secundaria Obligatoria, E.S.O.* for students from 12 to 16 years old)[27]. Figure 3.15.1 shows these two stages alongside the non-compulsory: Preschool Education (*Educación Infantil* 3-6 years), Upper Secondary Education (*Bachillerato* 16-18 years), Vocational Education and Training (*Ciclos Formativos de Formación Profesional de Grado Medio/Grado Superior*) and Higher Education.

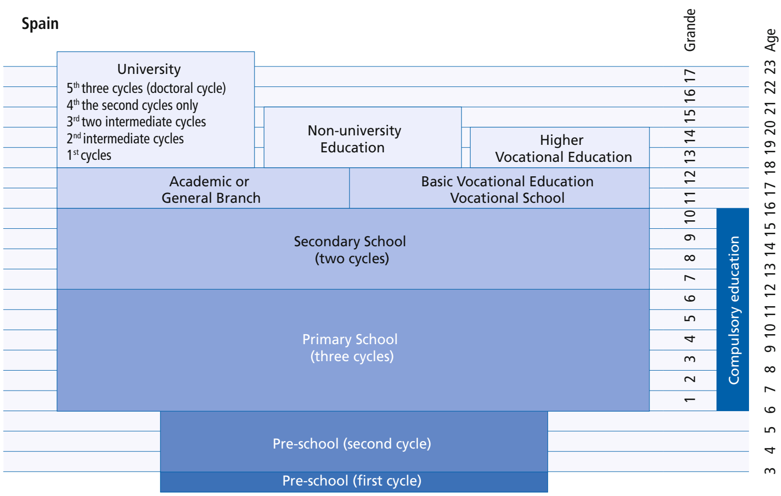

Figure 3.15.1 Spanish Education system structure
Source: Martínez-Usarralde (2015: 761)

27 Before the promulgation of the L.O.G.S.E., the L.G.E. stablished that Primary Education (*Enseñanza General Básica*, E.G.B.) lasted eight years. More specifically, it was designed for students aged 6-14 years old. All pupils that had succeeded in this key stage and who wanted to go to university, enrolled to four years of Upper Secondary Education (three courses of *Bachillerato Unificado Polivalente*, B.U.P. and one year of *Curso de Orientación Universitaria* C.O.U.). But teenagers who had failed to achieve E.G.B. objectives usually dropped out of the education system or started Vocational Education and Training (Fernández et al., 2007).

L.O.M.L.O.E. has removed the dual option (academic versus vocational established by L.O.M.C.E.) from the final year of compulsory education and the final external exams, and has added a new branch of upper secondary education combining science and humanities. Education in civics and ethics has been given a more important role, focusing on human rights, sustainability, and equity. It has also established that the minimum timetable for compulsory subjects in Primary Education, Junior Secondary Education and Upper Secondary Education cannot be less than 50% in the Autonomous Communities, which do have a co-official language, and 60% for those who do not. Nevertheless, as in the past, cross-party agreement about education has proved to be impossible.

3.15.3 The status of teachers & the teaching profession

The project titled *Trust in professions* is periodically developed by non-profit organization GFK. In its 2018 edition, which covers twenty countries, the report examined the empirically researched trust placed in over thirty professions.

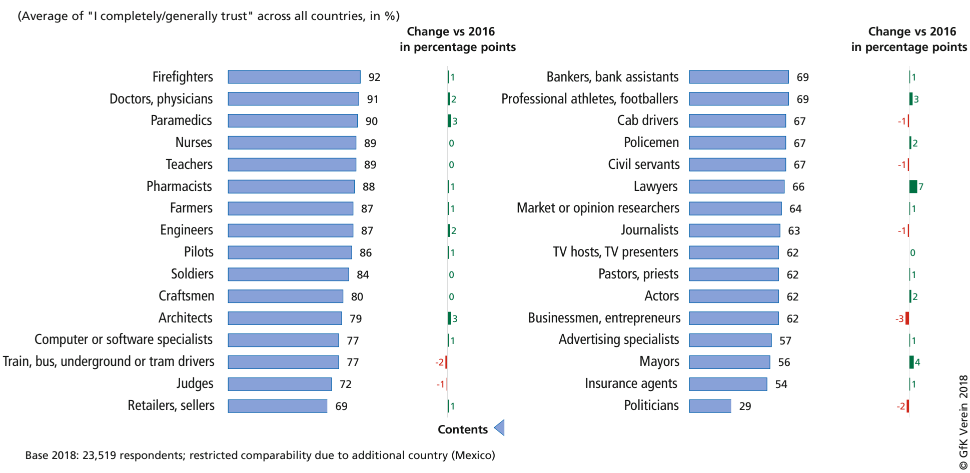

Figure 3.15.2 Trust in professions
Source: Verein (2018)

The general outcomes, which show the mean of the twenty countries, posit that the teaching profession appears as one of the most valued lines of work worldwide. Figure 3.15.2 shows that teachers take the 5th place (after firefighters, doctors, paramedics, and nurses) worldwide, and in Spain (Figure 3.15.3) teachers take the 8th place (after firefighters, nurses, paramedics, pharmacists, train/bus/underground drivers, doctors/physicians, and farmers). To sum it up, teachers are trustful to the Spanish.

Another report, which asked 19,587 adults aged 16-74 across 23 countries the same question online, shows that scientists are seen as the most trustworthy profession globally, followed by doctors and teachers (Ipsos, 2019). Furthermore, teachers are considered the most trustworthy professionals in USA and Brasil, whereas in Spain 56% of participants in the study considered teachers as the most trustworthy (vs. doctors – 69%, and scientists -67%).

Top three:
- #1 most trustworthy
- #2 most trustworthy
- #3 most trustworthy

	TOT	ARG	AUS	BEL	BRA	CAN	CHN	FRA	GB	GER	HUN	IND	ITA	JAP	KOR	KSA	MEX	POL	RSA	RUS	SPA	SWE	TUR	USA
Scientists	60%	74%	62%	56%	53%	58%	63%	59%	62%	52%	58%	67%	67%	40%	42%	53%	72%	59%	50%	76%	67%	56%	70%	55%
Doctors	56%	68%	69%	64%	48%	63%	56%	62%	67%	51%	38%	49%	60%	39%	28%	52%	68%	45%	64%	49%	69%	56%	61%	60%
Teachers	52%	61%	60%	51%	57%	57%	62%	48%	58%	39%	48%	63%	47%	18%	27%	48%	58%	44%	54%	72%	56%	44%	59%	61%
Members of the Armed Forces	43%	32%	58%	36%	39%	56%	72%	55%	52%	24%	39%	70%	47%	35%	18%	-	40%	35%	29%	55%	39%	39%	35%	60%
The Police	38%	26%	56%	44%	31%	52%	80%	53%	47%	49%	31%	33%	50%	33%	21%	-	11%	36%	12%	20%	45%	49%	39%	48%
Ordinary men/women	37%	47%	42%	37%	32%	37%	45%	35%	37%	32%	23%	49%	35%	18%	22%	45%	45%	44%	33%	64%	43%	26%	26%	42%
Judges	32%	12%	44%	38%	26%	40%	65%	36%	43%	41%	24%	42%	29%	31%	15%	-	18%	28%	33%	24%	23%	43%	32%	39%
Lawyers	25%	18%	22%	21%	20%	20%	53%	28%	26%	25%	16%	25%	20%	28%	14%	34%	17%	31%	21%	36%	23%	33%	23%	15%
Television news readers	24%	18%	22%	30%	18%	26%	50%	20%	30%	35%	14%	29%	17%	17%	17%	35%	17%	22%	31%	15%	19%	31%	13%	18%
Pollsters	23%	8%	24%	24%	23%	24%	28%	35%	26%	20%	15%	38%	15%	18%	13%	40%	9%	13%	21%	27%	22%	27%	31%	34%
Civil Servants	23%	25%	9%	21%	24%	16%	45%	35%	11%	26%	20%	23%	29%	10%	14%	39%	36%	23%	13%	39%	22%	19%	23%	14%
Business leaders	22%	18%	17%	23%	20%	19%	46%	26%	16%	13%	12%	34%	21%	15%	12%	40%	35%	21%	30%	21%	12%	19%	19%	19%
Journalists	21%	17%	23%	16%	25%	23%	33%	14%	24%	17%	18%	27%	16%	18%	24%	-	19%	17%	31%	37%	7%	28%	15%	32%
Clergy/priests	21%	17%	17%	22%	21%	29%	48%	19%	15%	23%	13%	28%	19%	11%	13%	31%	27%	22%	23%	27%	15%	16%	12%	23%
Bankers	20%	14%	13%	13%	13%	22%	43%	13%	13%	12%	8%	38%	13%	16%	23%	45%	23%	18%	28%	20%	7%	23%	23%	20%
Advertising executives	13%	16%	8%	7%	17%	10%	30%	10%	9%	9%	4%	22%	12%	8%	10%	31%	22%	10%	14%	9%	11%	6%	17%	12%
Government Ministers	12%	8%	12%	9%	10%	13%	50%	10%	11%	11%	8%	21%	15%	10%	12%	-	9%	13%	5%	10%	8%	22%	23%	11%
Politicians generally	9%	5%	10%	9%	8%	10%	22%	8%	11%	9%	5%	17%	8%	7%	8%	-	6%	5%	6%	10%	7%	11%	11%	9%

Figure 3.15.3 Trustworthy professions
Source: Ipsos (2019)

This perception was also confirmed by the European Union in a report in which it established that there doesn't seem to be a necessity to design any communication strategy to improve the prestige of teachers because the image of the profession is already considered very positive (European Union, 2013:19).

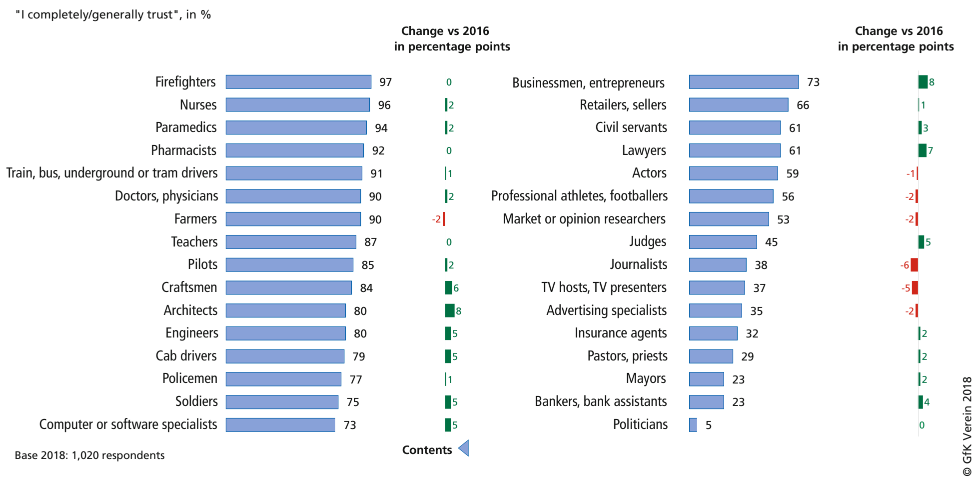

Figure 3.15.4 Trust in professions in Spain
Source: Verein (2018)

The Spanish Sociological Research Center (CIS) periodically publishes reports dealing with different concerns. In the barometer of February 2013 (Centro de Investigaciones Sociológicas, 2013) a study was published about the perception of the Spanish population about different professions, and more specifically their opinions about teachers. Table 3.15.1 shows the answers on a scale from 0 to 100.

Table 3.15.1 Most valued profession
Source: Centro de Investigaciones Sociológicas (2013)

Most valued profession	Mean
Doctor	81.58
University teacher	75.16
Primary Teacher	74.70
Preschool Teacher	74.64
Secondary Teacher	73.67
Vocational Education and Training Teacher	73.92
Architect	66.80
Bricklayer	64.10
Street sweeper	64.09

The respondents were then asked about the professions they would recommend to their children. The answers given were in order: doctor, lawyer, architect, university teacher, judge, and teacher (in general). Less recommended were: waiter, street sweeper, writer, bricklayer, policeman, and vocational education and training teacher[28].

It is worth mentioning the perception about teachers' salary, social prestige, and access requisites to the profession. Table 3.15.2 and 3.15.3 show the answers in these categories for Secondary Education and Vocational Education, and Trainee Teachers. In both, most consider that they require solid training, they make it possible to develop personal initiative, and they require a sense of responsibility, and a strong vocation. The level of agreement is not as high when focused on salary and social prestige.

Table 3.15.2 Do you consider a Secondary teachers' profession to …
Translated from: Centro de Investigaciones Sociológicas (2013: 9)

	Strongly agree	Agree	Disagree	Strongly disagree	Don't know	No answer
... be well paid	6.4	38.3	29.9	3.5	21.6	0.2
... have social prestige	7.4	46.6	38.1	3.8	3.7	0.4
... require a solid training	33.3	58.4	4.9	0.2	3	0.3
... make it possible to develop personal initiative and creativity	19.1	48.6	18.8	10.4	10.4	0.4
... require a sense of responsibility	41.0	49.7	6	2.7	2.7	0.4
... require a strong vocation	46.2	45.2	5.2	2.4	2.4	0.3

Table 3.15.3 Do you consider a Vocational Education and Training teachers' profession to …
Translated from: Centro de Investigaciones Sociológicas (2013:10)

	Strongly agree	Agree	Disagree	Strongly disagree	Don't know	No answer
… be well paid	6	34.6	26.7	2.8	29.8	0.2
… have social prestige	7.3	41.8	37.7	5	7.7	0.5
… requires a solid training	29.9	58.9	5.3	0.3	6.2	0.4
… make it possible to develop personal initiative and creativity	22	48.5	14.5	2.1	12.5	0.4
… require a sense of responsibility	34.7	50.5	8.6	0.7	5.1	0.4
… requires a strong vocation	40	46.7	7.6	0.7	4.7	0.3

If we refer to the Spanish teachers' salary, we can observe (Figure 3.15.5) that their annual salaries are over the OECD and European Union teachers' mean in all educational levels: primary

28 To understand this fact, it is necessary to consider that before L.O.G.S.E. in 1990, Vocational Education and Training was considered a less significant type of training in Spain. Its social image was directly related to the profile of most Vocational Education and Training students: those who did not get good marks, did not want to continue studying or were not able to obtain their certificate in compulsory education.

education, lower secondary education, and higher secondary education, when they start their professional activity, after fifteen years of experience, and in the maximum permitted.

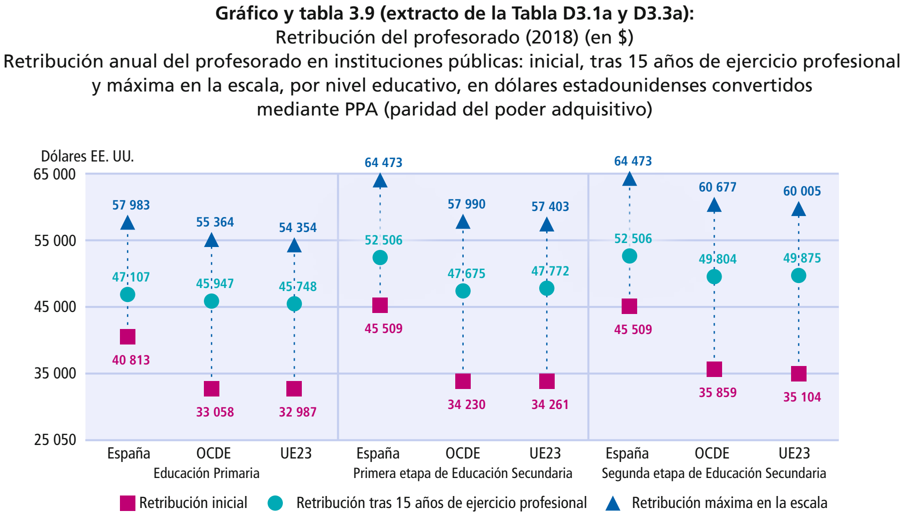

Figure 3.15.5 Teachers' salaries (I)
Source: Ministerio de Educación, Cultura y Deporte de España (2019: 80)

If data are analyzed in detail, it shows that only German lower secondary education teachers have higher initial salaries than the Spanish. On the other hand, the maximum salary for this educational level for the most experienced teachers is higher in Portugal, Germany, the Netherlands, the United States of America, and Ireland. In higher secondary education, German, Norwegian, and Mexican teachers have higher initial salaries than the Spanish. The maximum salary for experienced higher secondary education teachers remain lower in Spain than in Portugal, Germany, the Netherlands, the United States, and Ireland. Spanish teachers also need to have more years of experience (39) than in any other country to be eligible for the top salary.

Table 3.15.4 Teachers' salaries (II)
Source: Ministerio de Educación, Cultura y Deporte de España (2019: 80)

	Educación Primaria		1ª etapa de E. Secundaria		2ª etapa de E. Secundaria		Años para alcanzar la retribución máxima en E. Secundaria
	Retribución inicial	Retribución máxima en la escala	Retribución inicial	Retribución máxima en la escala	Retribución inicial	Retribución máxima en la escala	
España	**40 813**	**57 983**	**45 509**	**64 473**	**45 509**	**64 473**	**39**
OCDE	**33 058**	**55 364**	**34 230**	**57 990**	**35 859**	**60 677**	**35**
UE23	**32 987**	**54 354**	**34 261**	**57 403**	**35 104**	**60 005**	**28**
Francia	30 872	54 503	32 942	56 283	32 492	56 283	39
Grecia	19 825	38 804	19 825	38 804	19 825	38 804	36
Italia	30 403	44 468	32 725	48 833	32 725	51 045	35
Portugal	33 516	72 369	33 516	72 369	33 516	72 369	34
Alemania	60 507	79 355	67 163	88 214	70 749	96 736	a
Países Bajos	42 133	67 147	43 132	88 464	43 132	88 464	m
Finlandia	33 916	44 711	36 629	48 288	38 842	52 126	20
Noruega	38 559	50 883	38 559	50 883	46 914	57 374	16
Suecia	39 131	52 346	40 348	53 885	40 823	54 931	a
Brasil	14 775		14 775		14 775		m
Chile	23 747	44 107	23 747	44 107	24 555	45 723	a
México	20 851	41 693	26 560	53 262	50 775	62 678	a
Estados Unidos	40 067	68 712	40 602	69 586	41 430	72 498	a
Inglaterra (R.U.)	29 040	48956	29 040	48 956	29 040	48 956	a
Irlanda	36 553	70 967	36 553	71 568	36 553	71 568	m

Access to the profession of secondary teachers is competitive in Spain. Access to the Master of Teacher training, which is also compulsory for them, is limited to the best students (in the case of the University of Oviedo there are between five and twenty vacancies depending on specialty, for example). Once they have achieved the required training, they must apply for a public entrance examination in an Autonomous Community. These examinations do not take place every year, nor are they for all specialties. In this selection process, applicants take different tests to show their knowledge of the discipline as well as their didactic skills. The number of potential teachers' places is also limited for each specialty.

3.15.4 Pre-service & in-service education of teachers

The initial training required for teaching in preschool education (second cycle)[29] and Primary Education teachers is the same throughout Spain: hold a specific university degree (*Grado en Maestro de Educación Infantil o Primaria)* which takes four years. For Secondary Education and Vocational Education and Training, it is necessary to not only hold a relevant University Degree (*Grado*) of four years, but also to study a masters on Teacher Training (*Master's Degree in Teacher Training in Secondary and Upper Secondary Education and Vocational Training)* in the Faculties of Education or Teacher Training. These University studies are compulsory not only for future public school teachers, but also for private schools. To access a bachelor studies, a final mark equal to or greater than the minimum average grade in the university entrance examination is needed.

The admission to the *Master's Degree in Teacher Training in Secondary and Upper Secondary Education and Vocational Training* also has some specific requirements (Eurydice, 2020):

> *Accreditation of mastering competences concerning the targeted specialization by taking a test designed by universities for this purpose, with the exemption of those holding some of the university degrees corresponding the chosen specialization. Universities can set a maximum number of students to be accepted to the different specialties of the master.*
>
> *Accreditation of mastering a foreign language equivalent to B1 level of the Common European Framework of Reference for Languages.*
>
> *In Autonomous Communities with a co-official language, the accreditation of mastering both the co-official language and the Castilian language is required as a rule.*

The Master in the different specializations or the equivalent pedagogic and didactic training must include, at least, the modules and contents set for the whole State as seen in Table 3.15.5, respecting universities' autonomy.

29 Teachers of the first cycle of Preschool Education usually obtain their Qualification in a Vocational and Education Training Course. These teachers work with children from 0 to 3 years old.

Table 3.15.5 Master's Degree in Teacher Training in Secondary and Upper Secondary Education and Vocational Training Syllabus
Source: Eurydice (2020)

	Master's degree on Compulsory Secondary Education and Bachillerato, Vocational Training and Language Education Teacher Training – All specializations	Master's degree on Compulsory Secondary Education and Bachillerato, Vocational Training and Language Education Teacher Training – Educational Guidance specialization (*)	Pedagogical and didactic training equivalent to the master's degree in teaching
General module	Learning and personality development Education processes and contexts Society, family, and education		
Specific module	• Complements for education of a discipline • Learning and teaching of the corresponding subjects • Teaching innovation and introduction to education research	• Fields of educational guidance and pedagogical counselling • Processes of educational guidance and pedagogical counselling • Inclusive education and attention to diversity • Research and education innovation and change management	• Professional guidance • Learning and teaching • Inclusive education and attention to diversity • Teaching innovation and introduction to education research
Practicum	Stages in the corresponding specialization: • In educational institutions: all master's specializations or equivalent pedagogical and didactic training In sector teams external to the educational institutions or in bodies of educational guidance and psychopedagogical counselling in educational institutions: Educational Guidance specialization • Master's project or final project: equivalent pedagogical and didactic training		
Credits up to the discretion of universities	Credits at the of universities to be assigned to different modules (general, specific or practicum) or in others created at the universities' discretion		

(*) to be studied mainly by teachers who will work as guidance staff at schools or in sector teams outside of educational institutions

Access to the teaching profession varies in accordance with the ownership of the educational institution and the education level provided (Eurydice, 2020). In public educational institutions, candidates must pass a merit-based selection and a competitive examination whereas in publicly-funded private schools and non-publicly funded private schools selection is carried out by the school owner, together with the director. In publicly funded private schools the selection criteria for teachers have a public nature.

The tests aim at evaluating the applicants' suitability and they cover a list of topics previously established so that applicants can prepare for them. Thet are made up of the following phases (Eurydice, 2020):

1. Competitive examination. Specific knowledge of the teaching specialty is evaluated, as well as the pedagogic aptitude and the mastery of the necessary techniques for the execution of teaching.
2. Merit-based selection. Candidates' prior teaching experience, academic background and other merits are evaluated in accordance with scales established in the different calls to gain access to the body of school teachers (according to Autonomous Community), secondary education teachers (according to Autonomous Community) and technical

teachers of vocational training. The score of this phase is only applied if applicants have passed the competitive examination phase.

3 Traineeship. This aims at checking the selected applicants' aptitude for teaching.

An applicant is selected if they have passed all the tests in the competitive examination phase, but the number of selected applicants never exceeds the number of positions published.

3.15.5 National policies directed toward improving teaching quality

Before 2010, Spanish Secondary and Vocational Education and Training teachers had to obtain a certificate which enabled them to work as teachers (Pedagogical Aptitude Certificate). This training was shorter than the actual master's degree (only a few months), and had to be studied after finishing their university degrees in their discipline. Access to this course was not as competitive as the admission into the actual Master in Teacher Training in Secondary and Upper Secondary Education and Vocational Training.

Since 2010, there has been an important reform on Spanish national policies to improve teachers' qualifications by the establishment of the master which lasts one academic year and in which future teachers are taught full time on pedagogical, psychological, and didactic topics. This Master is set in the faculties of education of most Spanish universities. One substantial dimension of this training involves a traineeship at high schools for five or six months.

In-service teacher training can also be considered as an instrument to improve teaching quality. Although it is optional, it has specific effects on teachers' professional careers, regardless of the ownership of the educational institution they work at. Some of these effects are merits in public competitive examinations or receiving additional rewards.

3.15.6 Specific, national policies directed toward improving differentiation in teaching

L.O.M.L.O.E. has approved a broad concept of differentiation needs considering difficulties in the access to education, presence, participation or learning so that support or specific educational attention seems to be needed to achieve objectives. An early diagnosis and an annual assessment of how objectives are being achieved are pointed out as key matters.

There is also an intention to provide ordinary schools with all the resources to give the correct type of attention to all students and their specific needs. This act maintains the existence of differences between students "with special education needs" and those who have "a specific need of educational support".

On the other hand, L.O.M.L.O.E. substitutes the "Achievement and Learning Program" (for students in their third year of compulsory education showing difficulties which may cause risk of school dropout or of not finishing compulsory education) by "Curricular Diversification Programs" (not only for students in their third year of compulsory education but also those in their fourth year). This program adapts the core subjects according to student needs and organizes school timetables in a less rigid way. Basic Vocational Education and Training is also maintained for students who have difficulties in the achievement of Lower Secondary Education objectives and who prefer Vocational Training.

3.15.7 Country report on current international examinations (PISA, TIMSS)

Based on current results of popular international testing studies such as PISA, student performance in Spain in mathematics (M = 481) and science (M = 483) was below the OECD ($M_{\text{mathematics}}$ = 489; M_{science} = 489) and the European Union average ($M_{\text{mathematics}}$ = 494; M_{science} = 490) (Ministerio de Educación, Cultura y Deporte de España, 2019). Therefore, Spanish results in international evaluations have not always been as good as hoped for, particularly in mathematics (M = 481) in which the ratings were similar to those of Hungary and Lithuania (Ministerio de Educación, Cultura y Deporte de España, 2019; OECD, 2018a). Adopting a comparative perspective, there are few participants in Spain with outstanding results, and the level in lower achievement students was similar to the OECD average. In mathematics, 75% of the students showed a level 2/higher than 2 (OCDE average 76%); 7% obtained level 5/higher than 5 (OECD average 11%). In sciences, 79% of the students achieved level 2/higher than 2 (OECD average 78%) and 4% of students achieved level 5/higher than 5 (OECD average 7%).

Furthermore, there are substantial internal differences between Spanish regions, with generally better results in Castilla-León (M = 502), Navarra (M = 497) and Rioja (M = 503) in mathematics and Galicia (M = 510) and Castilla y León (M = 501) in science (Ministerio de Educación, Cultura y Deporte de España, 2019). Ceuta ($M_{\text{mathematics}}$ = 411; M_{science} = 415), Melilla ($M_{\text{mathematics}}$ = 432; M_{science} = 439), Canary Islands ($M_{\text{mathematics}}$ = 460; M_{science} = 470) and Andalucía ($M_{\text{mathematics}}$ = 467; M_{science} = 471) achieved the lowest results both in mathematics and in science. It should be noted that although Spain has a central Department of Education that is responsible for coordination, educational responsibilities have been transferred to autonomous communities, who are responsible for the design of curricula, language policies and other organizational issues concerning public schools, particularly in those regions which have their own language in addition to Spanish (Martínez Usarralde, 2015).

The International Association for the Evaluation of Educational Achievement (IEA) develops the Trends in International Mathematics and Science Study (TIMSS) every four years, with students in 4th and 8th grade. In Spain, only students in their 4th year (Primary Education) have participated in the study. In the 2015 edition, Spain has obtained 505 points in mathematics, which means these students scored above the 49 participants' average (M = 500) but below the OECD (M = 525) and European Union (M = 519) average. The best results have been obtained by Singapore (M = 618), South Korea (M = 608), Japan (M = 593), Northern Ireland (M = 570) and Russia (M = 564) (Ministerio de Educación Cultura y Deporte de España, 2016).

On the other hand, Spain has obtained 518 points in science and therefore Spain results are above the 500 points average of all participant countries, but below the OECD (M = 528) and European Union (M = 521) average. The countries that show the most outstanding performance are Singapore (M = 590), South Korea (M = 589), Russia (M = 567) and Finland (M = 554) (Ministerio de Educación Cultura y Deporte de España, 2016).

Spain is the European Union country with the highest improvement in mathematics when comparing the 2011 and 2015 results (23 points), followed by Northern Ireland (20), the Czech Republic (17), and Sweden (15).

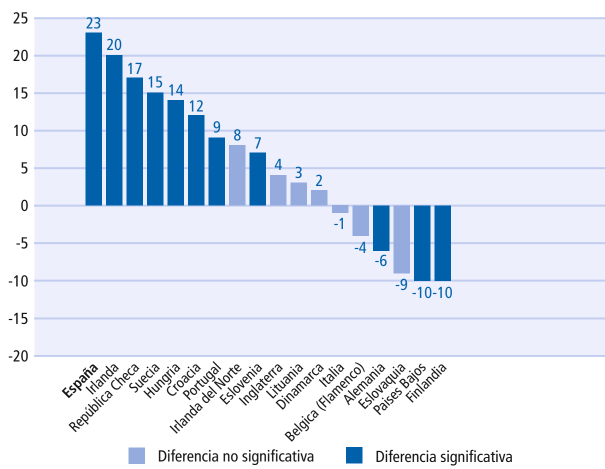

Figure 3.15.6 Improvement in mathematics
Source: Ministerio de Educación Cultura y Deporte de España (2016: 4)

Spain is the 4th country when considering improvement in science, 13 points. The Netherlands improved by 10 and 14 points respectively, and Finland 10 and 16 points.

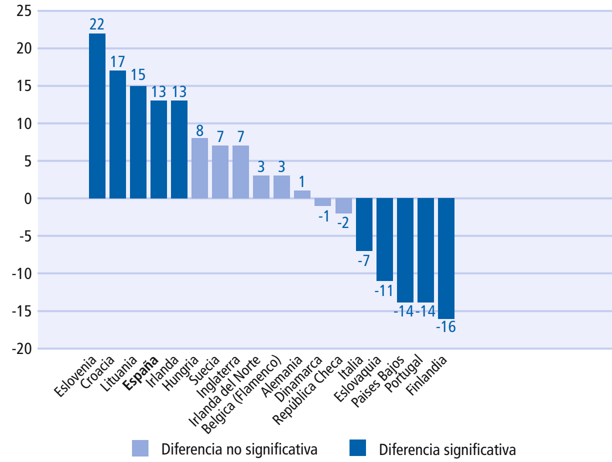

Figure 3.15.7 Improvement in science
Source: Ministerio de Educación Cultura y Deporte de España (2016: 4)

3.16 The Netherlands[30]

3.16.1 Socio-political context & implications for teaching/educational policy

The Dutch education system combines a centralized framework and policies with decentralized administration and school management. This framework provides standards with broad achievement goals and supervision set by central government, while schools and institutions have a great degree of educational and administrative autonomy on matters related to resource allocation, curriculum, and assessments. Therefore, one of the key features of the Dutch education system is freedom of education. In the Netherlands, it is compulsory for all young people aged 5-16 to attend school full-time or until they have obtained a basic qualification. The Dutch Ministry of Education, Culture, and Science works with local governments to coordinate educational policy.

Division characterizes education in the Netherlands. It is tailored to the student's specific requirements and background. There is a key moment at the end of primary education when pupils decide on the type of secondary education they will go into. The overall principle is to enhance equity and quality. The education system is divided over schools for different age groups: primary education (4-12 years), secondary education (12-16/18 years) and Tertiary education (16+). Schools are divided into public, private (religious), and general-special (neutral/non-denominational) schools. The Dutch grading scale runs from 1 (very poor) to 10 (outstanding). In primary and secondary education, some schools offer bilingual education and student are taught in both Dutch and English.

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Primary education

Children attend elementary school from groups 1-8. In group 8, pupils complete the Cito Eindtoets Basisonderwijs (Cito test, which is not compulsory but is widely applied). The test results help the teachers to recommend the type of secondary school best suited to each pupil. The opinion of pupils and their parents are also weighed in the decision.

Secondary education: early differentiation

Dutch high schools are divided into three streams: one to prepare students for vocational training (vmbo), another to prepare students for university (vwo), and a middle stream to prepare students to study at universities of applied sciences (havo).

For a visual representation of the Dutch educational setting, see Figure 3.16.1.

Gradual shift to higher tracks

Between 1990 and 2011, the proportion of students in pre-vocational education (vmbo) decreased from 58% to 39%. The number of students in general secondary education (havo) and pre-university education (vwo) rose from 32% to 44% (MoECS, 2012).

Level of (school) autonomy

The Netherlands has a highly decentralized school system (86% of decisions are made by the school, the OECD average is 41%). There is no national curriculum (even though there are national end examinations). School autonomy is grounded in the principle of "freedom of education", guaranteed by the Dutch Constitution since 1917. Parents are free choose any school for their children.

Responsibilities

Schools all have equivalent public funding. Approximately one third of pupils in primary education attend non-denominational schools, one third attend Catholic schools, and one quarter attend Protestant schools, and the remaining students attend another type of government-dependent school. The Ministry of Education, Culture and Science (MoECS) has overall responsibility. There is a large intermediary structure of school support organizations.

Expenditure

The Netherlands achieves good results with an average level of expenditure: 3.8% of GDP is spent on primary and secondary education, similar to the OECD average. Education

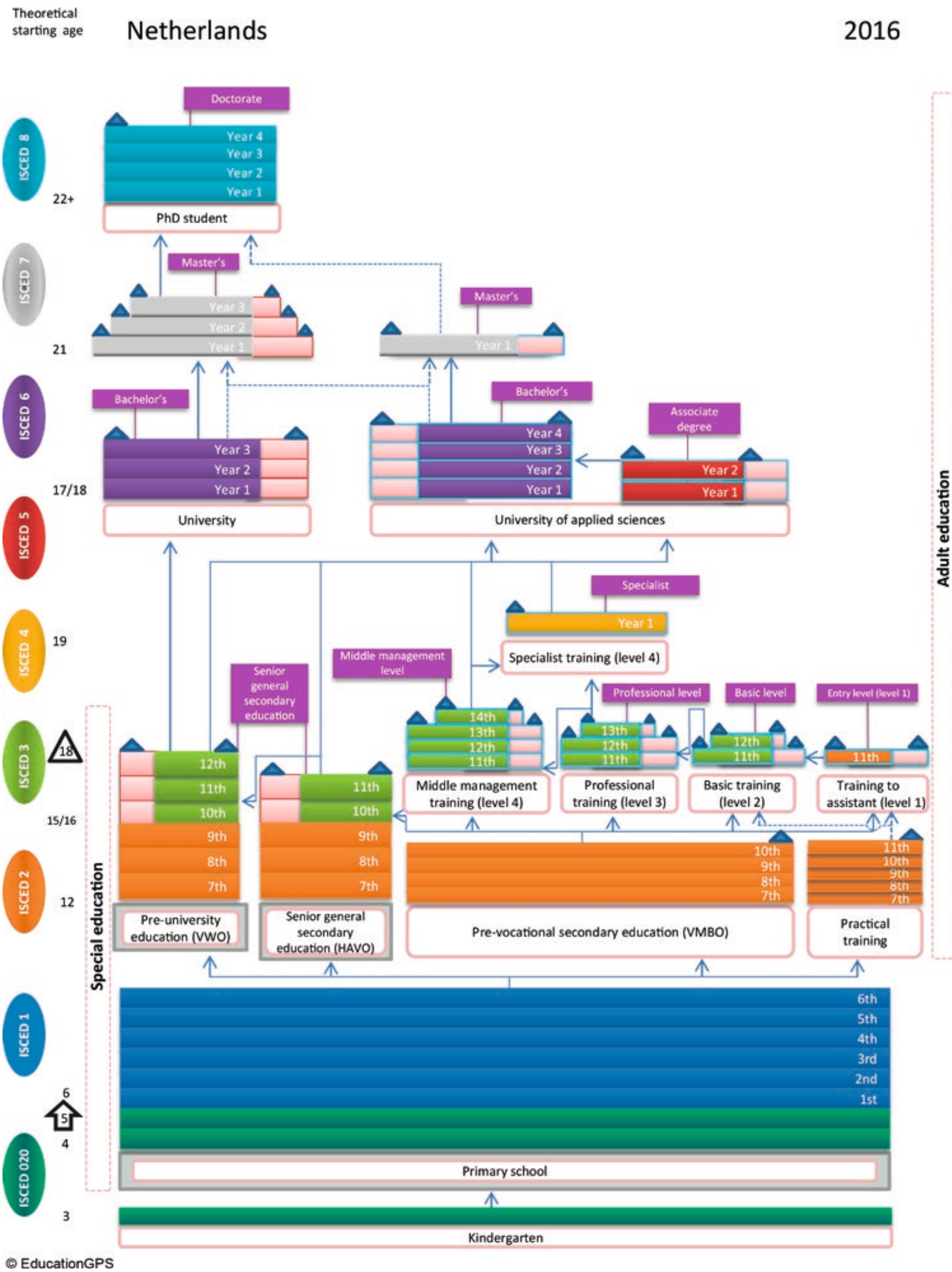

Figure 3.16.1 The education system in Netherlands
Source: OECD (2016b)

expenditure (2000-2012) has increased by 0.6% (OECD average increase is 0.2%). School funding mainly reflects the number of students (extra funding is provided for students with extra needs). School boards receive block grants for staffing and operating costs.

Teacher demographics and other teacher statistics

The Netherlands is facing a demographic decline in its student population. Between 2011 and 2020 the number of students in primary education is expected to decline by 100,000 (a decrease of 7%), with declines of up to 20% in the certain regions. Within these regions, some municipalities faced declines of up to 30% of the student population by 2020. The quality of education in smaller schools is harder to ensure, due to financial and staffing issues (Moseley and Owen, 2008; Huitsing and Bosman, 2011). Schools that have experienced a strong demographic decline are more often classified as weak or very weak by the Inspectorate of Education (Haartsen and Wissen, 2012).

Teachers devote a relatively large amount of time to teaching itself (more than 10% above the OESO average). Finding time for other tasks or professional development is problematic. School boards and teacher teams are held accountable for the quality of education. Together, they formulate goals and decide on the roles and responsibilities in achieving these goals.

By law 1,200 hours per full-time teacher per year should be devoted to teaching or to teaching tasks (e.g., preparing lessons, checking test results) and 459 hours should be devoted to organizational tasks (e.g., meetings) and professional development. Teachers negotiate with their manager about the distribution of tasks in a school year. The manager tests whether this complies with both the criteria of the law and school policy and divides the tasks among teachers. If the majority of teachers approve of this division, it is accepted.

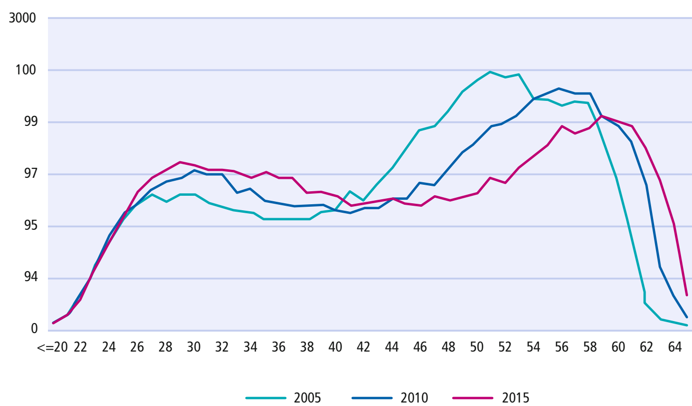

Figure 3.16.2 Profile of the teacher workforce
Source: OECD (2016b)

Currently, there is a teacher shortage in secondary and vocational education in the Netherlands (more older teachers are leaving the workforce compared to the number of entries to the workforce). In secondary education (SE), the majority of teachers have permanent, full-time positions with following composition: Permanent (85%), temporary (15%), full-time (75%), and part-time (25%).

3.16.2 Current trends in educational policy and practice & regional differences

The Dutch government has proposed some reforms to boost the equality and quality of education. Currently, there are four priorities set in Dutch educational policy: 1) find and employ skilled teachers, 2) tailor education in line with the student's personal ability and interests, 3) introduction of programs and activities for both weak and excellent students, and 4) introduce tenders for innovative projects (Veugelers, 2004).

Brief listing of some major historical reforms:

- 1917 Constitution – Private (denominational) schools and public schools get equal governmental funding.
- Bologna Declaration 1999 – A three-tier higher-education system consisting of the degrees of bachelor, master and doctor was adopted.
- January 1st, 2007 Socrates – Promotion of knowledge exchange, cooperation and mobility between EU education and training systems.
- August 1st, 2007 amendment – Under-18s who have finished their compulsory education must continue their schooling to obtain a basic qualification.
- Teachers' Program 2013-2020 (*Lerarenagenda 2013-2020*) – To develop teachers' quality.
- The Investing in Young People Act (2009-2012) – Required municipalities to provide work or learning opportunities to 18-27-year-olds, and a salary or allowance in exchange for their work or to support their education.
- The Language and Numeracy Act (2010) – Statements about knowledge and abilities that students must attain in literacy and mathematics at both primary and secondary (general and vocational) levels.
- The Quality in Diversity in Higher Education Act (*Wet Kwaliteit in verscheidenheid hoger onderwijs*, 2013) – Shift the deadline to enter higher education to an earlier date (May, 1st) and set study checks to help students make decisions about their future education.
- The 2014/15 legislation – Compulsory student assessments at the end of primary education

- January 1st, 2021 New Schools Act – School should more closely match the wishes of parents and pupils.

Source: Eurydice (2021c)

3.16.3 The status of teachers & the teaching profession

The public perception of the teaching profession in the Netherlands is relatively negative compared to their tasks and responsibilities in society, even though individual teachers are valued. The public is very critical about the professionalism of teachers and the quality of Initial Teacher Preparation (ITP) programs. Moreover, one of the perceptions about ITP programs is that it is a too quick a solution to a wide variety of societal problems. Additionally, the teaching profession has a negative image based on low salaries, high workload, and low autonomy. However, the public perception has been changing somewhat for the better. This is due to measures installed to increase the quality of primary and second-degree ITP programs and positive formal quality assessments. Past critical opinions have resulted in quality improvement of ITP programs. Implementing quality improvements is however challenging for ITP institutes. ITP institutes must attract more candidates while end-qualifications and criteria for entry remain strict.

Typical teacher in TALIS countries	Typical teacher in the Netherlands
68% are women Is **43** years old on average	**55%** are women Is **43** years old on average
91% completed university or other equivalent higher education	**95%** completed university or other equivalent higher education
90% completed a teacher education or training programme	**92%** completed a teacher education or training programme
Has an average of **16** years of teaching experience	Has an average of **16** years of teaching experience
82% are employed full time and **83%** have a permanent contract	**43%** are employed full time and **84%** have a permanent contract
Teaches in class with **24** students on average	Teaches in class with **25** students on average

Typical principal in TALIS countries	Typical principal in the Netherlands
51% are men Is **52** years old on average	**69%** are men Is **52** years old on average
96% completed university or other equivalent higher education	**100%** completed university or other equivalent higher education
90% completed a teacher education or training programme, **85%** a school administration/principal training programme and **78%** instructional leadership training	**89%** completed a teacher education or training programme, **96%** a school administration/principal training programme and **91%** instructional leadership training
Has an average of **9** years of experience as a principal and **21** years of teaching experience	Has an average of **10** years of experience as a principal and **20** years of teaching experience
62% are employed full time without teaching obligations and **35%** are employed full time with teaching obligations	**85%** are employed full time without teaching obligations and **13%** are employed full time with teaching obligations
Works in a school with **546** students and **45** teachers on average	Works in a school with **870** students and **74** teachers on average

Figure 3.16.3 The typical teacher and principal in the Netherlands
Source: OECD (2016b)

3.16.4 Pre-service & in-service education of teachers

Three main types of ITP routes are provided in the Netherlands:

- Teacher education for primary education (pabo)
- Teacher education for lower secondary and vocational education: 4-year bachelor's program offered by universities of applied sciences
- Teacher education for upper secondary education: a 1- or 2-year postgraduate MSc/MA program at a research university

People who obtain mbo level 4, havo or pre-university education (vwo) diploma can enter teacher training.

Table 3.16.1 Teacher education qualifications: Standard program and institutional providers
Source: OECD (2016b)

Types of qualifications	Standard programme		Institutional providers
	Structure	Allows for teaching in	
Primary education teaching qualification	• Four years integrated bachelor programme (education and practice)	• Primary education – all grades • Special education – all grades	University of Applied Sciences (HBO) – "Pedagogic Academic Basic Education" (PABO)
Secondary education 2nd degree teaching qualification	• Four years integrated bachelor programme on subject (e.g. English)	• VMBO – all grades (1 to 4) • HAVO – grades 1 to 3 • VWO – grades 1 to 3 • MBO – all grades	University of Applied Sciences (HBO)
Secondary education 1st degree teaching qualification	• Four years integrated bachelor or master programme focused on subject, followed by 1 or 2 years pedagogical and didactical integrated master programme	• VMBO – all grades (1 to 4) • HAVO – all grades (1 to 5) • VWO – all grades (1 to 6) • MBO – all grades	University – teacher education college University of Applied Sciences (HBO)

Initial teacher preparation (ITP) programs at universities of applied science are mainly positioned within the faculty of education. ITP programs at universities can be positioned in three ways:

1. in the different faculties which represent the school-disciplines
2. at a central position within the university
3. in the faculty of social sciences

3.16.5 National policies directed toward improving teaching quality

At the time of this project, the Minister and the State Secretary of Education, Culture and Science launched the Teacher Agenda 2013-2020 (*Lerarenagenda 2013-2020*, only available in Dutch) in October 2013. The quality of education and pupil performance are strongly dependent on competent teachers and good school management. To attract and retain good teachers, the government invests in measures to improve the quality of teachers, teacher training and career prospects. Improvements in teacher training programs should ensure that new teachers will meet the required quality standards. The Teachers Agenda 2013-2020 mentions different agreements to achieve this. These agreements are made in consultation with teachers, management, and teacher educators. The most important spearheads are:

Students who start in teacher training need prior knowledge which must be appropriate for their future profession. Therefore, Primary School Teacher Training Colleges (pabo's) have had entrance tests for math and Dutch since 2006. Students who finish teacher training must have sufficient knowledge and skills. This requires proper teacher training. Therefore, there will be a professional register for trainers. From 2014, science and technology is part of the curriculum of teacher training colleges (this spearhead was not reached).

Attractive and flexible learning pathways ensure that enough good students enroll in teacher training. In 2008, the education minor in universities started. As a result, hundreds of students are involved in teacher training each year. In 2009 the program *Eerst de Klas* (The class first) started. This program recruits outstanding students for a job in education. Besides that, students who just graduated from university can also do an education traineeship. The goal is that all teachers are qualified at the start of their profession. Teachers must continue in deepening and maintaining their knowledge and skills. Besides that, pabo's and primary schools are going to formulate agreements on deepening knowledge of novice teachers (after they graduated).

Teachers, teaching staff and school boards must continue to learn together and continue to work on the quality of education. Both opportunities for development and career opportunities are important for teachers. Pupils and students should give feedback on the performance and functioning of their teachers. In this way all stakeholders are involved. Teachers must keep their knowledge up to date and must increase their skills. 39,000 Teachers have already used the teacher development grant. Since 2015, teachers must have the time, money, and space to maintain their skills. In the collective agreements, consensus on time and facilities for continuing professional development will be reached.

The governmental policy strives to attract students into a teaching career by pre-service training and in-service support, and by developing flexible career routes. Given the autonomy of schools, there are no national programs for in-service learning. Schools can implement school-based schooling programs that connect to the development themes within the school for staff teams.

3.16.6 Specific, national policies directed toward improving differentiation in teaching

In the Netherlands, knowing how to account for differences between students is part of the standards prospective teachers must meet before entering the teaching profession and as such is included in teacher training programs and evaluation criteria for schools (Staatssecretaris van Onderwijs, Cultuur en Wetenschap, 2017). Despite this, teachers struggle to implement Differentiated Instruction into their daily practice.

Since there has been an increase in the number of students who are struggling in learning and have special education needs (SEN), a program under "education that fits" was launched. The Netherlands is divided into 75 educational regions and school boards within each region have the freedom to set up their own institutes and offer extra services for SEN students with funds from the national government.

3.16.7 Current international examinations (PISA, TIMSS)

The performance of Dutch students is among the highest in the world. But there has been a decline in performance since PISA 2003. The latest PISA test was conducted in 2018. As the figure shows, reading scores in the Netherlands were not statistically different from the OECD average, mathematics scores were higher than the OECD average, and science scores were higher than the OECD average. In comparison to the OECD average, a higher proportion of Dutch students had the highest levels of proficiency (Level 5 or 6) in at least one topic, but a lower proportion attained a minimum level of proficiency (Level 2 or higher) in at least one subject.

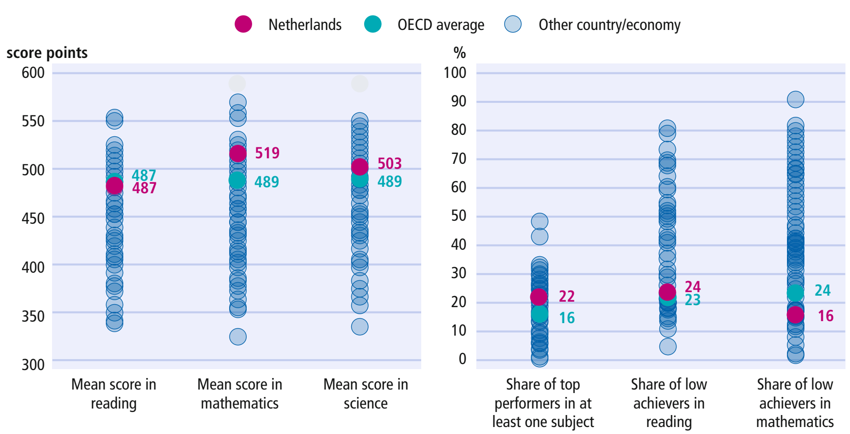

Figure 3.16.4 15 year old students' performance in reading, mathematics, and science in the Netherlands
Source: OECD (2019a)

Table 3.16.2 Performance of Dutch primary students on TIMSS and PIRLS
Source: OECD (2014)

Percentage of students reaching international benchmarks in TIMSS and PIRLS			
Internationial benchmark	**Area tested**	**Netherlands**	**International median**
Low	Reading (PIRLS)	100	95
	Mathematics (TIMSS)	99	90
	Science (TIMSS)	99	92
Intermediate	Reading (PIRLS)	90	80
	Mathematics (TIMSS)	88	69
	Science (TIMSS)	86	72
High	Reading (PIRLS)	48	44
	Mathematics (TIMSS)	44	28
	Science (TIMSS)	37	32
Advanced	Reading (PIRLS)	7	8
	Mathematics (TIMSS)	5	4
	Science (TIMSS)	3	5

Table 3.16.2 shows that Dutch students show an overall strong performance in reading, mathematics, and science on international tests (PIRLS and TIMSS 2012).

3.17 United States[31]

Context information is not included because it is unclear which regions or states the USA sample represents. The USA data was based on the met video project. A lot of background information is unknown or unavailable to the authors.

3.18 Türkiye[32]

3.18.1 Socio-political context & implications for teaching/educational policy

The Ministry of National Education (MoNE, in Turkish: *Milli Eğitim Bakanlığı*, or MEB) is responsible for the education system, and general directorates and their units are responsible for different aspects of education and policy compliance, such as basic education, secondary education, vocational education, special education and guidance and counselling (Figure 3.18.1).

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Provincial and District National Education Directorates across 81 Turkish provinces support the implementation of education policy.

Other bodies that help to shape education policy in Türkiye include:

- *The National Council of Education*, which convenes every four years, and advises the MoNE.
- *The Board of Education* develops curriculum, plans and objectives, and approves textbooks.
- *The Directorate for Strategy Development* serves as the consultation unit and coordinates the work of establishing education strategies, policies, and goals. The Directorate for Guidance and Inspection serves as the inspection unit. The Directorate General for Innovation and Education Technologies and the Directorate General for European Union and Foreign Relations coordinate involvement in international assessment studies.
- *The Vocational Education Council* decides on planning and development, with representatives from relevant ministries, trade and employers' unions and other key social partners. The Vocational Qualifications Authority aligns VET professional qualifications with professional standards; and for each province there is a Board of Vocational Education.
- *The Council of Higher Education (YÖK)* and its committees are responsible for higher education policies, while the Higher Education Board supervises the institutions.
- *The Assessment, Selection and Placement Center* is responsible for university entrance examinations and the placement of teachers, in collaboration with the MoNE.
- *The National Council for Teacher Training* is an advisory body that coordinates between the YÖK and the MoNE.

Consultation with external stakeholders includes work with international organizations (such as the World Bank, the European Investment Bank, the United Nations, UNICEF and the European Union), the private sector, non-governmental organizations and teachers' unions. (OECD, 2013a)

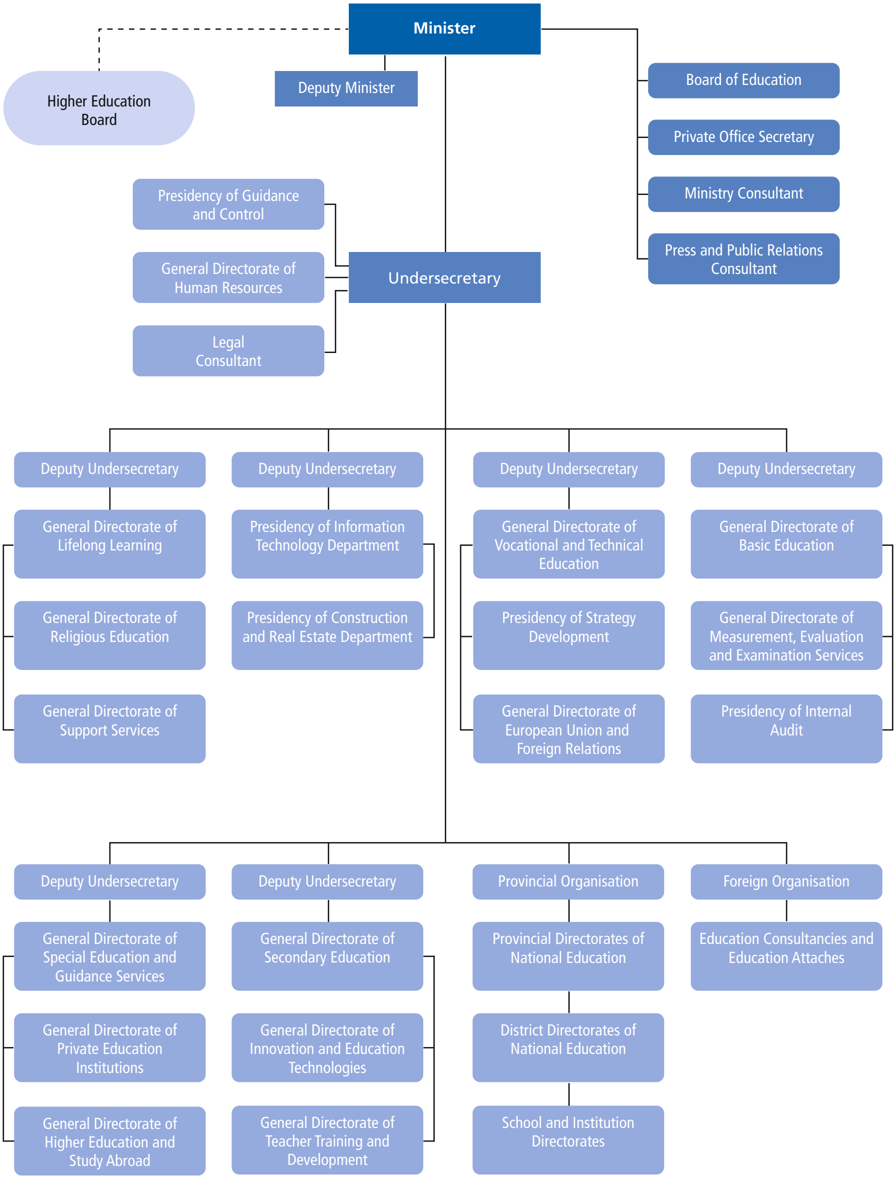

Figure 3.18.1 Structural Organization of the Ministry of National Education
Source: Ministry of National Education Republic of Turkey (2016)

The National Education System, established by National Education Basic Act No. 1739, consists of two main parts, "formal education" and "non-formal education". Formal education is regular education conducted within a school for individuals in a certain age group at the same level, under programs developed in accordance with its purpose. Formal education includes pre-primary, primary school, lower secondary school, upper secondary, and higher education institutions. In accordance with the general objectives and basic principles of national education, the objectives of non-formal education, that covers citizens who have never entered the formal education system or are at any level of it, or have left at that level, and which may accompany formal education or be independent of it are shown in Figure 3.18.2.

Mobile Classroom: Aiming at developing pre-primary education, the mobile classroom is an implementation to institution based pre-primary education for children of low-income families aged 36-66 months who cannot attend pre-primary education institutions. The mobile classroom project is carried out by General Directorate of Basic Education for provincial education directorates, municipalities, and universities.

Education with Transport: The practice of transporting primary, lower secondary and upper secondary school students who have problems accessing schools for various reasons to certain schools daily with the aim of providing them an education.

Minority Schools are private preschools, primary, and upper secondary schools founded by Greek, Armenian, and Jewish minorities, secured by the Treaty of Lausanne. Some higher education programs are given in English, German, or French (MEB, 2016a).

The academic year consists of two semesters (in total 185 working days) and runs from the 2nd week of September to the 3rd week of June. Winter break is two weeks, at the end of January and beginning of February. The summer holiday for teachers is from July 1st until September 1st. They work two weeks longer at the beginning and the end of the terms. During these weeks, they participate in professional development courses, evaluate the term, or finish preparations for the academic year.

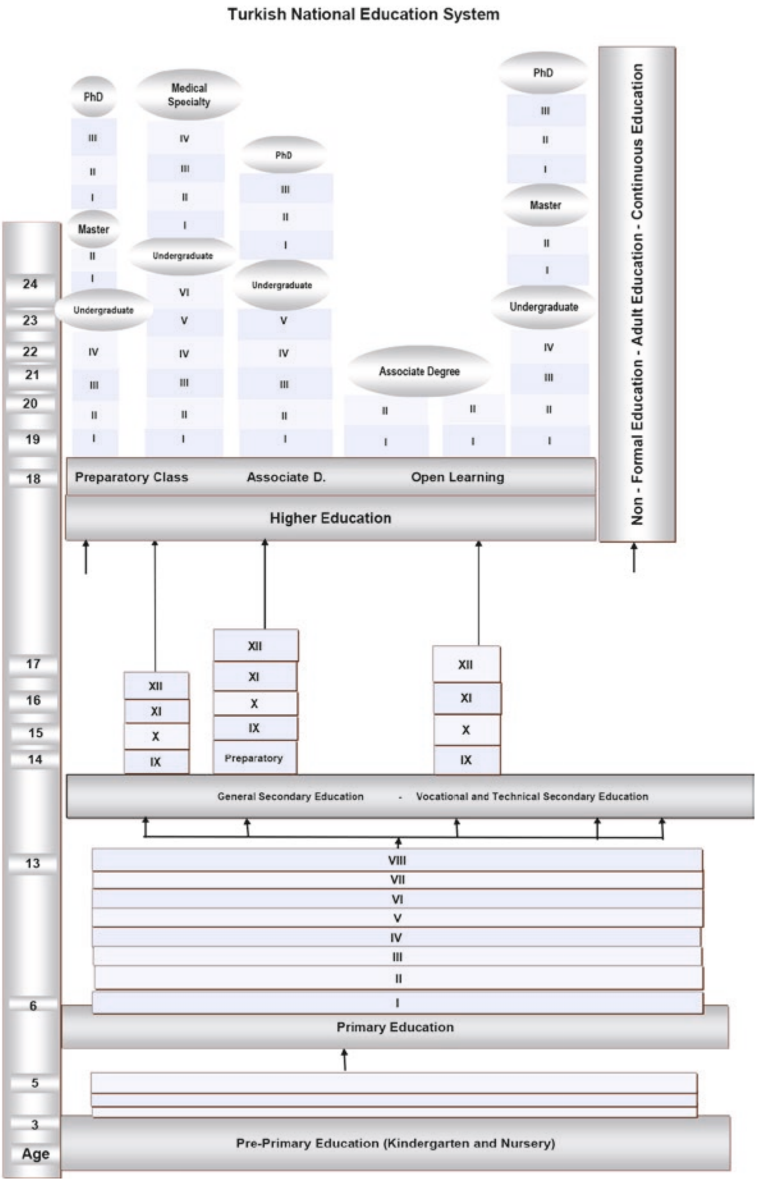

Figure 3.18.2 Turkish National Education System
Source: Ministry of National Education Republic of Turkey (2020)

3.18.2 Current trends in educational policy and practice & regional differences

Many recent reforms have been supported by national and international organizations, in certain cases beginning as pilot projects designed to transform the national education policy.

Some of the most recent projects:

- *E-School*

  Starting in the educational year 2008-2009, data on students and buildings for pre-primary and primary education have been collected online through the e-school module. From the educational year 2009-2010, data on students and buildings for secondary education have been collected online via the e-school module (MEB, 2016a).
- *Movement for Enhancing Opportunities and Improving Technology (fatih)*

  The FATIH Project in Education was launched in 2012 with the purpose of providing equal opportunities in education and improving technology in schools so that information technology tools help engage more senses in the educational process (MEB, n.d.).
- *Compulsory Education for 12 years [4+4+4])*

  Türkiye has one of the highest percentages of 25-64-year-olds who only completed primary education (46 %, rank 1/36), or even less than primary education (5 %, rank 6/26). This is the lowest in OECD and partner countries with available data (64 %, rank 26/28 (OECD, 2015a). To improve the quality of education and increase participation rates, in March 2012, the Grand National Assembly passed new legislation on primary and secondary education, usually referred to as "4+4+4" (4 years of primary education, first level; 4 years of primary education, second level; and 4 years of secondary education). Children start their primary education in the first month of the September following their 6th birthdays and finish in the school year in which they turn 14 years old (MEB, 2016a).
- *Novice Teacher Professional Development and Career Development (see: in-service education of teachers)*

  Türkiye has one of youngest teaching workforces of all OECD countries. Some 61% of primary and 76% lower secondary teachers (OECD average 38%) are below 40 (OECD, 2015a). A new performance-based program was set up for novice teacher professional appointment and career development in February 2016. The first group of novice teachers (30,000) completed the program March-August 2016 and they started working at schools in September 2016 (MEB, 2015a).

  In two waves, 30,000 teachers applied to the position announced by the Ministry of education in August and September 2016 (MEB, 2016d).
- *Girls' education*

  In Türkiye, women are well represented in the fields of sciences, technology, engineering, and mathematics. Some 48% of tertiary graduates in science, and 25% of graduates in engineering, manufacturing and construction were women (with OECD averages of 39%

and 24%, respectively) (OECD, 2015a). But the school-going rate of girls in primary and secondary schools was still 87% in 2002; the figure rose to 95% in 2015 with efficient studies that were run by the Ministry of National Education (MONE), and supported by civil society organizations (Ergu, 2016).

The girls' education campaign in Türkiye:

– Hey Girls, Let's Go to School!
  http://www.unicef.org/turkey/pr/ge6.html (2001-2005)
– "Dad, Send me to School" (BBOG) project
  http://www.bbog.org (2005-present)
– Mother-Daughter to School Campaign
  http://www.eokul-meb.com/ana-kiz-okuldayiz-kampanyasi-34731/ (2008-2012)

- *VET education*
  Multiple reforms in VET have occurred over the past two decades to increase the skilled labor force in Türkiye. In October 2016, parliament implemented a vocational education law to raise the number of students in secondary schools for vocational education to 50%. Currently, 44% (1,732,000) of secondary school students attend a form of vocational education, at 3,297 schools (MEB, 2016e).
- *Syrian Refugees*
  Since the beginning of Syrian civil war in 2011, Türkiye is hosting refugees, mostly children. The number of refuges is over 2.5 million and 50% is under the age of 19, with around one million school children. With the first wave of refugees, the Turkish Ministry of Education set up temporary education centers. Around 260,000 Syrian children of school age have continued their education in their mother tongue at 425 centers in 21 provinces. Syrian teachers within the refugee group are appointed to these centers. The Turkish Ministry of Education and UNICEF started a teacher-training program before the academic year of August-September 2016 to improve education quality and support the professional development of 20,000 Syrian teachers working at these centers. Besides these, over 60,000 Syrian children follow mainstream education in Turkish schools. The Ministry of Education has been working on a basic education program for Syrian children to continue their education along with Turkish children at the primary school level starting in September 2016 (MEB 2016f, 2016g). Currently, Türkiye is hosting the highest number of refugees in the world (UNHCR, 17 May 2021).

3.18.3 The status of teachers & the teaching profession

The teaching profession has quite a high respect and recognition from society at all levels of education. In a survey conducted by BAREM* in Türkiye among 1,000 people in 2014, 86,2%of respondents said they trust teachers, and in 2015 that number was 74.2%, making it the profession at the top of the list in both years (Hurriyet Daily News, 2015; Uslu, 2016). Of all teachers, primary school teachers have higher scores than secondary school teachers in terms of total trust and trust from students and parents (Kursunoglu, 2009). Moreover, according to the TALIS 2008 data, the majority of the teachers [(*71.60% of the teachers participating in the Turkish research (n: 2239)*)] in Türkiye think that their profession is recognized as respectable by society (Arslan, 2015). Overall, the teaching profession is traditionally a highly-respected profession in Türkiye (Dolton, Marcenaro, Vries & She, 2018). Some key educational indicators like ratio of students to teaching staff, number of hours of teaching time per year (for teachers in public institutions) are given in Table 3.18.1.

Table 3.18.1 List of key indicators for Türkiye, OECD 2020
Source: OECD (2020b)

#	List of key indicators[1,2,3]	Türkiye	Average or total	Min OECD	Max OECD
	Background information				
	Economy				
1	GDP per capita, 2016, in equivalent USD converted using PPPs (OECD Statistics)	26 330	42 441	14 276	107 775
2	GDP growth, 2016 (OECD Statistics)	3.2%	1.8%	0.6%	6,6%
	Society				
3	Population density, inhab/km², 2017 (OECD Statistics)	104	37	3	517
4	Population aged less than 15 as a percentage of total population, 2018 (OECD Data)	23.5%	17.0%	12.2%	28.4%
5	Foreign-born population as a percentage of total population, 2018 or the most recent available year (OECD Data)	2.8%	14.4%	0.8%	47.6%
	Education outcomes				
6	Mean performance in reading (PISA 2018)	466	487	412	523
7	***Average three-year trend in performance across pisa assessments, by domain (PISA 2018)***[4,5]				
	Reading performance	2.2	0.4	**-4.9**	**7.1**
	Mathematics performance	**4.1**	-0.6	**-9.1**	**6.4**
	Science performance	**6.1**	-1.9	**-10.7**	**6.4**
8	Enrollment rates of 3-year-olds in early childhood education and care, 2017 (EAG 2019)	10.1%	79.3%	2.4%	100%
9	Percentage of 25-64 year-olds whose highest level of attainment is lower secondary education, 2018 (EAG 2019)	15.1%	14.4%	0.8%	39.9%

#	List of key indicators[1,2,3]	Türkiye	Average or total	Min OECD	Max OECD
10	***Educational attainment of the population aged 25-34 by type of attainment, 2018 or latest available***				
	At least upper secondary education, 2018 (EAG 2019)	57.2%	85.4%	50.1%	97.8%
	Tertiary education, 2018 (EAG 2019)	33.3%	44.3%	23.4%	69.6%
	Vocational upper secondary or post-secondary non-tertiary education, 2018 (EAG database 2020)	10.8%	24.5%	1.8%	50.1%
11	***Unemployment rates of 25-34 year-olds by educational attainment, 2018 (EAG 2019)***				
	Below upper secondary	11.8%	13.7%	3.0%	37.3%
	Upper secondary and post-secondary non-tertiary	11.3%	7.3%	2.5%	25.1%
	Tertiary education	13.9%	5.5%	1.7%	23.2%
	Students: Raising outcomes				
Policy lever 1: Equity and quality					
12	First age of selection in the education system (PISA 2018)	11	14	10	16
13	***Students performing at the highest or lowest levels in reading (%) (PISA 2018)***				
	Students performing below Level 2	26.1%	22.6%	11.1%	49.9%
	Students performing at Level 5 or above	3.3%	8.7%	0.8%	15.0%
14	Percentage of students in schools where students are grouped by ability into different classes for all subjects (PISA 2015)	4.2%	7.8%	0.0%	56.1%
15	Percentage of students whose parents reported that the schooling available in their area includes two or more other schools (PISA 2015)	m	36.8%	20.4%	56.9%
16	Percentage of students reporting that they have repeated at least a grade in primary, lower secondary or upper secondary schools (PISA 2015)	10.9%	11.3%	0.0%	42.6%
17	Percentage of variance in reading performance in PISA test explained by ESCS (PISA 2018)[4]	11.4%	12.0%	6.2%	19.1%
18	Score difference in reading performance in PISA between non-immigrant and immigrant students AFTER adjusting for socio-economic status (PISA 2018)[4]	**-27**	**-24**	**-80**	**16**
19	Score difference between girls and boys in reading (PISA 2018)[4]	**25**	**30**	**10**	**52**
Policy lever 2: Preparing students for the future					
20	Mean proficiency in literacy among adults aged 16-64 on a scale of 500 (Survey of Adult Skills, PIAAC, 2015)	226.5	267.7	220.1	296.2
21	Difference in literacy scores between younger (25-34) and older (55-65) adults AFTER accounting for age, gender, education, immigrant or language background and parents' educational attainment (Survey of Adult Skills, PIAAC, 2015)	19.9	15.6	-8.3	37.6
22	***Share of students in upper secondary education in 2017 following:***				
	General programmes (OECD Stat – INES 2020)	53.6%	58.1%	27.6%	100.0%
	Vocational programmes (OECD Stat – INES 2020)	46.4%	43.1%	9.0%	72.4%
	Combined school and work-based programmes (OECD Stat – INES 2020)	a	18.3%	1.0%	58.0%
23	First-time graduation rates from tertiary education, 2017 (below the age of 30, excluding mobile students / OECD Stat – INES 2020)	49.0%	36.6%	10.1%	49.9%
24	Percentage of 18-24 year-olds not in education, employment or training, 2018 (EAG 2019)	29.8%	14.3%	5.9%	29.8%

Table 3.18.1 continued

#	List of key indicators[1,2,3]	Türkiye	Average or total	Min OECD	Max OECD
	Institutions: Improving schools				
	Policy lever 3: School improvement				
25	***The Learning Environment – PISA 2018***				
	Mean index of teacher support in language-of-instruction lessons	0.22	0.01	-0.61	0.47
	Mean index of disciplinary climate	-0.08	0.04	-0.34	1.07
	Mean index of students' sense of belonging	-0.14	0.00	-0.28	0.46
26	Percentage of teachers in lower secondary education aged 50 years old or more, 2017 (EAG 2019)	6.3%	37.0%	6.3%	54.2%
27	***Number of teaching hours per year in public institutions by education level, 2018 (EAG 2019)***[1]				
	Primary education	720	783	561	1063
	Lower secondary education	504	709	481	1063
28	Ratio of actual teachers' salaries to earnings for full-time, full-year adult workers with tertiary education, lower secondary education, general programmes, 2016 (EAG 2019)	0.85	0.88	0.64	1.40
29	Proportion of teachers who believe the teaching profession is valued in society (TALIS 2018)	26.0%	25.8%	4.5%	67.0%
30	Proportion of teachers who would become a teacher again if they could choose (TALIS 2018)	74.5%	75.6%	54.9%	92.2%
	Policy lever 4: Evaluation and assessment to improve student outcomes				
31	***Percentage of students in schools where the following arrangements aimed at quality assurance and improvement at school are used (PISA 2015):***				
	Internal/Self-evaluation	93.5%	93.2%	74.8%	100.0%
	External evaluation	78.8%	74.6%	20.8%	97.4%
32	***Percentage of students whose schools principals reported that standardised tests are used for the following purposes (PISA 2015):***				
	To make decisions about students' retention or promotion	32.4%	31.3%	3.4%	60.6%
	To monitor the school's progress from year to year	70.3%	69.4%	26.2%	97.7%
	To identify aspects of instruction or the curriculum that could be improved	56.7%	58.9%	14.1%	92.4%
33	Percentage of lower secondary teachers whose principals report conducting formal appraisal of their teachers at least once per year (TALIS 2018)	87.3%	63.5%	16.2%	98.1%
	Systems: Organising the system				
	Policy lever 5: Governance				
34	***Percentage of decisions taken at each level of government in public lower secondary education, 2017 (EAG 2018)***				
	Central	72.9%	23.8%	0.0%	83.3%
	State	0.0%	10.3%	0.0%	62.5%
	Regional/Sub- regional	18.8%	4.9%	0.0%	33.3%
	Local	0.0%	13.3%	0.0%	71.9%
	School	8.3%	34.0%	0.0%	91.7%
	Multiple levels	0.0%	13.8%	0.0%	100.0%
	Policy lever 6: Funding				
35	Expenditure on education as a percentage of GDP (from primary to tertiary), 2016 (EAG 2019)	5.4%	5.0%	0.0%	6.5%

#	List of key indicators[1,2,3]	Türkiye	Average or total	Min OECD	Max OECD
36	***Annual expenditure per student by educational institutions, for all services, in equivalent UD converted using PPPs for GDP, 2016 (EAG 2019)***				
	Pre-primary education	5 568	8 349	1 579	17 533
	Primary education	4 168	8 470	2 961	17 913
	Lower secondary education	4 063	9 884	2 561	21 739
	Upper secondary education	5 213	10 368	3 001	21 231
	Tertiary education	10 519	15 556	5 787	48 407
37	***Relative proportions of public and private expenditure on educational institutions, 2016 (EAG 2019)***				
	Public sources	74.6%	82.7%	62.7%	97.6%
	All private sources (includes international sources)	25.4%	17.4%	2.4%	37.3%
38	***Change in the share of expenditure on educational institutions, EAG 2019 (percentage-point difference between 2010 and 2016, primary to tertiary education)***				
	Public sources	m	-2.7	-9.8	6.3
	All private sources	m	2.5	-6.3	7.0

Notes
1. The average, total, minimums and maximums refer to OECD countries except in the Survey of Adult Skills, where the refer to participating countries. For indicators 6, 13 and 17-19, the average value refers to the arithmetic mean across all OECD member countries (and Colombia), excluding Spain. For indicator 5, the average value refers to the arithmetic mean across all OECD member countries (Except Japan, Korea and Poland) as calculated by the Education Policy Outlook.
2. "m": included when data is not available.
3. "NP": included if the country is not participating in the study.
4. Statistically significant values of the indicator are shown in bold (PISA only).
5. The average three year trend is the average change in PISA score points from a country's/economy's earliest participation in PISA to PISA 2018.
6. "a": included when the category is not applicable.
7. For Türkiye, this refers to typical teaching time (teaching time required from most teachers when no specific circumstances apply to teachers).

3.18.4 Pre-service & in-service education of teachers

Preservice Teacher Education

Teachers in Türkiye must have a bachelor's degree from an accredited program and pass the Public Staff Selection Exam. They are placed in schools by the Ministry of Education (MoNE) based on their exam scores and, to some extent, on their interests (Figure 3.18.4). Broadly speaking, they are assessed on pedagogical content knowledge, general culture, and general ability sections, and have session to evaluate teaching profession competencies. According to the state's needs, the Ministry of Education defines the minimum application grades, and selects successful candidates from those who meet this grade. In 2013, the teacher candidate test has been revised to include assessments on subject-specific knowledge at the Public Staff Selection Exam (MEB, 2015b).

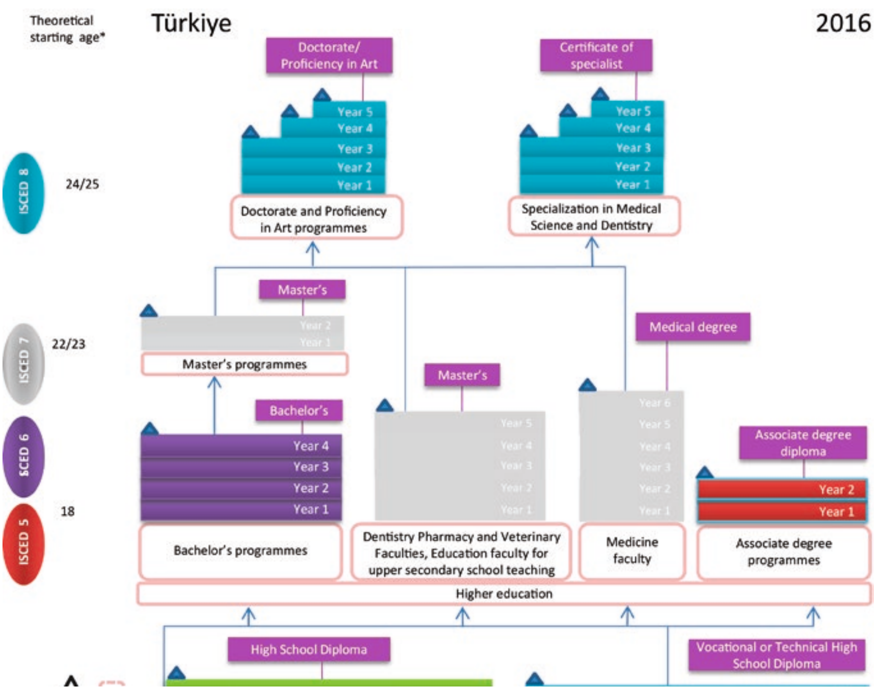

Figure 3.18.3 Preservice Teacher education
Source: adapted from OECD (2020c)

In-service education of teachers

Turkish teachers are younger on average than their international colleagues. TALIS results indicated that 18% of teachers in Türkiye were in their first two years of teaching in 2008, more than double the OECD average (see Table 3.18.2, MEB 2015c).

Table 3.18.2 Age distribution of teachers: percentage of teachers in public and private institutions, by level of education and age group, based on head counts in Türkiye
Source: OECD (2015a; 2020c)

	Primary					Lower Secondary					Upper Secondary				
	< 30 years	30-39 years	40-49 years	50-59 years	≥ 60 years	< 30 years	30-39 years	40-49 years	50-59 years	≥ 60 years	< 30 years	30-39 years	40-49 years	50-59 years	≥ 60 years
Türkiye	24	37	27	11	1	35	41	16	7	0	m	m	m	m	m
OECD average	13	28	28	25	5	11	27	28	27	7	8	25	29	29	9
E21 average	11	27	30	27	5	9	26	29	29	7	7	24	30	31	9
G20 average	16	29	28	23	4	16	30	28	22	5	12	27	30	25	6

m: data not available; n: size is either negligible or zero

Teachers are one of the most important assets of the educational system. Considering the high percentage of young teachers in the profession, the Ministry of Education (MEB) started "*The Novice Teacher Professional Appointment and Career Development Program*" in February 2016 to enhance teacher professionalism and support the novice teacher. Within the framework of this program novice teachers enrolled in in-service training in the first six months of their career. This in-service training program is defined and planned by Directorate General for Teacher Training and Improvement and academics.

The Ministry of Education repealed the age limit for teachers to be appointed for the first time in February 2015 (MEB, 2015d).

3.18.5 National policies directed toward improving teaching quality

In Türkiye, the structure of the teacher education system has been designed in accordance with the national education steps. In line with the regulations in the education system, the teacher education system was readjusted in 1973, 1982, and 1997. In 1973, the levels of all teacher education programs were increased to elevate the education level. In 1982, the responsibility for teacher education were handed over to universities. And lastly, in 1997, the structure and programs of teacher education were reregulated (Yüksel, 2012). Currently, teacher education in Türkiye is selective and programs are meticulous in choosing students and instructors for teacher training institutes, and in training and appointing teacher candidates.

3.18.6 Country report on current international examinations (PISA, TIMSS)

Türkiye has been participating in PISA since 2003, and examinations have been carried out on computers since 2015. Türkiye participated with 186 schools and 6,890 students in PISA 2018. The selection of students in the sample was made randomly (based on probability) by the International Center to represent 15-year-old students in Türkiye.

Türkiye has made considerable improvements in educational performance over recent years. Going forward, maintaining and extending these improvements, while strengthening inclusivity so that all students can access quality and engaging education regardless of the pathway they follow. Similarly, although student performance has improved, a smaller share of students in Türkiye achieve baseline proficiency (PISA level 2) in reading, mathematics, and science than on average across the OECD. In PISA 2018, Türkiye had the highest rates of school-level isolation among both high and low achievers, as well as an above average isolation index for advantaged students, suggesting some academic and social segregation within the Turkish system. Students in Türkiye reported a low sense of belonging at school and high levels of truancy in PISA 2018.

Chapter 4
Project response and attrition

During the project, multiple strategies were employed to reach the targeted sample size and improve response. The PI in each participating country kept close contact with schools for each data collection round. Timetables of participating teachers were discussed and checked timely to find good moments for observation of typical lessons and student surveys. To ensure privacy, each teacher was assigned a unique ID, coupled with a unique school ID. This allowed us to keep track of teachers over time for longitudinal measurements.

Some teachers weren't able to make the original planning for the observation and student survey. Subsequently, new schedules were discussed and agreed on with the PIs. Depending on the country, multiple trained observers were involved, ranging from university professors to senior school teachers. Participation was on a voluntary basis. In some countries, like South Korea, the Netherlands, and Hong Kong – China, participating teachers and schools received small incentives and feedback. In other countries, like Indonesia, schools received a seminar about research findings from the previous year to motivate teachers in participating further in subsequent rounds.

4.1 Data collection response 2015-2021

Table 4.1.1 shows the overview of the data collection response of 2015-2021. This is based on response during the measurement moments for both the observation and student questionnaires for each participating country.

4.2 Project attrition

For the longitudinal part of the project, attrition is unavoidable. Teachers did not continue participating in the longitudinal measurements for a variety of reasons such as rotation to other schools, increased workloads, and personal reasons. In Table 4.2.1, the percentage of attrition per country is given.

Table 4.1.1 Response per measurement moment, per instrument (observation and student questionnaire) per country

Instrument	The NL	Indonesia	Pakistan	S. Africa	S. Korea	Hk-China	Spain	USA	Mongolia	UK	Brazil	Türkiye	Malta	Norway
Obser-vation	%	%	%	%	%	%	%	%	%	%	%	%	%	%
M1	450.8	128	100	77.8	82.3	103.5	28.5	80.0	93.8	45.3	-	-	-	-
M2	312.5	63.5	100	75.5	-	-	-	25.8	93.8	28.8	-	-	-	-
M3	182.3	18.5	-		-	-	-	-	93.8	23.0	-	-	-	-
M4	87.8	-	-	-	-	-	-	-	-	22.3	-	-	-	-
Survey														
M1	462.3	73.8	-	-	92.8	37.0	102.5	-	100.8	23.3	4.3	111.5	NA	2.0
M2	540.5	75.3	-	79.0	-	-	-	-	-	-	-	-	-	-
M3	350.5	-	-	76.0	-	-	-	-	-	-	-	-	-	-
M4	272.0	-	-	0.3	-	-	-	-	-	-	-	-	-	-

Note. M1-M4 refer to measurement moments (repeated measures). A total of 400 teachers were set as a full response. In South Africa, M1 was repeated twice but the very first measurement data (N = 400 teachers) were not included in the report due to validity and reliability issues. In general, participating countries collected larger data than reported in the table but the unreliable and non-valid data was screened and excluded during the screening process. Response information in Malta could not be provided because teacher identification is missing due to strict privacy measures in the country.

Table 4.2.1 Attrition project for observation data per country (only longitudinal data)[1]

	the Nether-lands	Indonesia	Pakistan	South Africa	USA	Mongolia	UK
M1	1803	303	336	311	320	375	181
N attrition (attrition %)							
M2	553 (30.7%)	142 (46.9%)	0 (0.0%)	9 (2.8%)	217 (67.8%)	0 (0.0%)	66 (36.5%)
M3	1074 (59.6%)	178 (58.7%)	-	-	-	0 (0.0%)	89 (49.2%)
M4	1452 (80.5%)	-	-	-	-	-	92 (50.8%)

1 The calculation of attrition only included the drop out number of the same teachers across measurement moments. Although over measurement moments several teachers dropped out, new teachers were observed and not included in this calculation.

Table 4.2.2 Attrition project, per country, for student questionnaire data

	The Netherlands	Indonesia	South Africa
M1	1849	295	-
N attrition (attrition %)			
M2	313 (16.9%)	0 (0.0%)	316
M3	447 (24.2%)		12 (3.8%)
M4	761 (41.2%)	-	315 (99.7%)

Chapter 5

Instrument validation study (Step 1)

Research question 1: Are the Dutch measures of Differentiated Instruction in teaching reliable and valid to be used in other countries?

To answer this question, the data collected with the observation instrument and student questionnaire measuring Differentiated Instruction was analyzed. Descriptive statistics were conducted. Next, categorical confirmatory analysis (C-CFA) was applied to each country's data separately.

5.1 Descriptive statistics

5.1.1 Observation instrument

The Differentiated Instruction indicators have the following response categories: 1 = mostly weak, 2 = more often weak than strong, 3 = more often strong than weak, and 4 = mostly strong. Based on this original metric, the scores were converted into a qualification metric as follows:

1.00-2.00 = Insufficient
2.01-3.00 = Sufficient
3.01-4.00 = Good

Based on the total (raw) mean sores, we found that only Differentiated Instruction of UK teachers were rated "Good". South African, South Korean, Spanish, and Mongolian teachers were rated "Sufficient". Dutch, Indonesian, Pakistani, Hong Kong – Chinese, and American teachers were rated "Insufficient" (see Table 5.1.1).

Table 5.1.1 Descriptive statistics of Differentiated Instruction scale (raw scores) based on selected observation data

Country	$N_{Teacher}$	Item 1		Item 2		Item 3		Item 4		Differentiated Instruction		Qualification
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
1. The Netherlands	600	2.20	0.94	1.82	0.87	1.99	0.91	1.66	0.83	1.93	0.70	Insufficient
2. Indonesia	335	2.11	0.93	1.71	0.81	1.59	0.80	1.56	.775	1.74	0.69	Insufficient
3. Pakistan	400	2.01	0.77	1.97	0.70	1.84	0.66	1.77	0.69	1.90	0.50	Insufficient
4. South Africa	302	2.72	0.87	2.55	0.94	2.62	0.90	2.65	0.86	2.63	0.81	Sufficient
5. South Korea	208	3.26	0.81	2.50	0.87	2.63	0.87	2.73	0.87	2.78	0.67	Sufficient
6. Hong Kong – China	284	2.30	0.98	1.22	0.46	1.70	0.85	1.40	0.72	1.69	0.57	Insufficient
7. Spain	344	2.46	1.07	1.90	0.99	2.45	1.04	2.05	0.93	2.22	0.75	Sufficient
8. USA	320	1.75	0.82	1.36	0.52	2.37	0.76	1.28	0.51	1.69	0.42	Insufficient
9. Mongolia	403	2.86	0.71	2.42	0.75	2.42	0.71	2.4	0.71	2.53	0.54	Sufficient
10. UK	209	3.39	0.67	2.97	0.85	3.38	0.62	3.39	0.58	3.28	0.49	Good

A closer inspection of the indicator level shows some variations in the quality of observed Differentiated Instruction across countries (see Figure 5.1.1). In general, indicator 1 ("The teacher evaluates if lesson aims have been reached") was rated highest across countries. An exception to this rule were the American teachers, for who indicator 3 ("The teacher adjusts instructions to relevant inter-learner differwences") was rated highest. All indicators, including indicator 2 ("The teacher offers weaker learners extra study and instruction time") and indicator 4 ("The teacher adjusts the processing of subject matter to relevant inter-learner differences") were rated higher in the UK, South Korea, South Africa, and Mongolia respectively, compared to the remaining countries.

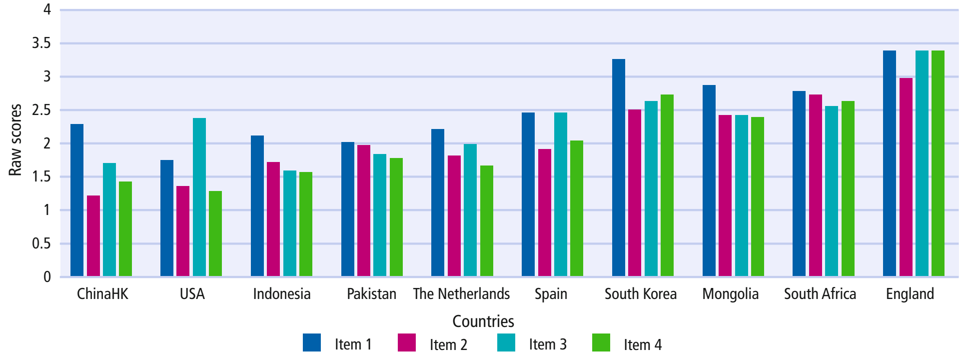

Figure 5.1.1 Means (raw scores) of the four Differentiated Instruction items based on selected observation data (ordered from lowest to highest)

5.1.2 Student questionnaire

The Differentiated Instruction questionnaire indicators have the following response categories: 1 = Never, 2 = Seldom, 3 = Frequently, and 4 = Often. Based on this original metric, the scores were converted into a qualification metric as follows:

1.00-2.00 = Insufficient
2.01-3.00 = Sufficient
3.01-4.00 = Good

Based on the total (raw) mean sores, we found that students perceived the quality of their teachers' Differentiated Instruction as "Good" in Brazil, South Korea, China, Spain, Mongolia, Türkiye, the UK, and Malta. Note, however, that the sample size in Brazil and Malta is too small. Therefore, results from these two countries should be interpreted with caution. In Norway, not only was the sample size very small, but there were also many missing responses for items 2, 3 and 4. Consequently, the mean score of this country is not viable to be used in comparisons. In the Netherlands, Indonesia, and South Africa, students rated the quality of their teachers' Differentiated Instruction "Sufficient" (see Table 5.1.2).

A closer inspection to the indicator level shows some variations regarding student perceptions of Differentiated Instruction across countries (see Figure 5.1.2). In general, all items were responded highly positively (close or above 3.00). Based on the (raw) mean scores, the quality of teachers' Differentiated Instruction based on student perceptions from highest to lowest is Brazil (M = 3.47, SD = 0.48), South Korea (M = 3.30, SD = 0.54), China (M = 3.15, SD = 0.67), UK (M = 3.09, SD = 0.35), Spain (M = 3.09, SD = 0.55), Türkiye (M = 3.08, SD = 0.73), Malta (M = 3.07, SD = 0.77), Mongolia (M = 3.02, SD = 0.67), South Africa (M = 3.00, SD = 0.72), Indonesia (M = 2.88, SD = 0.46), and the Netherlands (M = 2.87, SD = 0.66)

Table 5.1.2 Descriptive statistics of Differentiated Instruction scale (raw scores) based on selected student data[1]

Country	Item 1			Item 2			Item 3			Item 4			Differentiated Instruction			Qualification
	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	
1. The Netherlands	5789	2.84	0.818	5789	2.97	0.807	5789	2.93	0.848	5789	2.72	0.884	5789	2.87	0.66	Sufficient
2. Indonesia	4988	2.83	0.59	4996	2.89	0.67	4993	3.00	0.68	4998	2.80	0.69	4976	2.88	0.46	Sufficient
3. Brazil	242	3.58	0.68	242	3.54	0.63	242	3.66	0.61	242	3.10	0.84	242	3.47	0.48	Good
4. South Africa	4498	2.94	0.98	4538	3.01	0.94	4511	3.11	0.94	4513	2.88	1.04	4171	3.00	0.72	Sufficient
5. South Korea	4981	3.33	0.62	4982	3.42	0.63	4978	3.35	0.67	4976	3.09	0.83	4950	3.30	0.54	Good
6. China	2981	2.81	0.91	2981	3.27	0.82	2981	3.26	0.82	2981	3.26	0.822	2981	3.15	0.67	Good
7. Spain	4960	3.13	0.77	4959	3.12	0.78	4964	3.10	0.78	4965	3.00	0.90	4868	3.09	0.55	Good
8. Mongolia	4897	3.00	0.87	4914	3.09	0.91	4894	3.04	0.89	4889	2.96	0.93	4734	3.02	0.67	Good
9. Türkiye	4940	3.21	0.85	4958	3.33	0.84	4950	3.06	0.94	4955	2.70	1.03	4843	3.08	0.73	Good
10. UK	2106	3.18	0.65	2106	3.06	0.66	2106	3.00	0.74	2106	3.13	0.68	2106	3.09	0.35	Good
11. Malta	333	2.92	0.97	341	3.22	0.96	341	3.08	0.99	341	3.06	0.97	331	3.07	0.77	Good
12. Norway	131	3.31	0.73	129	3.28	0.72	39	2.97	0.81	130	3.08	0.76	38	3.13	0.63	Good

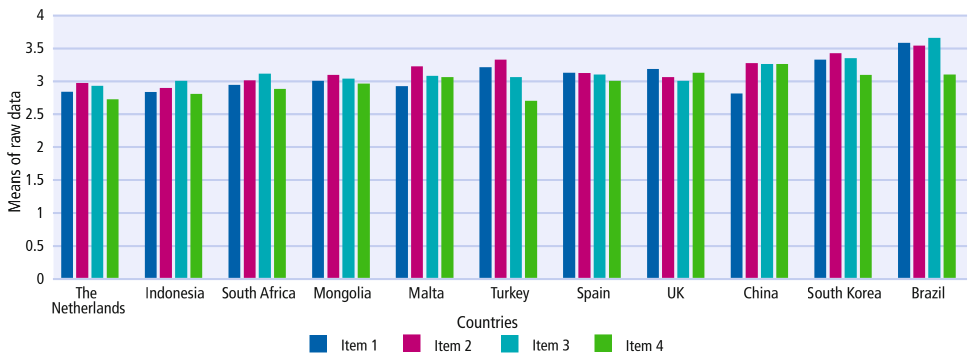

Figure 5.1.2 Means (raw scores) of the four Differentiated Instruction items (ordered from the lowest to the highest) based on selected student data

5.2 Reliability and validity

5.2.1 Observation instrument

The full measurement model of CFA for the differentiation scale in each country data shows good model fit in all included countries[2] (see Table 6.2.1). However, in Indonesia, South

1 Sample sizes in Brazil, Malta, and Norway were small. Therefore, results should be interpreted with caution.
2 All countries except Indonesia, South Africa, and Mongolia show satisfactory fit indices. Allowing item 3 and item 4 in those countries improved the model fit.

Africa, and Mongolia, it improved after adding the residual correlations for item 3 ("The teacher adjusts instructions to relevant inter-learner differences") and item 4 ("The teacher adjusts the processing of subject matter to relevant inter-learner differences") to the model. This indicates that in these three countries, the two items seem to be interpreted highly similarly by the observers. Based on these results, there is evidence that the differentiation scale, in general, is a valid scale in all 10 participating countries.

In all countries except the USA and Hong Kong – China, the factor loadings of the four Differentiated Instruction items are sufficiently high (> 0.40, see Table 5.2.2). In the USA, the factor loading of item 3 is relatively low (0.34). In Hong Kong – China, the factor loading of item 1 is very close to the cut-off (0.38). However, the factor loadings are still greater than 0.30 and, consequently, these items could be retained instead of suppressed and excluded (Field, 2013).

In order to answer research question 2, "*Are teachers in the Netherlands better at executing Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?*", at least partial scalar invariance of the differentiated scale should be met, whereas a full scalar invariant model is desireable. However, such a strict invariant model is scientifically unrealistic and practically impossible (Steenkamp & Baumgartner, 1998). Partial invariance is offered as a pragmatic compromise, in which some parameters are set to be equal, and the others are allowed to vary (Byrne, Shavelson, & Muthen, 1989).

When measuring differentiation practices across countries, we would expect minor violations of measurement invariance, given that groups of observers were expected to be knowledgeable about and skilful in specific differentiation practices, but also have slightly different attributes to the concepts used in the observation instrument because of their professional background and working environments. Based on the results of MGCFA analyses, partial scalar invariance of the Differentiated Instruction scale in eight countries was met sufficiently. For that reason, the Differentiated Instruction practices in these eight countries can be compared. However, results from South Korea and South Africa should be interpreted with caution because only 1 of 4 items is fully invariant (The majority of items are either invariant or partially invariant). In the Pakistan and Hong Kong – China data, the majority of items show non-invariant. Therefore, the latent means of these two countries cannot be compared directly (see Table 5.2.3).

Findings that many items show non-invariant in Pakistan and Hong Kong – China, and to some extent in South Korea, South Africa, may indicate that interpretations of Differentiated Instruction in these four countries differ to the other six countries. This may also indicate that among these four countries, the interpretations of Differentiated Instruction may be more similar. In order to find out whether the latter is true, MGCFA was conducted separately four these countries. Results show that only partial metric invariance is met (see Table 5.2.4). This indicates that the latent means of Differentiated Instruction in these countries cannot be compared directly. Reaching metric invariance level may allow the construct to be used for correlational analyses with other (outcome) measures.

Table 5.2.1 Categorical CFA of Differentiated Instruction scale for each country data

	$N_{Teacher}$	χ^2 (df)	RMSEA with 90% CI	SRMR	CFI	TLI	$\Delta\chi^2$ (df)	ΔRMSEA	ΔSRMR	ΔCFI	ΔTLI	Cornbach's Alpha
1. The Netherlands	600	0.103 (2)	0.000 [0.000; 0.003]	0.002	1.000	1.003						.768
2. Indonesia (Item 3 with Item 4)	335	11.429*(2) 2.076 (1)	0.119 [0.058; 0.189] 0.057 [0.000; 0.169]	0.017 0.006	0.998 1.000	0.993 0.998	7.937* (1)	0.062	0.011	0.002	0.005	.847
3. Pakistan	400	3.739 (2)	0.047 [0.000; 0.119]	0.018	0.996	0.988						.675
4. South Africa (Item 3 with Item 4)	302	12.616*(2) 0.391 (1)	0.133 [0.069; 0.207] 0.000 [0.000; 0.130]	0.012 0.001	1.000 1.000	0.999 1.000	8.918* (1)	0.133	0.011	0	0.001	.923
5. South Korea	208	2.632 (2)	0.039 [0.000; 0.149]	0.016	1.000	0.999						.791
6. China – HK	284	1.492 (2)	0.000 [0.000, 0.108]	0.014	1.000	1.006						.538
7. Spain	344	0.176 (2)	0.000 [0.000, 0.040]	0.003	1.000	1.006						.722
8. USA	320	5.445 (2)	0.073 [0.000, 0151]	0.029	0.974	0.923						.503
9. Mongolia (Item 3 with Item 4)	403	28.581 (2) 0.003 (1)	0.182 [0.126; 0.243] 0.000 [0.000, 0.000]	0.033 0.000	0.987 1.000	0.960 1.003	21.943* (1)	0.182	0.033	0.013	0.043	.747
10. UK	209	3.994 (2)	0.069 [0.000, 0.169]	0.030	0.989	0.968						.682

Table 5.2.2 Standardized factor loadings of separate CFAs of Differentiated Instruction for 10 countries (low factor loadings marked in italics)

	No residuals correlated (N = 7)														Item 3 with item 4 correlated (N = 3)					
Item	the Netherlands (N_{total} = 606)		Pakistan (N = 400)		South Korea (N = 208)		USA (N = 320)		HK – China (N = 284)		UK (N = 209)		Spain (N = 344)		South Africa (N = 304)		Indonesia (N = 335)		Mongolia (N = 403)	
	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained
1	0.509	25.9%	0.722	52.1%	0.457	20.9%	0.540	29.2%	*0.375*	14.1%	0.754	56.9%	0.415	17.2%	0.783	61.2%	0.682	46.5%	0.403	16.3%
2	0.813	66.0%	0.674	45.4%	0.727	52.8%	0.817	66.8%	0.793	62.9%	0.667	44.4%	0.783	61.2%	0.958	91.7%	0.909	82.7%	0.955	91.1%
3	0.807	65.1%	0.698	48.7%	0.958	91.8%	*0.336*	11.3%	0.636	40.5%	0.679	46.0%	0.756	57.1%	0.944	89.1%	0.922	85.0%	0.664	44.1%
4	0.871	75.8%	0.510	26.0%	0.851	72.3%	0.650	42.3%	0.801	64.1%	0.579	33.5%	0.837	70.1%	0.933	87.1%	0.787	61.9%	0.657	43.1%
Total		58.3%		43.1%		59.5%		37.4%		45.4%		45.2%		51.4%						
$R_{v25\text{-}v26}$ (*p*)															0.772 (0.000)		0.601 (0.000)		0.690 (0.000)	

Table 5.2.3 Categorical Multi-Group Confirmatory Factor Analysis of Differentiated Instruction for 10 countries[3]

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Decision
M1: Configural invariance	22.594 (17)	1.000	1.000	0.031 [0.000, 0.062]	0.014						
M2: Metric invariance	116.439* (44)	0.998	0.998	0.070 [0.054, 0.085]	0.028	M1	-0.002	-0.002	0.039	0.014	Rejected
M2a: Partial metric invariance	79.696* (41)	0.999	0.999	0.053 [0.035, 0.070]	0.023	M1	-0.001	-0.001	0.022	0.009	Rejected
M2b: Partial metric invariance	61.539* (39)	0.999	0.999	0.041 [0.020, 0.060]	0.021	M1	-0.001	-0.001	0.010	0.007	Accepted
M3: Scalar invariance	1016.266* (102)	0.979	0.988	0.162 [0.153, 0.171]	0.065	M2b	-0.020	-0.011	0.121	0.044	Rejected
M3a: Partial scalar invariance	391.616* (89)	0.993	0.995	0.100 [0.090, 0.110]	0.040	M2b	-0.006	-0.004	0.059	0.019	Rejected
M3b: Partial scalar invariance	146.589* (61)	0.998	0.998	0.064 [0.051, 0.078]	0.027	M2b	-0.001	-0.001	0.023	0.006	Rejected
M3c: Partial scalar invariance	115.703* (59)	0.999	0.999	0.053 [0.039, 0.067]	0.026	M2b	-0.000	-0.000	0.012	0.005	Accepted

Table 5.2.4 Categorical Multi-Group Confirmatory Factor Analysis in Four Countries: South Korea, South Africa, Pakistan, and Hong Kong – China

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Decision
M1: Configural invariance	9.300 (7)	1.000	1.000	0.033 [0.000, 0.083]	0.014						
M2: Metric invariance	33.965* (16)	0.999	0.999	0.061 [0.032, 0.090]	0.025	M1	-0.001	-0.001	0.028	0.011	Rejected
M2a: Partial metric invariance	20.169* (13)	1.000	1.000	0.043 [0.000, 0.078]	0.019	M1	-0.000	-0.000	0.010	0.005	Accepted
M3: Scalar invariance	324.664* (34)	0.991	0.994	0.169 [0.153, 0.186]	0.057	M2a	-0.009	-0.006	0.126	0.038	Rejected
M3a: Partial scalar invariance	67.143* (26)	0.999	0.999	0.073 [0.052, 0.094]	0.027	M2a	-0.001	-0.001	0.030	0.012	Rejected

3 Response category 4 was not recorded in Hong Kong – China (item 2) and the US (items 2 and 4) and response category 1 was not recorded in UK (items 1, 3, 4). Thus, response categories were recoded into three categories: "1 = mostly weak and more often weak than strong", "2 = more often strong than weak" and, "3 = mostly strong". Recoding improved model identification and fit in the analyses (Wang & Wang, 2012). MGCFA of Differentiation scale was conducted using the recoded response categories. However, the outcomes resulted in a negative degree of freedom and the chi-square and standard errors could not be computed. Alternatively, another approach of data modification was done by filling in the non-recorded response categories for a few items in the countries mentioned. The justification behind this approach is that according to Van de Grift et al. (2015), the four response categories can be collapsed into two categories for Rasch modelling, in which category 1 and 2 = 1 (insufficient), and categories 3 and 4 = 2 (sufficient). The following response was modified: two 3 responses were modified to 4 categories in US data; one 3 responses were modified to 4 categories in the Hong Kong China data; three 2 response categories were modified to 1 for English data. To check whether this modification does not have an influence on the CFA country data a separate CFA with modified responses was conducted. The results of CFA with original data and a slightly modified response do not show significant difference.

5.2.2 Survey instrument: My Teacher Questionnaire

The full measurement model of CFA for perceived differentiation scale in each country's data shows that the model fits adequately in 11 countries (see Table 5.2.5). Note that the data from Norway were not included in the CFA due to insufficient sample size.

Item 1 ("My teacher takes into account what I already know") seemed to contribute less positively to the overall model fit in five countries: the Netherlands, Indonesia, South Africa, Malta, and South Korea, as indicated by a RMSEA value (0.086 – 0.107) that was too high in the five countries, and a TLI value that was too low in Indonesia (0.841). Deleting this item improved the model fit significantly in each country. However, we decided to retain this item for further analyses for two reasons. Firstly, deleting the item was not preferred for a scale that consists of only a limited number of items, except the item is not functioning sufficiently well. Secondly, although the RMSEA values for this item are above the cut-off of 0.080, the deviation is relatively small. This indicates that the model is not perfect but is still within an acceptable range allowing for minor error. In addition, The CFI and TLI indices are generally high. Based on these results, there is evidence that the perceived Differentiated Instruction scale is a valid scale in 11 participating countries. In general, factor loadings of perceived Differentiated Instruction items are sufficiently high in all countries (> 0.40, see Table 5.2.6). Exceptions are for item 1 ("My teacher takes into account what I already know") and item 3 ("My teacher checks if I have understood the content of the lesson") in the UK, in which the factor loadings are below the common cut-off.

MGCFA analyses including data for all 11 countries resulted in convergence problems. This may be due to the degree of violations caused by item 1 in five countries. Therefore, MGCFA models with item 1 excluded in the data of 11 countries were tested. Results show that the CFI, TLI, and RMSEA values are generally adequate. However, ΔCFI, ΔTLI, and ΔRMSEA comparing the invariance levels are not acceptable at the (partial) metric invariance level (see Table 5.2.7). Next, MGCFA models excluding English data and item 1 were examined. The CFI, TLI, and RMSEA values of these models are generally adequate. The ΔCFI and ΔTLI for partial metric invariance are acceptable, but the ΔRMSEA indicates a model misfit (see Table 5.2.8). Finally, MGCFA models including all items but excluding UK and Indonesian data were tested. Results show that partial scalar invariance of the perceived Differentiated Instruction scale in the nine countries is met sufficiently (see Table 5.2.9). Based on these results, the student perceptions of Differentiated Instruction practices in the nine countries can be compared.

Table 5.2.5 Categorical CFA of Differentiation scale for each country data (inadequate model fit marked in italics)

	$N_{Students}$	Model	χ^2 (df)	RMSEA with 90% CI	SRMR	CFI	TLI
1. The Netherlands	5,789	M1: Full items	122.471* (2)	*0.102 [0.087, 0.118]*	0.021	0.992	0.977
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
2. Indonesia	5,000	M1: Full items	251.168* (2)	*0.158 [0.142, 0.175]*	0.036	0.947	*0.841*
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
3. South Africa	4,688	M1: Full items	109.918* (2)	*0.107 [0.091, 0.125]*	0.021	0.984	0.952
	4,658	M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
4. Mongolia	4,996	M1: Full items	54.904* (2)	0.073 [0.057, 0.090]	0.015	0.993	0.980
	4,948	M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
5. Malta	345	M1: Full items	7.113* (2)	*0.086 [0.024, 0.159]*	0.018	0.995	0.984
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
6. Türkiye	4,991	M1: Full items	67.300* (2)	0.081 [0.065, 0.098]	0.013	0.995	0.986
	4,989	M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
7. Spain	4,999	M1: Full items	4.570* (2)	0.016 [0.000, 0.036]	0.005	0.999	0.997
	4,997	M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
8. UK	2,106	M1: Full items	1.525 (2)	0.000 [0.000, 0.040]	0.007	1.000	1.004
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
9. China	2,981	M1: Full items	1.404 (2)	0.000 [0.000, 0.033]	0.004	1.000	1.000
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
10. South Korea	4,992	M1: Full items	105.191* (2)	*0.102 [0.086, 0.119]*	0.015	0.994	0.982
	4,988	M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000
11. Brazil	242	M1: Full items	1.396 (2)	0.000 [0.000, 0.115]	0.017	1.000	1.009
		M2: Item 1 removed	0.000* (0)	0.000 [0.000, 0.000]	0.000	1.000	1.000

Table 5.2.6 Standardized factor loadings of separate CFAs on 11 countries (low factor loadings marked in italics)

Item	Nether-lands (N_{total} = 5789)		South Africa (N = 4688)		Mongolia (N = 4996)		Türkiye (N = 4991)		Spain (N = 4999)		UK (N = 2106)		China (N = 2981)		South Korea (N = 4992)		Brazil (N = 242)		Malta (N = 345)		Indonesia (N = 5000)	
	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained	Std factor loading	Variance explained
1	0.761	57.9%	0.613	37.6%	0.597	35.7%	0.724	52.5%	0.599	35.9%	*0.150*	*2.3%*	0.573	32.8%	0.788	62.1%	0.610	37.2%	0.670	44.9%	0.438	26.1%
2	0.801	64.2%	0.654	42.7%	0.707	50.0%	0.725	52.5%	0.542	29.4%	0.624	38.9%	0.796	63.4%	0.797	63.5%	0.576	33.2%	0.818	66.9%	0.511	26.1%
3	0.706	49.8%	0.750	56.2%	0.763	58.2%	0.826	68.3%	0.620	38.4%	*0.136*	*1.9%*	0.779	60.8%	0.840	70.6%	0.620	38.4%	0.906	82.1%	0.809	65.4%
4	0.748	55.9%	0.735	54.0%	0.734	53.9%	0.817	66.7%	0.526	27.7%	0.663	44.0%	0.800	64.0%	0.749	56.1%	0.760	57.8%	0.655	42.9%	0.670	44.9%
Total		56.9%		47.6%		49.5%		60.0%		32.9%		21.8		55.3%		63.1%		41.7%		59.2%		45.5%

Table 5.2.7 Categorical Multi-Group Confirmatory Factor Analysis with 11 countries and without item 1[4] (inadequate model fit marked in italics)

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	0.000* (0)	1.000	1.000	0.000 [0.000, 0.000]	0.002						
M2: Metric invariance	1010.929* (20)	0.981	0.968	0.115 [0.109, 0.121]	0.028	M1	*-0.019*	*-0.032*	*0.115*	*0.026*	Rejected
M2a: Partial metric invariance	388.250* (15)	0.993	0.984	0.082 [0.075, 0.089]	0.019	M1	-0.007	*-0.016*	*0.082*	*0.017*	Rejected

Table 5.2.8 Categorical Multi-Group Confirmatory Factor Analysis with 10 countries, without UK, and without Item 1 (inadequate model fit marked in italics)

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	0.000* (0)	1.000	1.000	0.000 [0.000, 0.000]	0.002						
M2: Metric invariance	861.151* (18)	0.984	0.973	0.110 [0.104, 0.116]	0.024	M1	*-0.016*	*-0.027*	*0.110*	*0.022*	Rejected
M2a: Partial metric invariance	187.123* (12)	0.997	0.991	0.061 [0.054, 0.069]	0.012	M1	-0.003	-0.009	*0.061*	0.010	Rejected

Table 5.2.9 Categorical Multi-Group Confirmatory Factor Analysis with 9 countries, without UK and Indonesia (inadequate model fit marked in italics)

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	421.315* (18)	0.995	0.984	0.077 [0.071, 0.083]	0.015						
M2: Metric invariance	1586.604* (42)	0.980	0.974	0.099 [0.095, 0.103]	0.028	M1	-0.015	-0.010	*0.022*	0.013	Rejected
M2a: Partial metric invariance	1335.258* (41)	0.983	0.978	0.091 [0.087, 0.096]	0.026	M1	-0.012	-0.006	0.014	0.011	Accepted
M3: Scalar invariance	4710.543* (97)	0.939	0.966	0.112 [0.109, 0.115]	0.037	M2a	*-0.056*	*-0.018*	*0.035*	*0.022*	Rejected
M3a: Partial scalar invariance	2054.319* (79)	0.974	0.982	0.081 [0.078, 0.084]	0.028	M2a	-0.009	0.004	-0.010	0.002	Accepted

4 All eleven countries are included in this MGCFA, with item 1 removed. In Model 2a, the factor loading of item 2 is set free in South Korea, South Africa, Spain, Türkiye, and Indonesia. Freeing the factor loading of item 2 in all countries yields worse fit indices. Partial metric invariance is not met.

Chapter 6

International comparative study (Step 2)

Research question 2: Are teachers in the Netherlands better at executing Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?
2.1 Do teachers in other countries experience differentiation in teaching as one of the most difficult teaching behaviors to execute?
2.2 Are novice teachers in other countries less able to execute Differentiated Instruction in their teaching compared to experienced teachers?

Research question 3: Which personal and contextual factors explain differences between countries in Differentiated Instruction in teaching?

To answer RQ. 2, Categorical Multi-Group Confirmatory Analysis (C-MGCFA) was applied on combined country data for both observation and the student questionnaire.

To answer RQ. 3, multilevel modelling was performed on combined country data for both observation and the student questionnaire.

6.1 Differentiation practices – Observer perspectives

Research question 2: Are teachers in the Netherlands better at executing Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?

Based on the MGCFA results, the latent mean scores of differentiated scales in eight countries can be compared. The items fail to meet partial scalar invariance in Hong Kong – China and Pakistan. For this reason, these two countries were excluded for latent mean comparisons. With the Netherlands set as a reference, results show that Differentiated Instruction practices in the Dutch secondary school classrooms were observed to be lower compared to Spanish, Mongolian, English, South African, and South Korean classrooms[1] (see Table 6.1.1). Compared to American and Indonesian classrooms, Differentiated Instruction practices in

1 Comparison with South Korea and South Africa should be interpreted with caution because nearly 50% of the item proportion is invariant.

the Dutch classrooms were observed to be higher (see also Figure 6.1.1). In general, Differentiated Instruction practices were observed to be highest in the UK classrooms, followed by South Korean, Mongolian, South African, Spanish, Indonesian, and American classrooms respectively (see Figure 6.1.1).

Table 6.1.1 Latent means of Differentiated Instruction based on partial scalar equivalent in 10 countries

	The Netherlands (N = 600)	USA (N = 320)	Pakistan (N = 400)	Indonesia (N = 335)	Spain (N = 344)	Mongolia (N = 403)	UK (N = 209)	Hong Kong – China (N = 284)	South Africa (N = 302)	South Korea (N = 208)
Latent mean_10 countries (Unstandardized)	0.000	-0.561*	-0.249	-0.164*	0.369*	0.724*	1.429*	0.173	0.670*	0.955*
Latent mean_10 countries (Standardized)	0.000	-1.066*	-0.492*	-0.228*	0.578*	2.407*	3.429*	0.395	0.895*	1.885*

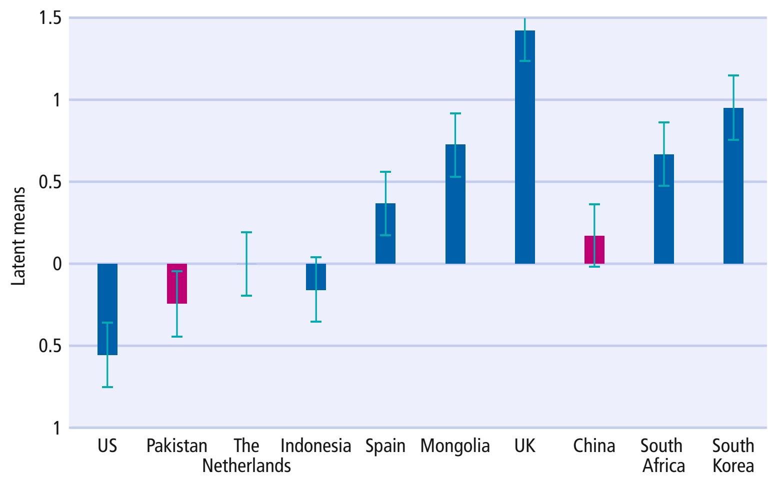

Figure 6.1.1 Comparison of latent means of the scalar equivalent MGCFA model for ten countries[2]

2.1 Do teachers in other countries experience Differentiated Instruction in teaching as one of the most difficult teaching behaviors to execute?

To answer this question, latent mean scores of Differentiated Instruction were compared with those of other domains effecting teaching behavior. Before the comparison was made,

2 Pakistan and Hong Kong – China data do not sufficiently meet partial scalar invariance. Their latent means cannot be compared directly with other countries. The means are included in the graph for 'raw indications' only (shown in red bar).

categorical confirmatory factor analysis was performed on the six effective teaching behavior domains, which include *Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, Teaching Learning Strategies, and Differentiated Instruction*, separately for each country. This step was taken to test the factor structure of the six effective teaching domains in each country. The results are presented in Table 6.1.2. As can be seen in this table, the 6-factor structure with full items is confirmed in the following 6 countries: the Netherlands, Indonesia, South Africa, South Korea, Pakistan, and UK. In Mongolia, Spain, Hong Kong – China, and the USA, an acceptable model fit could not be reached without (heavy) modifications and deleting some items. In Mongolia, acceptable factor structure was reached after deleting item 23. In Spain, acceptable factor structure was obtained after deleting items 13, 17, 23, and 31. In Hong Kong – China, adequate model fit was reached after excluding Items 3, 4, 10, 13, 16, 18, 19, 20. For the USA data, acceptable model fit was not reached even after deleting ten items. Fort this reason, these four countries are excluded in the multi-group CFA.

Table 6.1.3 shows the factor loadings of the six domains of effective teaching behavior across the 10 countries, followed by inter-domain correlations. In countries where the 6-factor structure with full items are supported (the Netherlands, Indonesia, South Africa, South Korea, Pakistan, and the UK), all factor loadings are adequate. In Mongolia and Spain, all factor loadings of included items are also sufficiently high. In the Hong Kong – China and USA data, however, there are items with problematic factor loadings, showing either negative values or exceeding 1.00 values.

Results of categorical multi-group confirmatory analyses with the six countries included are presented in Table 6.1.4. Results show that partial scalar invariance is reached. This means that comparing latent mean scores of the six domains of effective teaching behavior is deemed acceptable. However, Learning Climate and Classroom Management in Pakistan did not reach acceptable partial invariance. With these results, the quality of Differentiated Instruction across the six countries, in comparison to other five domains, can be examined, except for domains Learning Climate and Classroom Management in Pakistan.

Table 6.1.2 Categorical Confirmatory Factor Analysis for ten countries (inadequate model fit marked in italics)

	Model	$N_{Teacher}$	χ^2 (df)	RMSEA with 90% CI	SRMR	CFI	TLI
1. The Netherlands	All items	606	1761.164*(449)	0.069 [0.06, 0.073]	0.065	0.917	0.908
2. Indonesia	All items	335	1346.169*(449)	0.077 [0.073, 0.082]	0.071	0.938	0.931
3. South Africa	All items	304	1372.800*(449)	0.082 [0.077, 0.087]	0.053	0.966	0.962
4. South Korea	All items	208	815.571*(449)	0.063 [0.056, 0.069]	0.067	0.962	0.958
5. Pakistan	All items	400	1362.984*(449)	0.071 [0.067, 0.076]	0.075	0.926	0.919
	4 correlations set to 1	400	1372.147* (453)	0.071 [0.067, 0.076]	0.075	0.926	0.919
6. UK	All items	209	748.371* (449)	0.056 [0.049, 0.064]	0.086	0.969	0.965
	8 correlations set to 1	209	755.350* (457)	0.056 [0.049, 0.063]	0.087	0.969	0.966
7. Mongolia	All items	403	1660.461*(449)	*0.082 [0.078, 0.086]*	0.078	*0.893*	*0.881*
	Item 23 deleted	403	1364.907* (419)	0.075 [0.070, 0.079]	0.070	0.914	0.904
8. Spain	All items	344	1606.119*(449)	*0.087 [0.082, 0.091]*	*0.086*	*0.865*	*0.851*
	Items 13, 17, 23, 31 removed	344	977.737* (335)	0.075 [0.069,0.080]	0.072	0.914	0.903
9. Hong Kong – China	All items	284	2449.374* (449)	*0.125 [0.120, 0.130]*	*0.137*	*0.752*	*0.726*
	Items 3, 4, 10, 13, 16, 18, 19, 20 removed	284	587.683* (237)	0.072 [0.065, 0.080]	0.080	0.944	0.934
	Items 3, 4, 10, 13, 16, 18, 19, 20 removed Correlation between DIFF and ACTIV is set to 1	284	590.664* (238)	0.072 [0.065, 0.080]	0.081	0.943	0.934
10. USA	All items	320	3580.603*(449)	*0.148 [0.143, 0.152]*	*0.189*	*0.580*	*0.537*
	Items 1, 14, 16, 18, 19, 20, 24, 25 removed	320	930.073* (237)	*0.096 [0.089, 0.102]*	*0.120*	*0.827*	*0.799*
	Items 1, 14, 16, 18, 19, 20, 24, 25, 32 removed	320	793.046* (215)	*0.092 [0.085, 0.099]*	*0.110*	*0.847*	*0.820*

Table 6.1.3 Standardized factor loadings of separate CFA for 10 countries (low and extreme factor loadings are marked in italics)

Country and subscales	Standardized factor loadings							Domain correlations					Variance explained
								1	2	3	4	5	
The Netherlands (N_{total} = 606)													
1. Stimulating teaching (4 items)	0.802	0.755	0.886	0.775									65.0%
2. Classroom management (4 items)	0.783	0.727	0.724	0.678				0.770					53.1%
3. Clarity of instruction (7 items)	0.711	0.660	0.737	0.767	0.706	0.706	0.636	0.778	0.925				49.6%
4. Activating teaching (7 items)	0.613	0.610	0.737	0.787	0.695	0.657	0.447	0.673	0.682	0.887			43.2%
5. Differentiated teaching (4 items)	0.783	0.782	0.734	0.832				0.340	0.391	0.459	0.661		61.4%
6. Teaching learning strategies (6 items)	0.791	0.836	0.801	0.757	0.766	0.783		0.342	0.382	0.526	0.781	0.651	62.3%
Indonesia (N_{total} = 335)													
1. Stimulating teaching (4 items)	0.640	0.658	0.805	0.681									48.9%
2. Classroom management (4 items)	0.684	0.817	0.828	0.605				0.684					54.7%
3. Clarity of instruction (7 items)	0.590	0.569	0.728	0.729	0.812	0.677	0.769	0.711	0.918				49.1%
4. Activating teaching (7 items)	0.689	0.772	0.730	0.691	0.585	0.670	0.628	0.598	0.758	0.882			46.7%
5. Differentiated teaching (4 items)	0.839	0.830	0.926	0.908				0.275	0.501	0.696	0.771		76.9%
6. Teaching learning strategies (6 items)	0.774	0.821	0.848	0.751	0.728	0.834		0.457	0.614	0.802	0.860	0.803	63.0%
South Africa (N_{total} = 304)													
1. Stimulating teaching (4 items)	0.953	0.963	0.913	0.945									89.1%
2. Classroom management (4 items)	0.958	0.932	0.936	0.918				0.757					87.7%
3. Clarity of instruction (7 items)	0.846	0.780	0.894	0.793	0.819	0.857	0.821	0.779	0.767				69.0%
4. Activating teaching (7 items)	0.901	0.885	0.880	0.874	0.775	0.852	0.807	0.666	0.720	0.750			73.0%
5. Differentiated teaching (4 items)	0.875	0.903	0.983	0.982				0.582	0.560	0.642	0.678		87.8%
6. Teaching learning strategies (6 items)	0.873	0.948	0.895	0.900	0.925	0.875		0.603	0.709	0.713	0.755	0.682	81.6%

Table 6.1.3 continued

Country and subscales	Standardized factor loadings							Domain correlations					Variance explained
South Korea (N_{total} = 208)													
1. Stimulating teaching (4 items)	0.788	0.724	0.875	0.897									67.8%
2. Classroom management (4 items)	0.779	0.864	0.844	0.704				0.830					64.1%
3. Clarity of instruction (7 items)	0.815	0.661	0.726	0.827	0.819	0.795	0.756	0.875	0.939				59.8%
4. Activating teaching (7 items)	0.729	0.658	0.824	0.833	0.718	0.731	0.698	0.848	0.880	0.955			55.4%
5. Differentiated teaching (4 items)	0.740	0.711	0.848	0.920				0.643	0.711	0.752	0.830		65.5%
6. Teaching learning strategies (6 items)	0.764	0.846	0.814	0.847	0.809	0.783		0.622	0.689	0.795	0.878	0.786	65.8%
Pakistan (N_{total} = 400)													
1. Stimulating teaching (4 items)	0.466	0.459	0.774	0.856									44.0%
2. Classroom management (4 items)	0.762	0.653	0.705	0.779				0.816					52.8%
3. Clarity of instruction (7 items)	0.678	0.744	0.793	0.656	0.619	0.735	0.543	0.859	1.000				47.0%%
4. Activating teaching (7 items)	0.253	0.574	0.716	0.586	0.433	0.612	0.657	0.708	0.829	0.871			32.1%
5. Differentiated teaching (4 items)	0.775	0.614	0.656	0.629				0.686	0.860	0.846	1.000		45.0%
6. Teaching learning strategies (6 items)	0.655	0.739	0.626	0.691	0.729	0.641		0.617	0.724	0.727	1.000	1.000	46.4%
UK (N_{total} = 209)													
1. Stimulating teaching (4 items)	0.461	0.854	0.851	0.523									48.5%
2. Classroom management (4 items)	0.812	0.559	0.875	0.582				0.971					51.9%
3. Clarity of instruction (7 items)	0.575	0.535	0.834	0.664	0.478	0.813	0.604	1.00	1.000				43.0%
4. Activating teaching (7 items)	0.636	0.640	0.703	0.665	0.884	0.839	0.548	0.975	0.973	1.000			50.5%
5. Differentiated teaching (4 items)	0.675	0.820	0.679	0.575				1.000	0.919	1.000	1.000		48.0%
6. Teaching learning strategies (6 items)	0.683	0.846	0.639	0.860	0.567	0.664		0.980	0.974	1.000	0.972	1.000	51.5%
Mongolia (N_{total} = 403)													
1. Stimulating teaching (4 items)	0.747	0.750	0.818	0.812									61.2%
2. Classroom management (4 items)	0.701	0.693	0.749	0.761				0.760					52.8%
3. Clarity of instruction (7 items)	0.720	0.673	0.633	0.564	0.761	0.788	0.653	0.726	0.960				47.4%

Country and subscales	Standardized factor loadings							Domain correlations					Variance explained
4. Activating teaching (7 items)	0.640	0.630	0.744	0.679	0.689	0.618	0.550	0.642	0.791	0.923			42.6%
5. Differentiated teaching (4 items)	---	0.791	0.860	0.910				0.275	0.308	0.478	0.641		73.1%
6. Teaching learning strategies (6 items)	0.733	0.717	0.759	0.748	0.758	0.770		0.538	0.605	0.766	0.906	0.701	55.9%
Spain (N_{total} = 344)													
1. Stimulating teaching (4 items)	0.714	0.828	0.817	0.769									61.3%
2. Classroom management (4 items)	0.814	0.717	0.841	0.714				0.530					59.9%
3. Clarity of instruction (7 items)	0.762	0.693	0.724	0.750	---	0.719	0.717	0.633	0.864				53.0%
4. Activating teaching (7 items)	0.535	---	0.682	0.769	0.645	0.592	0.614	0.749	0.713	0.932			41.4%
5. Differentiated teaching (4 items)	---	0.724	0.846	0.805				0.688	0.378	0.420	0.447		63.0%
6. Teaching learning strategies (6 items)	0.854	0.820	0.818	0.688	---	0.768		0.328	0.435	0.589	0.759	0.431	62.7%
Hong Kong – China (N_{total} = 218)													
1. Stimulating teaching (4 items)	0.996	0.819	---	---									83.1%
2. Classroom management (4 items)	0.674	0.590	0.744	0.699				0.775					46.1%
3. Clarity of instruction (7 items)	0.677	---	0.701	0.723	---	0.809	0.684	0.671	0.922				51.9%
4. Activating teaching (7 items)	---	0.677	---	---	---	0.522	0.443	0.759	0.718	0.859			30.9%
5. Differentiated teaching (4 items)	0.624	0.818	0.669	0.591				0.609	0.579	0.607	1.000		46.4%
6. Teaching learning strategies (6 items)	0.821	0.907	0.867	0.828	0.500	0.807		*-0.565*	*-0.172*	*-0.070* *(p =0.221)*	*0.071* *(p=0.317)*	0.267	63.9%
USA (N_{total} = 320)													
1. Stimulating teaching (4 items)	---	0.630	0.672	0.652									42.5%
2. Classroom management (4 items)	0.778	0.650	0.691	0.576				0.914					45.9%
3. Clarity of instruction (7 items)	0.596	0.618	0.794	0.445	0.626	---	0.790	0.991	*1.077*				43.0%
4. Activating teaching (7 items)	---	0.357	---	---	---	0.554	0.488	*1.356*	*1.085*	*1.081*			22.4%
5. Differentiated teaching (4 items)	0.810	---	---	0.499				0.464	0.435	0.514	0.606		45.3%
6. Teaching learning strategies (6 items)	0.774	0.561	0.589	0.808	0.490	---		0.346	0.357	0.504	0.237	0.862	43.1%

Table 6.1.4 Categorical Multi-Group Confirmatory Factor Analysis for 6 countries (all items included; inadequate model fit marked in italics)

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Deci-sion
M1: Configural invariance	13674.885* (2884)	0.885	0.881	0.104 [0.103, 0.106]	0.091						
M2: Metric invariance	15739.042* (3044)	0.865	0.868	0.110 [0.108, 0.112]	0.115	M1	*-0.020*	-0.013	0.006	*0.024*	Rejected
M2a: Partial metric invariance	14054.674* (3031)	0.883	0.885	0.103 [0.101, 0.105]	0.106	M1	-0.002	0.004	-0.001	0.015	Accepted
M3: Scalar invariance	21876.993* (3321)	0.802	0.823	0.128 [0.126, 0.129]	0.112	M2a	*-0.081*	*-0.062*	*0.025*	0.006	Rejected
M3a: Partial scalar invariance	16786.994* (3229)	0.856	0.867	0.111 [0.109, 0.112]	0.105	M2a	*-0.027*	*-0.018*	0.008	-0.001	Rejected
M3b: Partial scalar invariance	15579.651* (3220)	0.868	0.878	0.106 [0.104, 0.107]	0.104	M2a	-0.015	-0.007	0.003	-0.002	Accepted

Based on results of MGCFA (see Table 6.1.5 and Figure 6.1.2), it can be concluded that all domains of effective teaching behavior in South Korea and some domains in the UK and South Africa, were observed to be higher compared to the Netherlands. Dutch teachers were observed to be higher in all domains compared to Indonesia, and to Pakistan (with the exception for Learning Climate and Classroom management, that did not meet partial invariance in Pakistan).

Table 6.1.5 Raw and latent means of the partially scalar equivalent MGCFA model for 6 countries

		The Netherlands (N = 606)	Indonesia (N = 335)	South Korea (N = 208)	South Africa (N = 304)	UK (N = 209)	Pakistan (N = 400)
Latent mean (Unstandar-dized)	Learning Climate	0.000	-0.882**	0.310*	-0.274*	-0.513**	-1.731**
	Classroom management	0.000	-1.225**	0.521**	-0.206	-0.387**	-2.606**
	Clarity of instruction	0.000	-1.123**	0.510**	-0.095	0.194*	-1.736**
	Activating teaching	0.000	-0.425**	0.798**	0.329**	1.036**	-1.194**
	Differentiated instruction	0.000	-0.459*	1.817**	1.184**	2.438**	0.033
	Teaching learning strategies	0.000	-0.054	1.548**	1.417**	1.893**	-0.309**
Latent mean (Standar-dized)	Learning Climate	0.000	-1.226**	0.267*	-0.211*	-0.547**	-2.859**
	Classroom management	0.000	-1.020**	0.348**	-0.095	-0.358**	-2.237**
	Clarity of instruction	0.000	-1.181**	0.441**	-0.072	0.232*	-2.045**
	Activating teaching	0.000	-0.487**	0.782**	0.260**	1.060**	-1.725**
	Differentiated instruction	0.000	-0.241**	1.181**	0.578**	2.316**	0.037
	Teaching learning strategies	0.000	-0.043	1.205**	0.838**	1.953**	-0.384**

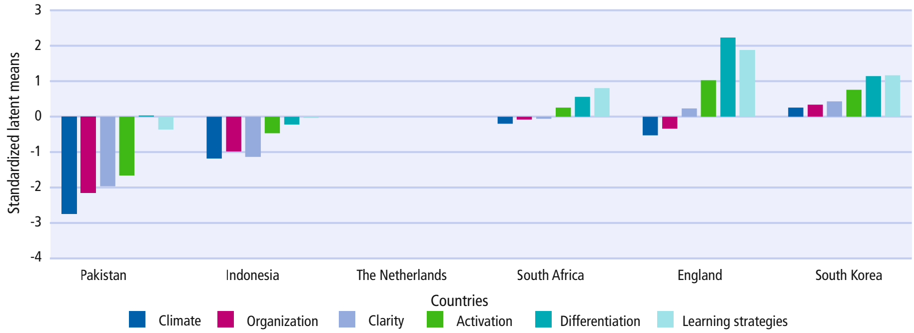

Figure 6.1.2 Comparison of latent means of the scalar equivalent MGCFA model for 6 countries

As can be seen in Figure 6.1.3, Differentiated Instruction was observed to be the lowest in the Netherlands, Indonesia, South Africa, and South Korea. In Pakistan, Differentiated Instruction was observed as the second lowest, after Teaching Learning Strategies. In contrast, Differentiated Instruction was observed to be the highest in the UK.

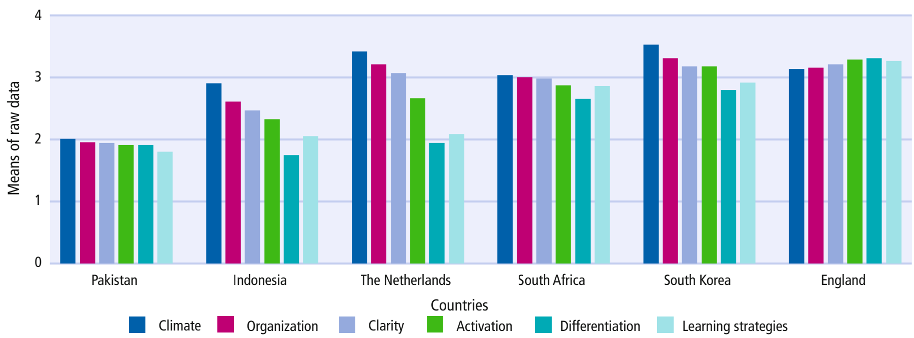

Figure 6.1.3 Raw mean scores of the six effective teaching behavior domains in 6 countries

2.2 Are novice teachers in other countries less able to execute Differentiated Instruction in their teaching compared to experienced teachers?

Information about teaching experience is missing in the datasets of Hong Kong – China, USA, and South Africa. Furthermore, there are only six inexperienced teachers (< 1%) in the Spanish data. In the UK data, there are only eight inexperienced teachers (about 5%). Therefore, comparison of Differentiated Instruction on teaching experience cannot be made for these five countries. The remaining five countries were included in subsequent analysis. Those countries are: the Netherlands, South Korea, Mongolia, Pakistan, and Indonesia. In the following, results of MGCFA for each country data on teaching experience are presented (see Tables 6.1.6-6.1.10). Full scalar (South Korea, Pakistan, and Indonesia) and partial scalar invariance (the Netherlands, Mongolia) were obtained. Subsequently, comparisons of Differentiated Instruction practices across the five countries can be made.

Results show that in the Netherlands, South Korea, and Mongolia, experienced teachers were observed to display higher levels of Differentiated Instruction practices compared to inexperienced teachers. In contrast, experienced teachers in Pakistan and Indonesia were observed to show lower levels of Differentiated Instruction compared to inexperienced teachers (see Table 6.1.11 and Figure 6.1.4).

Table 6.1.6 Categorical Multi-Group Confirmatory Factor Analysis regarding teaching experience for the Netherlands

The Netherlands	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Decision
M1: Configural invariance	10.227* (4)	0.999	0.998	0.039 (0.009, 0.069)	0.009						
M2: Metric invariance	12.735* (7)	0.999	0.999	0.028 (0.000, 0.053)	0.011	M1	0.000	0.000	-0.011	0.002	Accepted
M3: Scalar invariance	47.440* (14)	0.996	0.997	0.048 (0.034, 0.064)	0.016	M2	-0.003	-0.002	0.020	0.005	Rejected
M3a: Partial scalar invariance	28.560* (13)	0.998	0.998	0.034 (0.017, 0.051)	0.015	M2	-0.001	-0.001	0.006	0.004	Accepted

Table 6.1.7 Categorical Multi-Group Confirmatory Factor Analysis regarding teaching experience for South Korea

South Korea	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Decision
M1: Configural invariance	8.241 (4)	0.998	0.993	0.081 (0.000, 0.161)	0.018						
M1a: Configural invariance Item residules 2 correlated with 4	1.818 (2)	1.000	1.001	0.000 (0.000, 0.152)	0.009						
M2: Metric invariance	11.981 (7)	0.997	0.996	0.067 (0.000, 0.129)	0.023	M1	-0.001	0.003	-0.014	0.005	Accepted
M2a: Metric invariance Item residules 2 correlated with 4	3.703 (5)	1.000	1.002	0.000 (0.000, 0.094)	0.013	M1a	0.000	0.001	0.000	0.004	Accepted
M3: Scalar invariance	15.370 (14)	0.999	0.999	0.025 (0.000, 0.082)	0.026	M2	0.002	0.003	-0.042	0.003	Rejected
M3a: Scalar invariance Item residules 2 correlated with 4	6.998 (12)	1.000	1.003	0.000 (0.000, 0.044)	0.018	M2a	0.000	0.001	0.000	0.005	Accepted

Table 6.1.8 Categorical Multi-Group Confirmatory Factor Analysis regarding teaching experience for Mongolia

Mongolia	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	38.683* (4)	0.993	0.979	0.129 (0.094, 0.168)	0.024						
M1a: Configural invariance Item residules 3 correlated with 4	1.663 (2)	1.000	1.000	0.000 (0.000, 0.082)	0.005						
M2: Metric invariance	35.553* (7)	0.994	0.990	0.089 (0.061, 0.118)	0.029	M1	0.001	0.011	-0.040	0.005	Rejected
M2a: Metric invariance Item residules 3 correlated with 4	17.272* (5)	0.998	0.994	0.069 (0.035, 0.105)	0.018	M1a	-0.002	-0.006	0.069	0.013	Rejected
M2b: Partial metric invariance Item residules 3 correlated with 4	2.999 (3)	1.000	1.000	0.000 (0.000, 0.074)	0.005	M1a	0.000	0.000	0.000	0.000	Accepted
M3: Scalar invariance Item residules 3 correlated with 4	29.208* (10)	0.996	0.995	0.061 (0.036, 0.087)	0.012	M2b	-0.004	-0.005	0.061	0.007	Rejected
M3a: Partial scalar invariance Item residules 3 correlated with 4	3.779 (8)	1.000	1.001	0.000 (0.000, 0.026)	0.006	M2b	0.000	0.001	0.000	0.001	Accepted

Table 6.1.9 Categorical Multi-Group Confirmatory Factor Analysis regarding teaching experience for Pakistan

Pakistan	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	22.640* (4)	0.962	0.886	0.155 (0.097, 0.220)	0.041						
M1a: Configural invariance Item residules 2 correlated with 4	3.177 (2)	0.998	0.986	0.055 (0.000, 0.163)	0.016						
M2: Metric invariance	17.757* (7)	0.978	0.963	0.089 (0.038, 0.141)	0.041	M1	0.016	0.077	-0.066	0.000	Rejected
M2a: Metric invariance Item residules 2 correlated with 4	5.878 (5)	0.998	0.996	0.030 (0.000, 0.108)	0.022	M1a	0.000	0.010	-0.025	0.006	Rejected
M2b: Partial metric invariance Item residules 2 correlated with 4	5.395 (4)	0.997	0.992	0.042 (0.000, 0.123)	0.021	M1a	-0.001	0.006	-0.013	0.005	Accepted
M3: Scalar invariance Item residules 2 correlated with 4	15.660 (11)	0.991	0.990	0.047 (0.000, 0.095)	0.029	M2b	-0.006	-0.002	0.005	0.008	Accepted

Table 6.1.10 Categorical Multi-Group Confirmatory Factor Analysis regarding teaching experience for Indonesia

Indonesia	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRM-SEA	ΔSRMR	Decision
M1: Configural invariance	41.981* (4)	0.990	0.969	0.177 (0.131, 0.228)	0.025						
M1a: Configural invariance Item residules 3 correlated with 4	2.808 (2)	1.000	0.999	0.037 (0.000, 0.126)	0.004						
M1b: Configural invariance Item residules 1 correlated with 2	2.715 (2)	1.000	0.999	0.034 (0.000, 0.125)	0.004						
M2: Metric invariance	47.380* (7)	0.989	0.981	0.138 (0.103, 0.177)	0.028	M1	-0.001	0.012	-0.039	0.003	Rejected
M2a: Metric invariance Item residules 3 correlated with 4	17.817* (5)	0.997	0.992	0.092(0.048, 0.140)	0.012	M1a	-0.003	-0.007	0.055	0.008	Rejected
M2b: Partial metric invariance Item residules 3 correlated with 4	10.448* (4)	0.998	0.995	0.073 (0.019, 0.129)	0.009	M1a	-0.002	-0.004	0.036	0.005	Rejected
M2c: Partial metric invariance Item residules 3 correlated with 4	1.901 (3)	1.000	1.001	0.000 (0.000, 0.082)	0.004	M1a	0.000	0.002	-0.037	0.000	Rejected
M2d: Metric invariance Item residules 1 correlated with 2	19.754* (5)	0.996	0.990	0.099 (0.056, 0.146)	0.014	M1b	-0.004	-0.009	0.065	0.010	Rejected
M2e: Partial metric invariance Item residules 1 correlated with 2	5.647 (3)	0.999	0.997	0.054 (0.000, 0.122)	0.007	M1b	-0.001	-0.002	0.020	0.003	Accepted
M3: Scalar invariance Item residules 1 correlated with 2	18.526* (10)	0.998	0.997	0.053 (0.006, 0.090)	0.017	M2e	-0.001	0.000	-0.001	0.010	Accepted

Table 6.1.11 Latent means of the Differentiated Instruction score across inexperienced and experienced teacher groups for 5 countries (inexperienced teacher group as reference)

	The Netherlands (N = 2052)	South Korea (N = 320)	Mongolia (N = 1041)	Pakistan (N = 389)	Indonesia (N = 604)
Inexperienced	0.000	0.000	0.000	0.000	0.000
Experienced	0.425*	0.318*	0.136	-0.425 *	-0.298*

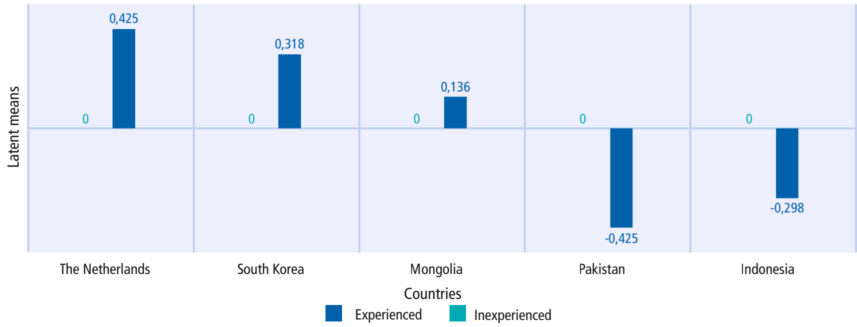

Figure 6.1.4 Latent means of the Differentiated Instruction score across inexperienced and experienced teacher groups for 5 separate countries (inexperienced teacher group as reference)

Research question 3: Which personal and contextual factors explain differences between countries in Differentiated Instruction in teaching?

For observation data, several personal and contextual background variables are available for inclusion in the analysis from six countries. Those countries are Indonesia, the Netherlands, Mongolia, Pakistan, South Korea, and Spain. A selection of balanced sample from the larger original sample was used for the analysis[3].

Available personal and contextual characteristics like teachers' gender, school subject, class size, and teaching experience were included in the analysis. The other five domains of effective teaching behavior (Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning strategies) are viewed as personal characteristics of teachers. These five domains were included in the analysis subsequently. Class size represents the number of students present during the time of the observation. Because of the variety of subjects differing across countries, school subjects were collapsed into three categories: alfa, beta, and gamma. Alfa subjects refer to native- and foreign language subjects like Dutch, English, and Spanish. Beta subjects refer to mathematics and natural sciences subjects like chemistry and biology (STEM subjects). Gamma subjects refer to social sciences and humanities like history and geography. Subjects in the arts, crafts and physical education were not included in the analyses. In Table 6.1.12 below, the descriptive statistics of the sample are presented.

3 This result was published as Smale Jacobse et al. (2022).

Table 6.1.12 Descriptives of the balanced sample used in the main analyses per country

	Indonesia	Mongolia	Pakistan	South Korea	Spain	the Netherlands	total
Number of teachers	426	352	373	280	114	277	1822
Number of schools	29	51	20	84	29	163	376
Teacher gender: female	263	300	179	188	76	169	1175
Teacher subject: alfa*	93	111	162	107	41	113	627
Teacher subject: beta*	184	164	177	124	49	93	791
Teacher subject: gamma*	149	77	34	49	24	71	404
Teacher experience in years(*M, sd*)	16.2 (9.9)	11.1 (8.6)	6.6 (5.3)	11.4 (8.8)	21.0 (9.5)	3.6 (6.8)	10.9 (9.6)
Teaching behavior: management (*M, sd*)	2.8 (0.8)	3.0 (0.5)	2.0 (0.6)	3.2 (0.6)	3.4 (0.6)	3.2 (0.6)	3.2 (0.7)
Teaching behavior: climate (*M, sd*)	3.0 (0.6)	3.1 (0.5)	2.0 (0.5)	3.2 (0.6)	3.4 (0.6)	3.3 (0.6)	3.0 (0.7)
Teaching behavior: instruction (*M, sd*)	2.7 (0.7)	2.9 (0.5)	1.9 (0.5)	3.1 (0.6)	3.2 (0.6)	3.0 (0.6)	2.9 (0.6)
Teaching behavior: activation (*M, sd*)	2.3 (0.6)	2.7 (0.5)	1.9 (0.4)	3.0 (0.6)	3.0 (0.5)	2.5 (0.6)	2.6 (0.6)
Teaching behavior: learning strategies (*M, sd*))	2.1 (0.7)	2.7 (0.5)	1.8 (0.5)	2.9 (0.6)	2.8 (0.8)	2.0 (0.7)	2.0 (0.7)
Teaching behavior: Differentiated Instruction (*M, sd*))	1.8 (0.7)	2.3 (0.6)	1.9 (0.5)	2.6 (0.7)	2.2 (0.8)	1.8 (0.7)	2.3 (0.8)
Class size (*M, sd*)	31.5 (7.8)	26.8 (10.4)	48.0 (14.7)	26.6 (5.8)	17.0 (6.5)	23.1 (5.2)	31.0 (13.3)

* alfa subjects: native- and foreign language subjects; beta subjects: mathematics and natural sciences; gamma subjects: social sciences and humanities

Multilevel regression analyses were used to analyze the relations of different variables with Differentiated Instruction in R studio using the packages multilevel (Biese, 2021; Bliese, 2016), nmle (Pinheiro, Bates, DebRoy, & Sarkar, 2021), LME4 (Bates, Mächler, Bolker, & Walker, 2021; Bates, Mächler, Bolker, & Walker, 2015) and sjPlot (Lüdecke, 2021). Analyes were done on combined country data. The Netherlands was used as a reference category.

Multilevel regression analyses show that there is a small, but significant, effect of teacher gender on Differentiated Instruction (see Table 6.1.13, Figure 6.1.5). In general, the quality of Differentiated Instruction practices was observed to be lower for male than for female teachers. When looking into country-specific results, the benefit of females is most profound in the Mongolian sample in which only 17% of teachers were male, which may have affected this finding.

Furthermore, there is a small but significant effect of teaching experience on Differentiated Instruction. The effect of teaching experience is most pronounced in the Netherlands and Spain. Results show that novice teachers in both countries showed higher level of Differentiated Instruction compared to experienced teachers. This finding might be affected by the sample characteristics of these two countries. In the Dutch sample, the average teachers' teaching experience is three years (significantly higher proportion of novice teachers). In the Spanish sample, the average teachers' teaching experience is 21 years (significantly higher proportion of experienced teachers). Regardless of these sample differences, it is interesting to find that novice teachers in these two countries showed moderately higher levels of Differentiated Instruction practices. One additional possible explanation may be that Dutch novice teachers received induction support for new teachers in their schools, which included supporting Differentiation Practices (as well as other effective teaching behaviors) as part of their professional development plan (Helms Lorenz et al., 2019). Similarly, younger teachers in Spain tend to be better trained in their initial education and professionalization to address students' needs (Fernández-García et al., 2019).

When the other five domains of effective teaching behavior were added to the model, the effects of gender and teaching experience became insignificant. Results show that Differentiated Instruction is related to classroom management, activating teaching, and teaching learning strategies. Teaching learning strategies is strongly related to Differentiated Instruction in all countries (r =.52 in the Netherlands and Spain to r =. 76 in Pakistan) as is the quality of activating teaching (r =.57 and r =.58 in the Netherlands and Spain respectively to r =.74 in South Korea).

Table 6.1.13 Predictors and estimates of Differentiated Instruction based on full multilevel regression model

	Differentiated Instruction		
Predictors	Estimates	SE	*p*-value
Fixed effects			
(Intercept)	-0.04	0.09	0.631
Teacher gender male (reference: female)	-0.05	0.02	0.056
Teacher experience	0.00	0.00	0.840
Teacher subject: alfa (reference: gamma)	-0.00	0.03	0.997
Teacher subject: beta (reference: gamma)	0.01	0.03	0.784
Teaching behavior: management	**0.08**	**0.03**	**0.002**
Teaching behavior: climate	0.02	0.03	0.525
Teaching behavior: instruction	0.04	0.04	0.246
Teaching behavior: activation	**0.36**	**0.03**	**<0.001**
Teaching behavior: learning strategies	**0.29**	**0.03**	**<0.001**
Class size	-0.00	0.00	0.530
Country: Indonesia (reference: the Netherlands)	0.01	0.07	0.922
Country: Mongolia (reference: the Netherlands)	0.14	0.06	**0.015**
Country: Pakistan (reference: the Netherlands)	0.52	0.08	**<0.001**
Country: South Korea (reference: the Netherlands)	0.32	0.06	**<0.001**
Country: Spain (reference: the Netherlands)	0.03	0.08	0.744

Note. Significant values are shown in bold.

Table 6.1.13 continued

	Differentiated Instruction		
Predictors	**Estimates**	**SE**	***p*-value**
Random Effects			
σ^2 teacher level		0.14	
τ00 school level		0.07	
ICC		0.33	
N School		376	
Observations		1822	
Marginal R^2 / Conditional R^2		0.542 / 0.694	

Note. Significant values are shown in bold.

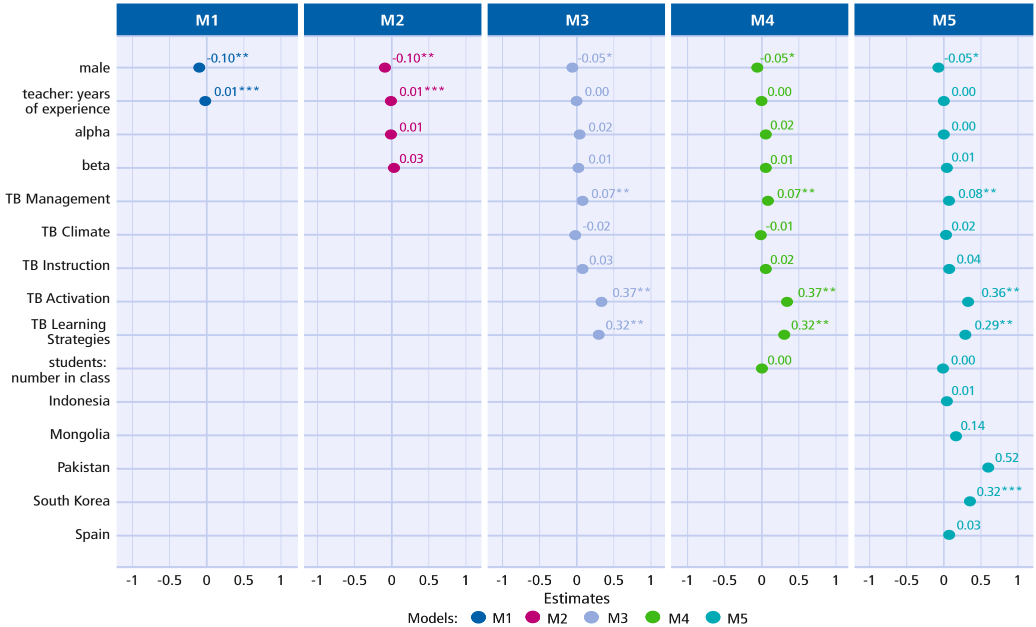

Figure 6.1.5 The relations between Differentiated Instruction and other personal, and contextual characteristics based on the multilevel regression models 1-5
Note. TB = Teaching behavior

To further assess country-level differences in how the different personal and contextual characteristics were related to Differentiated Instruction, model 4 of multilevel regression analyses were compared across the different countries (see Table 6.1.14). When performing the multilevel analyses for the countries separately, it becomes clear that across the different countries, Activating Teaching and Teaching Learning Strategies are significant and stable predictors of Differentiated Instruction. Additionally, in some countries, other teaching behaviors are significant predictors of Differentiated Instruction, like Classroom Management (in the Netherlands and Pakistan), Learning Climate, and Clarity of Instruction (in Mongolia).

In Pakistan, the Netherlands and South Korea, a small negative effect of class size on Differentiated Instruction was found in favor of smaller classes. In the Netherlands and South Korea, teaching experience was significantly related to Differentiated Instruction. On the other hand, the effect of experience was small and in the reverse direction in the Spanish sample. In the Mongolian sample, a negative effect of gender in favor of females was found. This may be due to the imbalance in teacher gender in the sample (more females than males). In the Netherlands, alfa and beta subjects were found to be related to better Differentiated Instruction practices compared to gamma subjects. The effect of school subject on Differentiated Instruction was not found across countries.

The percentage of the variance explained at the school level is relatively small, especially in Pakistan and the Netherlands. Overall, the effect of the other domains of effective teaching behavior is stronger than the effect of other personal and contextual characteristics across countries. There are a lot of communalities across the countries, but some country-specific influences of personal and contextual factors on Differentiated Instruction were found.

Table 6.1.14 Multilevel model specified for all of the different countries in the sample

Predictors	Indonesia			Mongolia			Pakistan			South Korea			Spain			the Netherlands		
	Esti-mate	SE	*p*	Esti-mate	SE	*p*	Esti-mate	SE	*p*	Esti-mate	SE	*p*	Esti-mate	SE	*p*	Esti-mate	SE	*p*
Fixed effects																		
(Intercept)	0.19	0.19	0.322	-0.03	0.19	0.887	**0.23**	**0.11**	**0.049**	0.21	0.14	0.126	0.29	0.45	0.524	**0.33**	**0.09**	**<0.001**
Teacher gender: male	-0.01	0.04	0.891	**-0.16**	**0.06**	**0.006**	0.05	0.04	0.202	0.04	0.03	0.173	-0.09	0.12	0.464	-0.02	0.02	0.380
Teacher experience	-0.00	0.00	0.666	-0.00	0.00	0.498	0.00	0.00	0.709	**0.00**	**0.00**	**0.003**	**-0.01**	**0.01**	**0.018**	**0.01**	**0.00**	**0.003**
Teacher subject: alfa	-0.01	0.05	0.776	0.02	0.06	0.674	-0.04	0.06	0.466	0.02	0.04	0.690	0.14	0.15	0.353	**0.06**	**0.03**	**0.027**
Teacher subject: beta	-0.03	0.04	0.508	-0.01	0.05	0.885	0.01	0.06	0.889	0.01	0.04	0.691	0.19	0.15	0.202	**0.12**	**0.03**	**<0.001**
Teaching behavior: management	0.02	0.05	0.597	-0.02	0.07	0.753	**0.14**	**0.05**	**0.004**	0.06	0.04	0.135	0.13	0.13	0.311	**0.16**	**0.03**	**<0.001**
Teaching behavior: climate	-0.05	0.06	0.400	**0.13**	**0.06**	**0.038**	0.02	0.04	0.547	0.06	0.04	0.093	-0.19	0.12	0.126	-0.03	0.03	0.220
Teaching behavior: instruction	0.02	0.07	0.774	**0.20**	**0.09**	**0.021**	0.11	0.06	0.065	0.10	0.05	0.064	-0.14	0.20	0.470	**-0.10**	**0.03**	**0.002**
Teaching behavior: activation	**0.30**	**0.07**	**<0.001**	**0.31**	**0.07**	**<0.001**	**0.17**	**0.06**	**0.009**	**0.34**	**0.05**	**<0.001**	**0.81**	**0.20**	**<0.001**	**0.38**	**0.03**	**<0.001**
Teaching behavior: learning strat.	**0.42**	**0.05**	**<0.001**	**0.20**	**0.07**	**0.002**	**0.51**	**0.05**	**<0.001**	**0.26**	**0.04**	**<0.001**	0.19	0.10	0.080	**0.26**	**0.02**	**<0.001**
Class size	0.00	0.00	0.689	-0.00	0.00	0.896	**-0.00**	**0.00**	**0.016**	**-0.01**	**0.00**	**0.049**	-0.01	0.01	0.554	**-0.01**	**0.00**	**0.006**
Random effects																		
$\sigma 2$ teacher level	0.14			0.12			0.08			0.13			0.22			0.26		
$\tau 00$ school level	0.10			0.08			0.00			0.06			0.09			0.03		
ICC	0.41			0.39			0.01			0.3			0.29			0.1		
N schools	29			51			20			142			29			428		
N observations	426			352			373			860			114			2518		
Marginal R2 / Conditional R2	0.467 / 0.685			0.418 / 0.646			0.669 / 0.671			0.511 / 0.655			0.423 / 0.589			0.356 / 0.417		

Note. Significant values are shown in bold.

6.2 Differentiation practices – Student perspectives

Research question 2: Are teachers in the Netherlands better at executing (perceived) Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?

Based on the MGCFA results, the latent mean scores of perceived differentiated scales in nine countries can be compared. The items fail to meet partial scalar invariance in UK and Indonesia. Therefore, these two countries were excluded for latent means comparison. With the Netherlands set as a reference, results show that Differentiated Instruction practices in Dutch secondary school classrooms were perceived to be lower compared to South African, Mongolian, Malta, Turkish, Spanish, Chinese, South Korean, and Brazilian classrooms (see Table 6.2.1).

The level of teachers' Differentiated Instruction was reported the highest by students in Brazil, followed by South Korea, China, Türkiye, Malta, Spain, Mongolia, South Africa, and the Netherlands, respectively (see Figure 6.2.1). It should be noted, however, that the sample size from Brazil and Malta was very low. Additionally, in Brazil, the sample was highly dominated by students from private schools, which may explain the high ratings.

Table 6.2.1 Comparison of the latent means of the differentiation score among nine countries

	The Netherlands (N_{total} = 5,789)	South Africa (N = 4,688)	Mongolia (N = 4,996)	Malta (N = 342)	Türkiye (N = 4,991)	Spain (N = 4,999)	China (N = 2,981)	South Korea (N = 4,992)	Brazil (N = 242)
Latent means	0.000	0.283	0.299	0.380	0.465	0.365	0.645	0.738	1.242
Item 1	0.744	0.628	0.603	0.696	0.722	0.600	0.570	0.795	0.641
Item 2	0.784	0.669	0.687	0.801	0.776	0.555	0.755	0.814	0.661
Item 3	0.733	0.758	0.753	0.845	0.779	0.605	0.779	0.842	0.747
Item 4	0.759	0.702	0.758	0.737	0.828	0.529	0.843	0.721	0.559

2.1 Do teachers in other countries experience Differentiated Instruction in teaching as one of the most difficult teaching behaviors to execute (as perceived by students)?

To answer this question, latent mean scores of perceived Differentiated Instruction was compared with those of other domains of effecting teaching behavior. Before the comparison was made, categorical confirmatory factor analysis was performed on the six effective teaching behavior domains, which include *Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, Teaching Learning Strategies, and Differentiated Instruction*, separately for each country. This step was taken to test the factor structure of the six perceived effective teaching domains in each country. The sample descriptive including datasets of 12 countries can be seen in Table 6.2.2. Due to insufficient sample size, data from Norway was excluded from the CFA analysis.

Results of CFA on separate country data (total 11 sets of country data included) showed that acceptable model fit was reached for the full set of the MTQ items in five countries: South Korea, Mongolia, Türkiye, China, and Malta (see Table 6.2.3). This means that the factor structure of the six domains of effective teaching behavior, based on student perceptions, is confirmed in these five countries. In other country data including the Netherlands, Spain, South Africa, Brazil, the UK, and Indonesia, adequate model fit was reached after deleting one or more items. The most problematic item was item 10 ("My teacher explains how I need to do things"), which caused a poor model fit in six country data. After deleting item 10, the model fit in the Netherlands and Brazil is acceptable. In the UK, adequate model fit was obtained after deleting five items (items 4, 26, 35, 39, 40). In Spain, adequate model fit was obtained after excluding six items (items 5, 10, 11, 30, 33, 40). In South Africa, adequate model fit was reached after excluding eight items (items 3, 10, 27, 30, 34, 37, 40, 41). In Indonesia, adequate model could not be reached even after excluding nine items (items 3, 7, 10, 11, 19, 22, 27, 30, 40). Based on these results, factor loadings of items in 10 country data are presented in Table 6.2.4[4]. No information of factor loadings for Indonesia are presented because an acceptable factor structure of the six domains of effective teaching behavior is not supported.

For inclusion in the MGCFA allowing for the examination of comparison across countries, we applied the criterium that exclusion of items in the scale should be kept to a minimum. Seven countries meet this criterium, including South Korea, Mongolia, Türkiye, China, Malta, the Netherlands, and Brazil (see Table 6.2.5).

4 Criterium for inclusion/deletion of items for CFA analyses: At least half of the items for each effective teaching behavior domain should be valid, with a minimum of at least three items per domain (scale) are valid.

Table 6.2.2 Descriptive statistics of raw scores of six effective teaching behavior domains in twelve countries based on selected student data

Country	Learning Climate			Classroom management			Clarity of Instruction			Activating teaching			Differentiated Instruction			Teaching Learning Strategies		
	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD	$N_{Students}$	Mean	SD
1. The Netherlands	5,789	3.31	0.56	5,789	3.40	0.49	5,789	3.26	0.53	5,789	3.07	0.57	5,789	2.87	0.66	5,789	2.65	0.64
2. Indonesia	4,985	2.93	0.45	4,985	3.04	0.39	4,981	2.97	0.43	4,984	2.94	0.41	4,976	2.88	0.46	4,982	2.84	0.43
3. Brazil	242	3.75	0.33	242	3.73	0.31	242	3.69	0.34	242	3.54	0.44	242	3.47	0.48	242	3.29	0.55
4. South Africa	4,148	3.10	0.70	4,006	3.16	0.64	4,006	3.11	0.66	3,848	3.09	0.65	4,171	3.00	0.72	3,971	2.98	0.70
5. South Korea	4,952	3.33	0.51	4,951	3.45	0.46	4,947	3.42	0.49	4,917	3.33	0.51	4,950	3.30	0.54	4,936	3.24	0.56
6. Hong Kong – China	2,981	3.01	0.62	2,981	3.04	0.61	2,981	2.97	0.60	2,981	3.04	0.60	2,981	3.15	0.67	2,981	3.02	0.61
7. Spain	4,871	3.17	0.45	4,842	3.19	0.41	4,846	3.16	0.44	4,822	3.07	0.48	4,868	3.09	0.55	4,814	2.78	0.56
8. Mongolia	4,709	2.96	0.65	4,708	3.21	0.58	4,727	3.17	0.60	4,518	2.96	0.63	4,734	3.02	0.67	4,715	2.86	0.66
9. Türkiye	4,823	3.30	0.64	4,715	3.31	0.58	4,701	3.20	0.67	4,592	2.96	0.69	4,843	3.08	0.73	4,716	2.72	0.77
10. UK	2,105	3.03	0.31	2,105	3.06	0.24	2,105	3.08	0.25	2,105	3.06	0.22	2,106	3.09	0.35	2,106	3.07	0.26
11. Malta	340	3.37	0.67	337	3.33	0.68	334	3.29	0.64	333	3.23	0.70	331	3.07	0.77	335	2.92	0.69
12. Norway	127	3.52	0.50	126	3.46	0.45	*66*	*3.31*	*0.53*	*129*	*3.25*	*0.53*	*38*	*3.13*	*0.63*	*97*	*2.95*	*0.48*

Table 6.2.3 Categorical Confirmatory Factor Analysis of six effective teaching behavior domains for eleven countries (based on selected student data[5])

	$N_{students}$	Model	χ^2 (df)	RMSEA with 90% CI	SRMR	CFI	TLI
1. South Korea	4992	M1: Full items	25423.225* (764)	0.080 [0.080, 0.081]	0.041	0.941	0.937
		M2: Full items, 3 correlations set to 1	25473.082* (767)	0.080 [0.079, 0.081]	0.041	0.941	0.937
2. Mongolia	5000	M1: Full items	13507.994* (764)	0.058 [0.057, 0.059]	0.039	0.934	0.929
		M2: Full items, 1 correlation set to 1	13509.271* (765)	0.058 [0.057, 0.059]	0.039	0.934	0.929
3. Türkiye	4995	M1: Full items	19416.723* (764)	0.070 [0.069, 0.071]	0.044	0.931	0.926
		M2: Full items, 1 correlation set to 1	19415.860* (765)	0.070 [0.069, 0.071]	0.044	0.931	0.926
4. China	2981	M1: Full items	677.041* (764)	0.000 [0.000, 0.000]	0.013	1.000	1.000
		M2: Full items, 4 correlations set to 1	677.755* (768)	0.000 [0.000, 0.000]	0.013	1.000	1.000
5. Malta	342	M1: Full items	2052.028* (764)	0.070 [0.067, 0.074]	0.071	0.946	0.942
		M2: Full items, 3 correlations set to 1	2055.382** (767)	0.070 [0.066, 0.074]	0.071	0.946	0.942
6. The Netherlands	5789	M1: Full items	24031.608* (764)	0.073 [0.072, 0.073]	0.048	0.903	0.896
		M2: Item 10 excluded	20156.556* (725)	0.068 [0.067, 0.069]	0.044	0.916	0.910
7. Spain	5000	M1: Full items	20081.791* (764)	0.071 [0.070, 0.072]	0.056	0.816	0.802
		M2: Item 10 excluded	16443.175* (725)	0.066 [0.065, 0.067]	0.051	0.846	0.834
		M3: Items 10, 30 excluded	12588.695* (687)	0.059 [0.058, 0.060]	0.046	0.877	0.868
		M4: Items 10, 30, 40 excluded	11290.882* (650)	0.057 [0.056, 0.058]	0.044	0.887	0.878
		M5: Item 5 10 11 30 33 40 excluded	8443.690* (545)	0.054 [0,053, 0.055]	0.040	0.908	0.900
8. UK	2106	M1: Full items	1944.278* (764)	0.027 [0.026, 0.029]	0.038	0.884	0.876
		M2: Item 10 excluded	1886.231* (725)	0.028 [0.026, 0.029]	0.039	0.879	0.870
		M3: Items 10, 30 excluded	1757.644* (687)	0.027 [0.026, 0.029]	0.038	0.881	0.871
		M4: Item 4 26 35 39 40 excluded	1169.198* (579)	0.022 [0.020, 0.024]	0.034	0.924	0.918
		M5: Item 4 26 35 39 40 excluded; 13 correlations set to 1	1194.145* (592)	0.022 [0.020, 0.024]	0.034	0.923	0.918
9. South Africa	4698	M1: Full items	19542.695* (764)	0.072 [0.071, 0.073]	0.049	0.883	0.874
		M2: Item 10 excluded	18218.554* (725)	0.072 [0.071, 0.073]	0.048	0.887	0.879
		M3: Items 10, 30 excluded	17203.118* (687)	0.072 [0.071, 0.072]	0.048	0.890	0.882
		M4: Items 3, 10, 27, 30, 34, 37, 40, 41 excluded	11684.367* (480)	0.070 [0.069, 0.072]	0.044	0.911	0.902
		M5: Items 3, 10, 27, 30, 34, 37, 40, 41 excluded; 1 correlation set to 1	11683.958* (481)	0.070 [0.069,0.072]	0.044	0.911	0.903
10. Brazil	242	M1: Full items	1023.949* (764)	0.037 [0.031, 0.043]	0.082	0.957	0.954
		M2: Item 10 excluded	954.318* (725)	0.036 [0.030, 0.042]	0.079	0.961	0.958
		M3: Item 10 excluded; 2 correlations set to 1	955.296* (727)	0.036 [0.029, 0.042]	0.080	0.962	0.959
11. Indonesia	5000	M1: Full items	21517.871* (764)	0.074 [0.073, 0.075]	0.061	0.850	0.839
		M2: Item 10 excluded	20412.655* (725)	0.074 [0.073, 0.075]	0.060	0.854	0.843
		M3: Items 10, 30 excluded	18923.329* (687)	0.073 [0.072, 0.074]	0.059	0.860	0.849
		M4: Item 3, 7, 10, 11, 19, 22, 27, 30, 40 excluded	11943.022* (449)	0.072 [0.070, 0.073]	0.054	0.890	0.878

5 Due to an insufficient sample size, data from Norway was excluded in the analyses.

Table 6.2.4 Standardized factor loadings of separate CFA for ten countries based on student data[6]

Country and subscales	Standardized factor loadings										Domain correlations					Variance explained
South Korea (N = 4,992)											1	2	3	4	5	
1. Stimulating Teaching (5 items)	0.813	0.800	0.835	0.859	0.854											69.3%
2. Classroom Management (8 items)	0.832	0.771	0.878	0.766	0.805	0.814	0.826	0.853			0.966					67.1%
3. Clarity of Instruction (7 items)	0.738	0.852	0.824	0.820	0.831	0.797	0.809				0.942	0.991				65.8%
4. Activating Teaching (10 items)	0.815	0.811	0.691	0.861	0.822	0.795	0.829	0.826	0.834	0.842	0.979	0.970	0.972			66.2%
5. Differentiated Instruction (4 items)	0.820	0.808	0.826	0.758							1.000	0.970	0.986	1.000		64.5%
6. Teaching Learning Strategies (7 items)	0.876	0.802	0.835	0.832	0.865	0.773	0.750				0.942	0.943	0.938	0.978	1.000	67.2%
Mongolia (N = 5,000)																
1. Stimulating Teaching (5 items)	0.494	0.670	0.528	0.736	0.752											41.6%
2. Classroom Management (8 items)	0.714	0.661	0.702	0.582	0.710	0.672	0.668	0.761			0.957					47.0%
3. Clarity of Instruction (7 items)	0.506	0.734	0.706	0.691	0.733	0.736	0.714				0.909	0.989				48.0%
4. Activating Teaching (10 items)	0.597	0.630	0.667	0.694	0.764	0.739	0.737	0.726	0.731	0.719	0.979	0.964	0.942			49.3%
5. Differentiated Instruction (4 items)	0.651	0.724	0.744	0.702							0.945	0.989	0.961	1.000		49.9%
6. Teaching Learning Strategies (7 items)	0.702	0.701	0.732	0.717	0.742	0.677	0.612				0.956	0.939	0.926	0.998	0.979	48.8%
Türkiye (N = 4,995)																
1. Stimulating Teaching (5 items)	0.708	0.747	0.579	0.744	0.851											53.3%
2. Classroom Management (8 items)	0.762	0.596	0.765	0.553	0.794	0.655	0.783	0.790			0.977					51.5%
3. Clarity of Instruction (7 items)	0.661	0.769	0.815	0.759	0.777	0.802	0.802				0.917	0.988				59.4%
4. Activating Teaching (10 items)	0.752	0.678	0.127	0.824	0.720	0.758	0.836	0.743	0.861	0.844	0.945	0.960	0.943			55.2%
5. Differentiated Instruction (4 items)	0.770	0.763	0.796	0.786							0.947	0.995	0.986	1.000		60.7%
6. Teaching Learning Strategies (7 items)	0.804	0.762	0.793	0.678	0.856	0.789	0.690				0.886	0.903	0.913	0.949	0.958	59.2%

6 Categorical Multi-Group Confirmatory Factor Analysis for seven countries (Spain, UK, South Africa, and Indonesia were excluded), with item 10 deleted

Table 6.2.4 continued

Country and subscales	Standardized factor loadings										Domain correlations					Variance explained
China (N = 2,981)											1	2	3	4	5	
1. Stimulating Teaching (5 items)	0.588	0.602	0.791	0.793	0.587											46.1%
2. Classroom Management (8 items)	0.606	0.788	0.785	0.786	0.595	0.602	0.786	0.639			0.979					49.6%
3. Clarity of Instruction (7 items)	0.799	0.798	0.594	0.604	0.628	0.615	0.602				0.988	0.996				44.7%
4. Activating Teaching (10 items)	0.588	0.603	0.784	0.602	0.785	0.586	0.597	0.784	0.785	0.792	1.000	1.000	0.993			48.6%
5. Differentiated Teaching (4 items)	0.590	0.787	0.790	0.789							1.000	0.997	0.990	1.000		55.3%
6. Teaching Learning Strategies (7 items)	0.590	0.794	0.582	0.812	0.584	0.604	0.788				1.000	0.993	0.990	0.999	0.992	47.2%
Malta (N = 345)																
1. Stimulating Teaching (5 items)	0.732	0.767	0.664	0.864	0.894											62.3%
2. Classroom Management (8 items)	0.804	0.761	0.837	0.719	0.884	0.812	0.753	0.907			0.981					65.9%
3. Clarity of Instruction (7 items)	0.556	0.878	0.739	0.852	0.789	0.851	0.724				0.921	1.000				60.3%
4. Activating Teaching (10 items)	0.706	0.689	0.792	0.839	0.671	0.802	0.896	0.803	0.850	0.910	0.980	0.972	0.995			63.9%
5. Differentiated Instruction (4 items)	0.741	0.802	0.822	0.771							0.919	0.977	1.000	0.977		61.6%
6. Teaching Learning Strategies (7 items)	0.866	0.811	0.781	0.643	0.796	0.693	0.575				0.910	1.000	0.928	0.928	0.933	55.4%
The Netherlands (N_{total} = 5,000)																
1. Stimulating Teaching (5 items)	0.726	0.767	0.702	0.785	0.849											58.9%
2. Classroom Management (8 items)	0.783	0.628	0.755	0.638	0.713	0.681	0.769	0.807			0.930					52.5%
3. Clarity of Instruction (7 items)	0.528	0.821	0.711	0.704	0.732	0.779	0.651				0.864	0.990				50.3%
4. Activating Teaching (10 items)	0.692	0.548	0.740	0.700	0.643	0.759	0.696	0.797	0.821	0.838	0.914	0.935	0.941			53.0%
5. Differentiated Teaching (4 items)	0.722	0.773	0.788	0.739							0.844	0.835	0.878	0.924		57.1%
6. Teaching Learning Strategies (7 items)	---	0.686	0.764	0.648	0.775	0.740	0.641				0.731	0.709	0.766	0.844	0.875	50.5%
Spain (N_{total} = 5,000)																
1. Stimulating Teaching (5 items)	0.699	0.693	0.670	0.683	---											47.1%
2. Classroom Management (8 items)	0.645	0.558	---	0.627	0.687	0.653	---	0.706			0.903					42.0%

Country and subscales	Standardized factor loadings										Domain correlations					Variance explained
											1	2	3	4	5	
3. Clarity of Instruction (7 items)	---	0.560	0.557	0.572	0.596	0.630	0.597				0.780	0.956				34.3%
4. Activating Teaching (10 items)	0.525	0.381	0.548	0.645	0.553	0.593	0.687	---	0.672	0.654	0.627	0.706	0.875			34.9%
5. Differentiated Instruction (4 items)	0.542	0.571	0.649	0.522							0.630	0.773	0.940	0.941		32.8%
6. Teaching Learning Strategies (7 items)	---	0.560	0.662	0.516	0.652	0.630	0.494				0.385	0.461	0.649	0.814	0.823	34.7%
UK (N = 2,106)																
1. Stimulating Teaching (5 items)	0.271	0.352	0.389	0.345	0.396											12.5%
2. Classroom Management (8 items)	0.358	---	0.242	0.315	0.270	0.370	---	0.438			1.000					11.5%
3. Clarity of Instruction (7 items)	0.396	0.319	0.217	0.335	0.287	0.366	0.249				1.000	1.000				9.9%
4. Activating Teaching (10 items)	0.218	0.277	0.461	0.260	0.290	0.329	0.333	0.297	0.399	---	1.000	1.000	1.000			10.6%
5. Differentiated Teaching (4 items)	0.349	---	---	0.335							1.000	1.000	1.000	1.000		11.7%
6. Teaching Learning Strategies (7 items)	0.447	0.314	0.327	0.359	0.319	0.272	0.404				1.000	1.000	0.911	0.919	1.000	12.5%
South Africa (N_{total} = 4,698)																
1. Stimulating Teaching (5 items)	0.702	0.715	0.728	0.769	---											53.2%
2. Classroom Management (8 items)	0.723	0.707	0.741	0.708	0.770	---	---	---			0.987					53.3%
3. Clarity of Instruction (7 items)	0.693	0.749	0.715	0.709	0.717	0.753	---				0.948	0.998				52.2%
4. Activating Teaching (10 items)	---	0.681	0.678	0.737	0.700	0.725	0.729	0.698	0.689	0.708	0.942	0.952	0.960			49.7%
5. Differentiated Instruction (4 items)	0.638	0.704	0.705	---							0.927	0.924	0.957	1.000		46.6%
6. Teaching Learning Strategies (7 items)	---	0.692	0.706	0.679	0.776	0.681	0.633				0.808	0.817	0.871	0.931	0.958	48.4%
Brazil (N = 242)																
1. Stimulating Teaching (5 items)	0.624	0.665	0.608	0.630	0.870											47.1%
2. Classroom Management (8 items)	0.541	0.489	0.728	0.610	0.805	0.649	0.589	0.672								41.3%
3. Clarity of Instruction (7 items)	0.530	0.722	0.670	0.687	0.767	0.618	0.719									45.8%
4. Activating Teaching (10 items)	0.569	0.538	0.733	0.761	0.584	0.739	0.814	0.651	0.833	0.762						49.8%
5. Differentiated Teaching (4 items)	0.605	0.621	0.733	0.668												43.3%
6. Teaching Learning Strategies (7 items)	---	0.796	0.802	0.545	0.695	0.727	0.530									47.8%

Table 6.2.5 Categorical Multi-Group Confirmatory Factor Analysis for seven countries (with item 10 deleted) for the student data

	Chi-square (df)	CFI	TLI	RMSEA	SRMR	Model comp	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Decision
M1: Configural invariance	77620.857* (5351)	0.949	0.948	0.062 [0.062, 0.063]	0.048						
M2: Metric invariance	99461.273* (5591)	0.934	0.935	0.069 [0.069, 0.070]	0.080	M1	-0.015	-0.013	0.007	0.032	Rejected
M2a: Partial metric invariance	73524.549* (5562)	0.952	0.953	0.059 [0.059, 0.060]	0.063	M1	0.003	0.005	-0.003	0.015	Accepted
M3: Scalar invariance	98216.801* (6006)	0.935	0.941	0.066 [0.066, 0.067]	0.065	M2a	-0.017	-0.012	0.007	0.002	Rejected
M3a: Partial scalar invariance	90750.588* (5977)	0.940	0.945	0.064 [0.063, 0.064]	0.064	M2a	-0.012	-0.008	0.005	0.001	Accepted
M4: Latent means	84838.566* (5905)	0.944	0.949	0.062 [0.062, 0.062]	0.058						

Table 6.2.6 Latent means of the six domains based on MGCFA partial scalar model for the student data

	The Netherlands	South Korea	Türkiye	China	Mongolia	Brazil	Malta
Learning Climate	0.000	0.036	0.022	-0.663*	-0.763*	1.068*	0.150*
Classroom management	0.000	0.119*	-0.171*	-0.716*	-0.398*	0.819*	0.026
Clarity of Instruction	0.000	0.390*	0.012	-0.567*	-0.136*	1.121*	0.139*
Activating Teaching	0.000	0.437*	-0.001	0.044	-0.118*	1.053*	0.391*
Differentiated Instruction	**0.000**	**0.654***	**0.319***	**0.456***	**0.244**	**1.187***	**0.304***
Teaching Learning Strategies	0.000	0.891*	0.138*	0.745*	0.430*	1.051*	0.452*

* *p* < .05

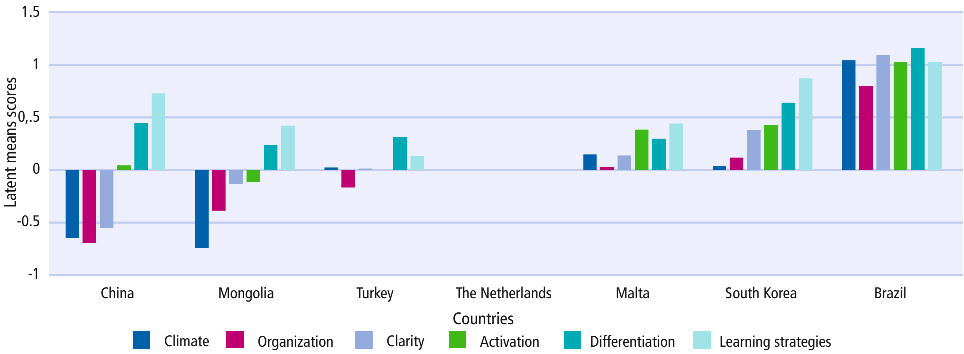

Figure 6.2.2 Latent means of the six domains in the partial scalar invariance model for seven countries (the Netherlands as reference country)

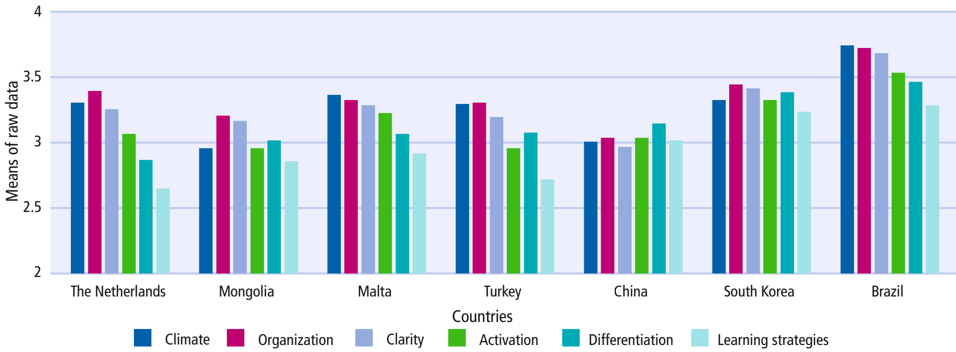

Figure 6.2.3 Raw mean scores of the six domains for student data

Results of categorical multi-group confirmatory analyses with the seven countries included are presented in Table 6.2.5. Results show that partial scalar invariance is reached. This means that comparing latent mean scores of the six domains of effective teaching behavior across the seven countries is deemed acceptable. The results show that, in general, Dutch students perceived Differentiated Instruction of their teachers to be lower compared to South Korean, Turkish, Chinese, Mongolian, Brazilian, and Maltese students (see Table 6.2.6 and Figure 6.2.2). Of the seven countries, Differentiated Instruction was perceived to be the highest in Brazil, followed by South Korea, China, Türkiye, Malta, and Mongolia, respectively (see Figure 6.2.3).

In the Netherlands, Teaching Learning Strategies was perceived to be the lowest, followed by Differentiated Instruction, Activating Teaching, Clarity of Instruction, Learning Climate, and Classroom Management, respectively. This implies that Differentiated Instruction seemed to be the second most difficult teaching behavior for Dutch teachers to display in their classroom practices, as perceived by their students. This trend is similar for Brazil and Malta, in which Differentiated Instruction was perceived as the second lowest after Teaching Learning Strategies. In Türkiye, Differentiated Instruction was perceived as the third lowest after Teaching Learning Strategies and Activating Teaching.

In contrast, in South Korea and Mongolia, Differentiated Instruction was perceived as the third highest after Learning Climate and Classroom Management. In China, Differentiated Instruction was perceived to be the highest.

2.2 Are novice teachers in other countries less able to execute Differentiated Instruction in their teaching compared to experienced teachers (as perceived by students)?

Data on teaching experience is not available in student data. For this reason, comparison regarding Differentiated Instruction and teaching experience is conducted on observation data only.

Research question 3: Which personal and contextual factors explain differences between countries in Differentiated Instruction in teaching (as perceived by students)?

Student gender was included as a personal factor, and subject taught and school denomination were included as contextual factors. School type variable was available in Indonesia only. Thus, this variable was examined in this country only. Furthermore, teachers' teaching behavior including Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies were include as teachers' personal factors (see Table 6.2.8).

Regarding student gender, results show that in the Netherlands, Mongolia, Spain, China, student gender can explain differences in their perceptions of teachers' Differentiated Instruction ($p < 0.05$). In Türkiye, the effect of gender is close to significant ($p < 0.10$). The effect of student gender is not significant in Indonesia, the UK, South Africa, and South Korea. In general, in the Netherlands and China (see Models 1 and 2), girls reported lower levels of perceived Differentiated Instruction compared to boys. In the Netherlands, the effect of student gender disappeared after adding the five domains of teaching behavior to the model (Model 2). In contrast, the effect of student gender in China appeared after adding the five domains of teaching behavior (see Model 2). This indicates that the effect of student gender on Differentiated Instruction in these two countries depend on the five domains of teaching behavior.

On the contrary, girls generally reported higher levels of perceived Differentiated Instruction in Mongolia, Spain, (and Türkiye). In Mongolia, the effect of student gender remains significant before and after adding the five domains of teaching behavior. This indicates that student gender seems to have a unique effect in Mongolia (its effects does not depend on other teaching domains). In Spain (and Türkiye), the effect of student gender disappeared after adding the five domains of teaching behavior. This indicates that the effect of student gender in Spain (and Türkiye) also depend on the five domains of teaching behavior. With respect to school type in Indonesia, this variable did not explain differences in perceived Differentiated Instruction.

School denomination could explain differences in perceived Differentiated Instruction in Indonesia and South Korea. In both countries, generally, Differentiated Instruction was reported to be higher in private schools compared to public schools. In Indonesia, the effect of school denomination appeared after adding the five domains of teaching behavior. In South Korea, the effect of school denomination disappeared after adding the five domains of teaching behavior. This implies that the effect of school denomination on Differentiated Instruction depends on the other five domains of effective teaching behavior.

Subject taught could explain differences in Differentiated Instruction in the Netherlands, Mongolia, and Spain. In these three countries, students reported lower levels of Differentiated Instruction in science (STEM) classrooms compared to non-science classrooms. The effect of subject taught in these three countries disappeared after adding the five domains of effective teaching behavior.

In general, student perceptions of Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies could predict those of Differentiated Instruction. The effects of these five domains are stronger than those of other personal and contextual factors. In all countries but the UK, the five domains of teaching behavior appeared to have a significant unique effect on Differentiated Instruction. In the UK, the effect of Learning Climate, Classroom Management, and Clarity of Instruction on Differentiated Instruction seems to be embedded in that of Activating Teaching and Teaching Learning Strategies. In all countries, generally, perceived Activating Teaching and Teaching Learning Strategies are the two strongest predictors of perceived Differentiated Instruction.

Table 6.2.7 Descriptive statistics of student data with balanced samples

Countries	N_{region}	N_{school}	$N_{teacher}$	$N_{student}$	School type		School denomination			Student age				Student gender			Subject taught		
					General (0)	Vocational (1)	Public (0)	Private (1)	missing	M	SD	Max	Min	Male (0)	Female (1)	Missing	Sc	Non-sci	Missing
NL	12	304	1,654	5,000	85.5%	14.5%	100%			14.24	1.60	9	22	47.9%	51.8%		28.2%	55.5%	11.0%
IND	9	24	304	5,000	87.8%	12.2%	16.2%		83.8%	16.54	1.00	12	19	39.9%	60.1%		47.6%	51.2%	1.3%
Mong	2	50	371	5,000	100%	0	92.0%	8.0%	0	13.75	1.44	10	19	46.2%	50.3%	3.5%	49.8%	50.2%	0
SA	4	10	317	5,000	98.0%	1.2%	98.1%	1.4%	0.6%	15.24	1.37	12	17	40.8%	57.6%	1.6%	40.5%	59.1%	0
SK	1	26	344	5,000	92.3%	7.7%	65.4%	34.6%	0	15.38	1.53	12	18	42.6%	57.1%	0.3%	37.1%	62.9%	0
Spain	3	51	271	4,867	51.0%	*NA*	64.7%	35.3%	0	16.14	2.07	13	52	50.0%	48.6%	1.4%	30.4%	69.6%	0
Türkiye	2	24	442	5,000	91.7%	8.3%	100%	0	0	16.54	1.21	14	21	43.2%	54.3%	2.5%	40.7%	50.0%	4.3%
UK	1	14	93	2,106	100%	0	88.5%	11.5%	0	14.44	1.03	13	16	49.5%	50.5%	0	44.9%	37.4%	4.0%
Malta		6	24	345															
Brazil	3	7	10	242	100%	0	4.1%	95.9%	0	14.06	1.78	11	19	42.1%	49.2%	8.7%	29.3%	47.9%	22.7%
China	2	22	148	2,981	100%	0	100%	0	0	16.37	2.02	12	20	51.0%	49.0%	0			

Note. NA = In the Spanish data, the proportion of vocational schools could not be traced (thus school type is not modelled in the analysis). The system recognizes a combination between general and vocational school.

Table 6.2.8 Multilevel modeling involving background variables of MTQ data

	Indonesia						The UK						Mongolia					
	Model 0		Model 1		Model 2		Model 0		Model 1		Model 2		Model 0		Model 1		Model 2	
	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
Fixed effect																		
Intercept	2.882***	0.021	2.889***	0.028	0.061	0.042	3.093***	0.012	3.089***	0.020	2.306***	0.211	3.058***	0.026	2.946***	0.033	-0.025	0.034
Student gender (ref = boys)			-0.014	0.013	0.006	0.008			0.007	0.016	0.008	0.016			**0.079*****	**0.019**	**0.030****	**0.011**
School type (ref = general)			0.043	0.057	-0.028	0.042												
School denomination (ref = public)			0.001	0.050	**-0.080***	**0.040**			-0.006	0.042	-0.009	0.042						
School subject (ref = science)			-0.011	0.024	-0.004	0.009			0.010	0.027	0.013	0.027			**0.139*****	**0.036**	-0.012	0.012
Learning Climate					**0.108*****	**0.014**					0.027	0.028					**0.047*****	**0.015**
Classroom Management					**0.140*****	**0.019**					0.024	0.035					**0.242*****	**0.021**
Clarity of Instruction					**0.099*****	**0.016**					-0.004	0.033					**0.150*****	**0.019**
Activating Teaching					**0.309*****	**0.020**					**0.140*****	**0.038**					**0.340*****	**0.022**
Teaching Learning Strategies					**0.312*****	**0.014**					**0.069***	**0.033**					**0.224*****	**0.018**
Random effects																		
Level 3 variance (school)																		
Intercept	0.006	0.003	0.005	0.003	0.007	0.002							0.015	0.006	0.015	0.006	0.000	0.000
Level 2 variance (Teacher)																		
Intercept	0.031	0.004	0.031	0.004	0.001	0.001	0.008	0.002	0.008	0.002	0.008	0.002	0.081	0.009	0.076	0.009	0.000	0.001
Level 1 variance (Student)																		
Residual	0.169	0.004	0.169	0.004	0.075	0.002	0.117	0.004	0.114	0.004	0.113	0.004	0.373	0.008	0.371	0.008	0.123	0.003
Deviance	5710.691		5624.829		1300.313		1552.298		1230.428				9283.616		8944.187		2853.641	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Significant values are shown in bold.

Table 6.2.8 continued

	South Africa						Türkiye						China					
	Model 0		Model 1		Model 2		Model 0		Model 1		Model 2		Model 0		Model 1		Model 2	
Fixed effect	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
Intercept	3.076***	0.017	3.063***	0.026	0.030	0.039	3.076***	0.024	3.022***	0.036	-0.240***	0.035	3.045***	0.091	3.033***	0.100	-0.021	0.037
Student gender (ref = boys)			-0.015	0.020	-0.004	0.013			0.037	0.019	0.002	0.011			-0.038	0.030	-0.028*	0.014
School type (ref = general)																		
School denomination (ref = Public)																		
School subject (ref = science)			0.033	0.026	-0.001	0.015			0.054	0.044	-0.015	0.012			0.036	0.037	0.013	0.016
Learning Climate					**0.081*****	**0.019**					**0.085*****	**0.016**					**0.140*****	**0.022**
Classroom Management					**0.113*****	**0.024**					**0.291*****	**0.021**					**0.235*****	**0.027**
Clarity of Instruction					**0.103*****	**0.022**					**0.237*****	**0.018**					**0.180*****	**0.025**
Activating Teaching					**0.379*****	**0.026**					**0.296*****	**0.019**					**0.326*****	**0.030**
Teaching Learning strategies					**0.298*****	**0.018**					**0.163*****	**0.014**					**0.168*****	**0.027**
Random effects																		
Level 3 variance (school)																		
Intercept							0.003	0.004	0.002	0.004	0.000	0.000	0.163	0.053	0.192	0.062	0.000	0.000
Level 2 variance (Teacher)																		
Intercept	0.060	0.007	0.060	0.007	0.010	0.002	0.154	0.013	0.155	0.014	0.003	0.001	0.018	0.006	0.006	0.004	0.001	0.001
Level 1 variance (Student)																		
Residual	0.411	0.009	0.410	0.009	0.123	0.003	0.376	0.008	0.373	0.008	0.105	0.003	0.400	0.013	0.396	0.013	0.097	0.003
Deviance	9148.664		8962.213		2686.879		9705.769		9036.693		2201.752		4224.509		3590.080		931.683	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Significant values are shown in bold.

	Spain						The Netherlands						South Korea					
	Model 0		Model 1		Model 2		Model 0		Model 1		Model 2		Model 0		Model 1		Model 2	
	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
Fixed effect																		
Intercept	3.090***	0.014	2.994***	0.028	-0.070	0.054	2.820***	0.019	2.759***	0.030	-0.253***	0.043	3.292***	0.020	3.330***	0.033	-0.046	0.028
Student gender (ref = boys)			**0.055****	**0.015**	0.026	0.011			**-0.048****	**0.016**	-0.019	0.011			0.001	0.024	0.005	0.008
School type (ref = general)																		
School denomination (ref = Public)			0.014	0.029	-0.002	0.020									**-0.089***	**0.037**	-0.007	0.010
School subject (ref = science)			**0.092****	**0.030**	0.021	0.015			**0.138****	**0.034**	0.011	0.015			-0.009	0.030	0.004	0.007
Learning Climate					**0.067*****	**0.019**					**0.145*****	**0.017**					**0.173*****	**0.014**
Classroom Management					**0.230*****	**0.023**					**0.073*****	**0.022**					**0.054*****	**0.018**
Clarity of Instruction					**0.245*****	**0.021**					**0.138*****	**0.019**					**0.108*****	**0.017**
Activating Teaching					**0.293*****	**0.019**					**0.360*****	**0.020**					**0.367*****	**0.020**
Teaching Learning strategies					**0.184*****	**0.013**					**0.316*****	**0.013**					**0.303*****	**0.014**
Random effects																		
Level 3 variance (school)																		
Intercept	0.000	0.002	0.000	0.002	0.002	0.001	0.004	0.004	0.005	0.004	0.000	0.001	0.004	0.003	0.002	0.002	0.000	0.000
Level 2 variance (Teacher)																		
Intercept	0.039	0.005	0.035	0.005	0.003	0.001	0.092	0.009	0.087	0.008	0.010	0.002	0.060	0.006	0.060	0.006	0.000	0.000
Level 1 variance (Student)																		
Residual	0.256	0.005	0.255	0.005	0.133	0.003	0.314	0.006	0.314	0.006	0.133	0.003	0.236	0.005	0.236	0.005	0.052	0.001
Deviance	7435.831		7305.412		3589.130		9377.528		9352.635		4537.478		7417.848		7406.714		-500.907	

Note. * $p < .05$, ** $p < .01$, *** $p < .00$. Significant values are shown in bold.

Chapter 7

Development of differentiation practices over time (Step 3)

Research question 4: How does Differentiated Instruction develop over time when comparing countries?

Research question 5: What personal and contextual factors explain differences and growth in Differentiated Instruction when comparing countries?

Research question 6: What is the impact of (changes in) Differentiated Instruction on students' academic engagement?
6.1 Are there any differences regarding the impact of Differentiated Instruction between countries?
6.2 If so, which factors explain the differences?

To answer RQs 4-6, Latent Growth Curve Modelling (LGCM) was conducted.

7.1 Development of differentiation practices – Observer perspectives

Research question 4: How does Differentiated Instruction develop over time when comparing countries?

In general, variations within a teacher over time, between teacher, and between schools are visible across the countries (see Table 7.1.1). The variability of within teacher over time in Differentiated Instruction practices is larger than that of between teacher and between schools across the countries (54.93% in Indonesia-89.83% in South Africa). In Indonesia, between teacher variation is relatively small but not negligible (5.61%). In South Africa and Pakistan, however, between teacher variation is negligible (< 1%), suggesting that there seemed to be no variations in Differentiated Instruction practices of teachers in these two countries[1].

1 The number of schools is much higher in the Dutch (and to some degree Korea) sets, making potentially a different division between variance at different levels. Therefore, findings related to variance proportions across levels should be interpreted with caution.

Table 7.1.1 Proportion of variance across school, teacher, and measurement moment levels

Country	Level	DIF
The Netherlands	School	14.53
	Teacher	18.80
	Moment	66.67
Indonesia	School	39.46
	Teacher	5.61
	Moment	54.93
South Africa	School	10.16
	Teacher	0.001
	Moment	89.83
Mongolia	School	25.33
	Teacher	15.39
	Moment	59.27
Pakistan	School	26.31
	Teacher	0.001
	Moment	73.69

Based on the MLGCM results, changes in Differentiated Instruction practices across countries are visible (see Tables 7.1.2-7.1.8; Figure 7.1.1). Differences in the pattern of change over time in the countries were found. For South Africa, Pakistan, and the USA (see Tables 7.1.4, 7.1.6, and 7.1.8), only two measurement moments are available. Thus, only a linear trend of change can be estimated. In Pakistan and South Africa, the change of Differentiated Instruction practices showed a linear increase from moment 1 to moment 2 ($p < 0.05$). This means that the teachers in these two countries showed positive improvement in their Differentiated Instruction practices. In the USA, the linear effect of time is not significant. This indicates that Differentiated Instruction practices of American teachers were observed to be the same between moment 1 and moment 2.

In the Netherlands and Mongolia (see Tables 7.1.2 and 7.1.5), the change in teachers' Differentiated Instruction practices showed a curvilinear (quadratic), inverted U-shaped like, pattern ($p < 0.05$). The inverted U-shaped like pattern in Mongolia was steeper compared to that of the Netherlands. In the Netherlands, Differentiated Instruction practices increased significantly from moment 1 to moment 4. The increase was steeper from moment 1 to moment 2, then it continued to decelerate slightly between moment 2 and moment 4.

In Mongolia (see Table 7.1.5), Differentiated Instruction practices also increased from moment 1 to moment 2, and it continued to decrease between moment 2 and moment 3 subsequently. In Indonesia (see Table 7.1.3), the change in Differentiated Instruction practices is best represented by a curvilinear (quadratic), U-shaped like, pattern ($p < 0.05$) The change was marked by a decrease from moment 1 to moment 2, then it continued to increase from moment 2 to moment 3 subsequently.

In the UK, the change in teachers Differentiated Instruction followed a curvilinear (cubic) trend (see Table 7.1.7). Initially, Differentiated Instruction practices increased significantly, then it continued to deteriorate slightly before it continued to increase again with a lower rate compared to the initial state.

A negative covariance coefficient between intercepts and slopes of Differentiated Instruction ($< p < 0.05$, see Model 2) was found. This trend is consistent across the countries, except for the UK and the USA. This means that, in general, teachers who started off lower in Differentiated Instruction practices during the first measurements showed steeper increases over time compared to those who started off higher at the end of the measurement, and vice versa. In the UK, a positive covariance between the intercept and the slope was found. This indicates that teachers who started off lower in differentiated practices during the first measurement showed a lower increase over time compared to those who started off higher and the end of the measurement, and vice versa.

Table 7.1.2 MLGCM results for Differentiated Instruction in the Netherlands

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	1.974***	0.021	1.553***	0.054	1.552***	0.052	1.554***	0.053
Time			0.263***	0.048	0.263***	0.046	0.258***	0.047
Time^2			-0.026**	0.009	-0.026**	0.009	-0.024**	0.009
Random effects								
Level 3 variance (school)								
Intercept	0.075	0.011	0.067	0.010	0.066	0.010	0.094	0.022
Intercept x Time							-0.021	0.008
Time							0.014	0.003
Level 2 variance (Teacher)								
Intercept	0.096	0.010	0.103	0.010	0.175	0.037	0.126	0.036
Intercept x Time					-0.043	0.013	-0.017	0.013
Time					0.026	0.005	0.012	0.005
Level 1 variance (Time)								
Residual	0.344	0.010	0.318	0.009	0.281	0.010	0.281	0.010
Deviance	7696.881		7483.695		7442.237		7399.618	

Note. $^+$ p <.10, * p < .05, ** p < .01, *** p < .001

Table 7.1.3 MLGCM results for Differentiated Instruction in Indonesia

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	1.763***	0.085	2.036***	0.162	2.060***	0.153	2.091***	0.175
Time			-0.329+	0.173	-0.361*	0.160	-0.408*	0.167
$Time^2$			0.080+	0.045	0.090*	0.043	0.105*	0.043
Random effects								
Level 3 variance (school)								
Intercept	0.176	0.052	0.175	0.052	0.176	0.053	0.352	0.119
Intercept x Time							-0.094	0.044
Time							0.038	0.019
Level 2 variance (Teacher)								
Intercept	0.025	0.015	0.027	0.015	0.257	0.093	0.168	0.084
Intercept x Time					-0.123	0.047	-0.063	0.042
Time					0.074	0.026	0.035	0.022
Level 1 variance (Time)								
Residual	0.245	0.019	0.242	0.019	0.183	0.022	0.181	0.021
Deviance	1176.748		1172.645		1163.488		1144.299	

Note. + p <.10, * p < .05, ** p < .01, *** p < .001

Table 7.1.4 MLGCM results for Differentiated Instruction in South Africa

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	2.732***	0.053	2.233***	0.104	2.234***	0.111	2.238***	0.156
Time			0.335***	0.060	0.334***	0.062	0.330***	0.092
$Time^2$								
Random effects								
Level 3 variance (school)								
Intercept	0.066	0.024	0.070	0.024	0.070	0.023	0.534	0.205
Intercept x Time							-0.291	0.118
Time							0.183	0.072
Level 2 variance (Teacher)								
Intercept	0.000	0.000	0.000	0.000	3.199	0.259	2.735	0.234
Intercept x Time					-1.865	0.154	-1.572	0.138
Time					1.179	0.095	0.994	0.085
Level 1 variance (Time)								
Residual	0.583	0.034	0.553	0.032	0.000	0.000	0.000	0.000
Deviance	1447.529		1417.473		1408.139		1388.790	

Note. + p <.10, * p < .05, ** p < .01, *** p < .001

Table 7.1.5 MLGCM results for Differentiated Instruction in Mongolia

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	2.360***	0.048	1.584***	0.111	1.585***	0.099	1.596***	0.113
Time			0.906***	0.115	0.906***	0.097	0.900***	0.100
$Time^2$			-0.222***	0.028	-0.222***	0.023	-0.222***	0.023
Random effects								
Level 3 variance (school)								
Intercept	0.094	0.023	0.094	0.023	0.096	0.023	0.250	0.066
Intercept x Time							-0.071	0.023
Time							0.032	0.009
Level 2 variance (Teacher)								
Intercept	0.057	0.010	0.062	0.010	0.260	0.050	0.155	0.045
Intercept x Time					-0.105	0.022	-0.051	0.019
Time					0.060	0.010	0.033	0.009
Level 1 variance (Time)								
Residual	0.220	0.011	0.203	0.010	0.142	0.010	0.142	0.010
Deviance	1794.227		1734.951		1695.444		1662.245	
Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001								

Table 7.1.6 MLGCM results for Differentiated Instruction in Pakistan

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	2.003***	0.064	1.744***	0.081	1.773***	0.080	1.743***	0.170
Time			0.152***	0.033	0.152***	0.033	0.172	0.105
$Time^2$								
Random effects								
Level 3 variance (school)								
Intercept	0.068	0.024	0.069	0.024	0.069	0.024	0.495	0.174
Intercept x Time							-0.284	0.104
Time							0.189	0.066
Level 2 variance (Teacher)								
Intercept	0.000	0.000	0.000	0.000	0.879	0.068	0.501	0.039
Intercept x Time					-0.548	0.043	-0.286	0.023
Time					0.380	0.029	0.199	0.015
Level 1 variance (Time)								
Residual	0.193	0.010	0.187	0.010	0.000	0.000	0.000	0.000
Deviance	849.950		829.395		826.489		661.585	
Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001								

Table 7.1.7 MLGCM results for Differentiated Instruction in UK

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	3.231***	0.033	2.164***	0.293	2.173***	0.282	2.179***	0.282
Time			1.553***	0.441	1.544***	0.425	1.542***	0.426
$Time^2$			-0.679***	0.193	-0.675***	0.186	-0.675***	0.186
$Time^3$			0.090***	0.025	0.090***	0.024	0.090***	0.025
Random effects								
Level 3 variance (school)								
Intercept	0.008	0.008	0.009	0.008	0.007	0.007	0.012	0.016
Intercept x Time							-0.003	0.001
Time							0.001	0.002
Level 2 variance (Teacher)								
Intercept	0.091	0.016	0.093	0.016	0.043	0.038	0.037	0.038
Intercept x Time					0.003	0.001	0.006	0.012
Time					0.004	0.005	0.003	0.005
Level 1 variance (Time)								
Residual	0.137	0.010	0.130	0.010	0.121	0.011	0.121	0.011
Deviance	667.222		649.956		641.982		640.859	

Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001

Table 7.1.8 MLGCM results for Differentiated Instruction in the USA

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	1.673	0.024	1.721	0.062	*Time effect is not significant*		*Time effect is not significant*	
Time			-0.039	0.046				
$Time^2$								
$Time^3$								
Random effects								
Level 3 variance (school)								
Intercept	0.017	0.009	0.017	0.009				
Intercept x Time								
Time								
Level 2 variance (Teacher)								
Intercept	0.000	0.000	0.000	0.000				
Intercept x Time								
Time								
Level 1 variance (Time)								
Residual	0.163	0.013	0.162	0.013				
Deviance	468.554		467.862					

Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001

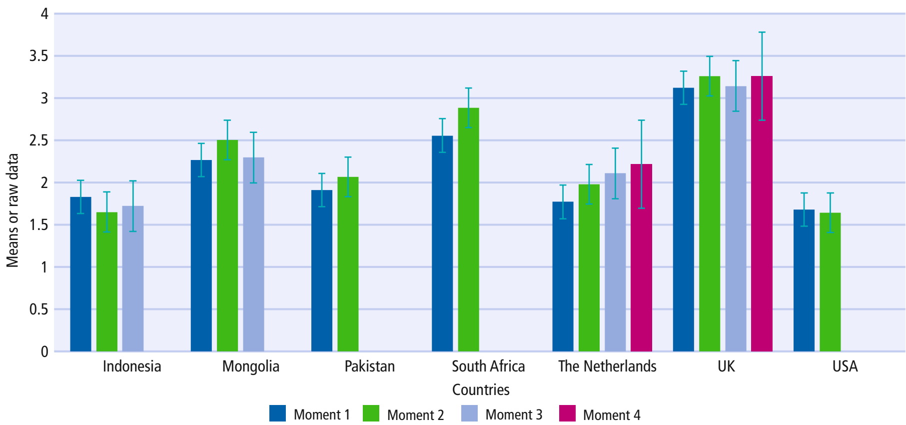

Figure 7.1.1 Changes in Differentiated Instruction practices over time across countries

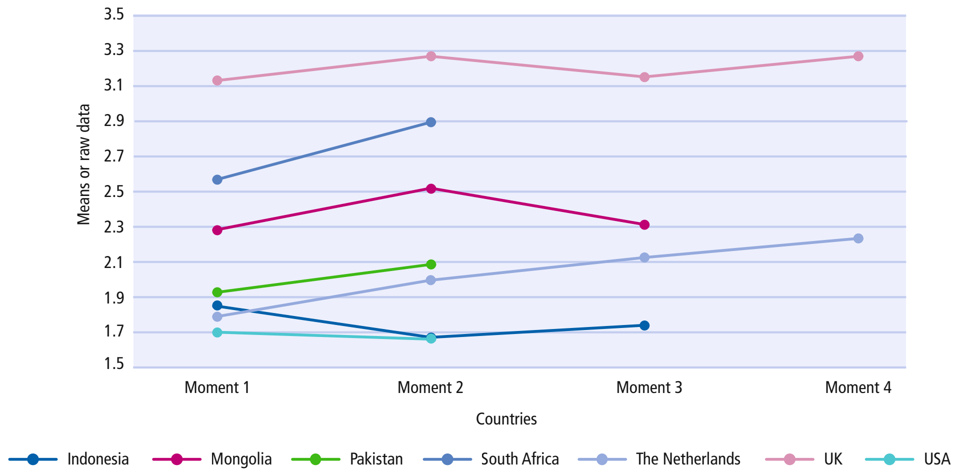

Figure 7.1.2 Changes in Differentiated Instruction practices over time across countries

Research questions 5: What personal and contextual factors explain differences and growth in Differentiated Instruction between countries?

To answer this research question, country data with longitudinal measures were included. Those countries are the Netherlands, Indonesia, South Africa, Mongolia, Pakistan, the UK, and the USA. Multilevel growth curve modelling with covariates and time effects were performed. The covariates are background variables which include teacher gender, teaching experience, and subject taught (see Table 7.1.9).

Teacher gender appeared to be a significant factor for Differentiated Instruction in the Netherlands and Mongolia. In the Netherlands, teacher gender could explain differences and growth in Differentiated Instruction over time, although significant at a 10% level (see Model 2). Results show that the growth of Differentiated Instruction seems to be steeper for female compared to male teachers over time. In Mongolia, no interaction effect between measurement moment and teacher gender. Only the main effect of teacher gender is significant ($p < 0.05$), indicating that female teachers showed generally higher levels of Differentiated Instruction compared to male teachers.

Teaching experience appeared to be a significant predictor of Differentiated Instruction in the Netherlands, Mongolia, Pakistan, and the UK. In the Netherlands and Mongolia, no significant interaction effect between measurement moment and teaching experience was found. The main effect shows that, in the Netherlands ($p < 0.01$) and Mongolia ($p < 0.05$), experienced teachers generally displayed higher levels of Differentiated Instruction compared to novice teachers. In Pakistan and the UK, there are significant interaction effects between measurement moments and teaching experience ($p < 0.001$). In both countries, experienced teachers showed faster rates in the development of Differentiated Instruction over time.

Subject taught shows significant effect on Differentiated Instruction in the Netherlands ($p < 0.001$) and Pakistan ($p < 0.10$). No significant interaction effect between measurement moment and subject taught was found in both countries. Results show that the levels of Differentiated Instruction were higher in science (STEM) classrooms compared to non-science classrooms.

Table 7.1.9 Differentiated Instruction, personal, and contextual factors across 7 countries

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate x moment)		Model 1 (covariate)		Model 2 (covariate x moment)		Model 1 (covariate)		Model 2 (covariate x moment)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect												
Intercept	1.574***	0.062	1.604***	0.073	1.974***	0.130	*Not modelled*		2.246***	0.113	*Not modelled*	
Time	**0.256*****	0.051	**0.242*****	0.053	**-0.141****	0.054	-	-	**0.336*****	0.060	-	-
Time^2	**-0.024***	0.010	**-0.024***	0.010	0.000	0.000	-	-	-	-		
Time^3	-											
											-	-
Teacher gender (ref = male)	**0.066***	0.027	-0.016	0.053	-0.017	0.045	-	-	-0.015	0.063	-	-
Teaching experience (ref = inexperienced)	**0.152****	0.057	0.167	0.129	-0.011	0.066	-	-	-	-		
Subject taught (ref = science)	**-0.102*****	0.029	-0.075	0.055	-0.017	0.043	-	-	-0.010	0.065	-	-
Moment x Teacher gender			0.035^{+}	*0.019*								
Moment x Teaching experience			-0.005	0.042								
Moment x Subject taught			-0.012	0.020								
Random effects												
Level 3 variance (school)												
Intercept	0.067	0.011	0.067	0.011	0.233	0.068	-	-	0.071	0.025	-	-
Level 2 variance (Teacher)												
Intercept	0.094	0.011	0.094	0.011	0.000	0.000	-	-	0.000	0.000	-	-
Level 1 variance (Time)												
Residual	0.315	0.010	0.315	0.010	0.232	0.014	-	-	0.553	0.033	-	-
Deviance	6706.314		6702.877		857.109		-		1417.371		-	

Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

	Mongolia				Pakistan				The UK			
	Model 1 (covariate)		Model 2 (covariate x moment)		Model 1 (covariate)		Model 2 (covariate x moment)		Model 1 (covariate)		Model 2 (covariate x moment)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect												
Intercept	1.375***	0.124	1.419***	0.153	1.905***	0.099	1.991***	0.115	1.863***	0.327	2.268***	0.340
Time	**0.918*****	0.117	**0.896*****	0.126	**0.152*****	0.033	0.095^{+}	*0.052*	**1.365*****	0.483	**1.262****	0.474
Time^2	**-0.222*****	0.029	**-0.222*****	0.029	-	-	-	-	**-0.611****	0.211	**-0.637****	0.207
Time^3	-	-	-	-	-	-	-	-	**0.082****	0.028	**0.085****	0.027
Teacher gender (ref = male)	**0.118***	0.051	0.108	0.107	-0.127	0.118	-0.126	0.118	-0.030	0.052	-0.029	0.052
Teaching experience (ref = inexperienced)	**0.095***	0.038	0.039	0.080	-0.109^{+}	*0.065*	**-0.507*****	0.122	**0.572*****	0.082	0.062	0.163
Subject taught (ref = science)	0.038	0.035	0.038	0.035	-0.064^{+}	*0.035*	0.033	0.105	-0.066	0.051	-0.065	0.051
Moment x Teacher gender	-	-	0.005	0.047	-	-	-	-	-	-	-	-
Moment x Teaching experience	-	-	0.028	0.035	-	-	**0.264*****	0.069	-	-	**0.193*****	0.054
Moment x Subject taught	-	-	-	-	-	-	-0.064	0.066	-	-	-	-
Random effects												
Level 3 variance (school)	0.100	0.024	0.100	0.024	0.066	0.024	0.066	0.024	0.003	0.005	0.003	0.005
Intercept												
Level 2 variance (Teacher)	0.033	0.009	0.033	0.009	0.000	0.000	0.000	0.000	0.055	0.013	0.057	0.013
Intercept												
Level 1 variance (Time)	0.198	0.011	0.198	0.011	0.185	0.010	0.181	0.010	0.141	0.011	0.136	0.011
Residual												
Deviance	1529.319		1528.676		820.939		806.214		544.069		531.618	

Note. $^{+}$ p <.10, * p < .05, ** p < .01, *** p < .001. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

Table 7.1.9 continued

	USA			
	Model 1 (covariate)		Model 2 (covariate x moment)	
	Coefficient	SE	Coefficient	SE
	Fixed effect			
Intercept	1.753***	0.065	*Not modelled*	
Time	-0.037	0.046	-	-
$Time^2$	-	-	-	-
$Time^3$	-	-	-	-
Teacher gender (ref = male)	-	-	-	-
Teaching experience (ref = inexperienced)	-	-	-	-
Subject taught (ref = science)	-0.065	0.041	-	-
Moment x Teacher gender	-	-	-	-
Moment x Teaching experience	-	-	-	-
Moment x Subject taught	-	-	-	-
Random effects				
Level 3 variance (school)	0.017	0.009	-	-
Intercept				
Level 2 variance (Teacher)	0.000	0.000	-	-
Intercept				
Level 1 variance (Time)	0.162	0.013	-	-
Residual				
Deviance	465.374		-	

Note. $^+$ p <.10, * p < .05, ** p < .01, *** p < .001. In some countries, interaction effect models were not performed if main effects of main variables are *ns.*

Research question 6: What is the impact of (changes in) Differentiated Instruction on students' academic engagement?
6.1 Are there any differences regarding the impact of Differentiated Instruction between countries?
6.2 If so, which factors explain the differences?

To answer these research questions, longitudinal observation data from seven countries were included for analyses, including that of the Netherlands, Indonesia, South Africa, Mongolia, Pakistan, the UK, and the USA (see Table 7.1.10). Teacher gender, teaching experience, and subject taught were included as background variables.

Results show that Differentiated Instruction has a significant and positive relation to student academic engagement in all seven countries ($p < 0.001$), even after adjusting for some background variables. However, some differences across countries are visible. In Indonesia, Pakistan, and the USA, no significant interaction effect between measurement moment and Differentiated Instruction was found. This suggests that in these three countries, the relationship between Differentiated Instruction and student engagement remain stable over time. The positive main effect of Differentiated Instruction on student engagement indicates that higher levels of Differentiated Instruction correspond to a higher level of student engagement, and vice versa.

In the Netherlands, South Africa, Mongolia, and the UK, interaction effects between time and Differentiated Instruction were found ($p < 0.01$). This indicates that the relationship between Differentiated Instruction and student engagement in these four countries is related to time factor (i.e., measurement moments). In the Netherlands and South Africa, the interaction effect between measurement moment and Differentiated Instruction on student engagement is negative. The longer the time measurement, the weaker the effect of Differentiated Instruction on student engagement. This seems to suggest that over time, the effect of Differentiated Instruction on student engagement is weaker. In contrast, the interaction effect between measurement moment and Differentiated Instruction on student engagement in Mongolia and the UK is positive. The longer the time measurement, the stronger the effect of Differentiated Instruction on student engagement. This seems to indicate that over time, the effect of Differentiated Instruction on student engagement is stronger.

In the Netherlands, but not in other six included countries, there is a significant interaction effect between measurement moment, Differentiated Instruction, and subject taught on student engagement ($p < 0.05$). This implies that subject taught also plays a role in explaining the link between time and Differentiated Instruction on student engagement. This seems to suggest that the effect of time and Differentiated Instruction on student engagement is more pronounced in non-science classrooms compared to science classrooms.

Table 7.1.10 Differentiated Instruction, student engagement, personal and contextual factors across seven countries

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
	Fixed effect											
Intercept	2.193***	0.043	1.687***	0.128	2.078***	0.136	*Time effect ns*		1.492***	0.111	0.831**	0.267
Time	**0.109*****	0.009	**0.283*****	0.049	-0.044	0.051			**0.110***	0.048	**0.583****	0.182
Time^2					0.000	0.000						
Time^3												
Differentiation	**0.278*****	0.016	**0.533*****	0.063	**0.466*****	0.042			**0.523*****	0.032	**0.767*****	0.095
Teacher gender (ref = male)	-0.008	0.025	-0.007	0.025	-0.047	0.048			-0.004	0.051	0.007	0.051
Teaching experience (ref = inexperienced)	-0.001	0.052	0.000	0.052	-0.016	0.068						
Subject taught (ref = science)	**0.076****	0.026	**0.503****	0.154	-0.056	0.045			0.055	0.052	0.048	0.052
Differentiation x Subject taught			**-0.211****	0.077								
Moment x Differentiation			**-0.085*****	0.022							**-0.172****	0.064
Moment x Teacher gender												
Moment x Teaching experience												
Moment x Subject taught			**-0.124***	0.059								
Moment x Differentiation x Subject taught			**0.059***	0.028								

Note. $^{+}$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
Random effects												
Level 3 variance (school)	0.033	0.007	0.032	0.007	0.090	0.029	0.030	0.012	0.019	0.010	0.015	0.009
Intercept												
Level 2 variance (Teacher)	0.073	0.009	0.074	0.009	0.043	0.022	0.040	0.011	0.028	0.022	0.024	0.022
Intercept												
Level 1 variance (Time)	0.284	0.009	0.282	0.009	0.205	0.023	0.150	0.012	0.333	0.027	0.335	0.027
Residual												
Deviance	6201.604		6181.037		864.606		808.319		1135.806		1128.718	

Note. $^{+}$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

	Mongolia				Pakistan				The UK			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
					Fixed effect							
Intercept	2.189***	0.185	2.362***	0.250	0.613***	0.106	0.756**	0.232	0.904**	0.318	1.747***	0.424
Time	**-0.341****	0.120	**-0.426****	0.145	0.012	0.030	-0.081	0.138	**1.075***	0.468	0.868⁺	0.469
Time^2	-0.034	0.026	-0.033	0.026					**-0.456***	0.204	**-0.494***	0.203
Time^3									**0.057***	0.027	0.062*	0.027
Differentiation	**0.266*****	0.070	**0.188+**	0.103	**0.701*****	0.038	**0.629****	0.232	**0.522*****	0.038	**0.231***	0.104
Teacher gender (ref = male)	-0.051	0.044	-0.051	0.044	0.053	0.088	0.050	0.089	0.010	0.034	0.018	0.034
Teaching experience (ref = inexperienced)	0.251⁺	0.133	-0.010	0.287	0.022	0.064	0.021	0.064	0.038	0.066	0.038	0.065
Subject taught (ref = science)	0.024	0.031	0.023	0.031	-0.002	0.039	-0.002	0.039	0.024	0.034	0.021	0.034
Differentiation x Subject taught												

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

	Mongolia				Pakistan				The UK			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
Differentiation x Teaching experience	-0.026	0.049	0.091	0.124								
Moment x Differentiation	**0.217*****	0.026	**0.255*****	0.045			0.047	0.067			**0.098****	0.033
Moment x Teacher gender												
Moment x Teaching experience	**-0.063***	0.031	0.063	0.126								
Moment x Subject taught												
Moment x Differentiation x Subject taught												
Moment x Differentiation x Teaching experience			-0.056	0.055								
Random effects												
Level 3 variance (School)	0.085	0.020	0.085	0.020	0.029	0.012	0.030	0.012	0.001	0.002	0.001	0.002
Intercept												
Level 2 variance (Teacher)	0.024	0.007	0.023	0.007	0.040	0.011	0.040	0.011	0.000	0.000	0.000	0.000
Intercept												
Level 1 variance (Time)	0.153	0.008	0.153	0.008	0.151	0.012	0.150	0.012	0.132	0.009	0.130	0.009
Residual												
Deviance	1250.373		1249.325		808.798		808.319		391.132		382.350	

Note. $^{+}$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

Table 7.1.10 continued

	USA			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE
	Fixed effect			
Intercept	2.389***	0.118	2.248***	0.163
Time	-0.007	0.051	-0.006	0.051
Time^2				
Time^3				
Differentiation	**0.305*** **	0.054	0.386***	0.084
Teacher gender (ref = male)				
Teaching experience (ref = inexperienced)				
Subject taught (ref = science)	***0.084***$^+$	0.046	***0.314***$^+$	0.190
Differentiation x Subject taught			-0.136	0.109
Differentiation x Teaching experience				
Moment x Differentiation				
Moment x Teacher gender				
Moment x Teaching experience				
Moment x Subject taught				
Moment x Differentiation x Subject taught				
Moment x Differentiation x Teaching experience				
	Random effects			
Level 3 variance (School)	0.000	0.000	0.000	0.000
Intercept				
Level 2 variance (Teacher)	0.020	0.021	0.018	0.021
Intercept				
Level 1 variance (Time)	0.197	0.024	0.199	0.025
Residual				
Deviance	554.227		552.675	

Note. $^+$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. In some countries, interaction effect models were not performed if main effects of main variables are *ns*. Significant values are shown in bold.

7.2 Development of differentiation practices – Student perspectives

Research question 4: How does Differentiated Instruction develop over time when comparing countries (as perceived by students)?

Regarding student data, only three countries collected longitudinal data: the Netherlands (4 measurement moments), Indonesia (2 measurement moments), and South Africa (3 measurement moments). Student data is nested in four levels i.e., school (level 4), teacher (level 3), student (level 2) and measurement moment (level 1), except for in South Africa (the data collection did not include identifiers of all these levels). Results indicate that between schools, variation in perceived Differentiated Instruction is relatively small. The largest variations are located at the student level. Between teacher variations are also rather large (see Table 7.2.1).

Table 7.2.1 Proportion of variance across school, teacher, and measurement moment levels

Country	Level	DIF (%)
The Netherlands	School	2.04
	Teacher	19.08
	Student	78.88
	Moment	0.00
Indonesia	School	3.75
	Teacher	15.78
	Student	80.47
	Moment	0.00
South Africa	School	
	Teacher	13.91
	Student	86.09
	Moment	0.00

MLGCM results show that student perceptions of Differentiated Instruction in the three countries changed over time (see Tables 872.2-7.2.4, Figure 7.1.3). The change in Differentiated Instruction in the three countries is best represented by a linear trend. In the Netherlands and South Africa, the effect of time is positive, indicating that perceived Differentiated Instruction in these countries increased over time. On the contrary, the effect of time in Indonesia is negative, indicating that perceived Differentiated Instruction in this country declined over time.

The covariance between the intercept and the slope at the teacher level in the three countries is negative, indicating that teachers who were perceived lower in the beginning grew faster over time, and vice versa.

Table 7.2.2 MLGCM results for Differentiated Instruction in the Netherlands

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	2.834***	0.008	2.748***	0.013	2.748***	0.013	2.765***	0.016
Time			0.049***	0.009	0.049***	0.009	0.034**	0.011
$Time^2$			-0.003	0.002	-0.003	0.002	-0.000	0.002
Random effects								
Level 4 variance (School)								
Intercept	0.009	0.002	0.009	0.002	0.009	0.002	0.008	0.002
Intercept x Time								
Time								
Level 3 variance (Teacher)								
Intercept	0.085	0.003	0.084	0.003	0.084	0.003	0.211	0.008
Intercept x Time							-0.055	0.003
Time							0.023	0.001
Level 2 variance (Student)								
Intercept	0.351	0.001	0.351	0.001	0.363	0.008	0.337	0.001
Intercept x Time					-0.005	0.004	0.000	0.000
Time					0.001	0.001	0.000	0.000
Level 1 variance (Time)								
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	242365.154		242088.124		242083.776		239506.958	
Note. + $p<.10$, * $p<.05$, ** $p<.01$, *** $p<.001$								

Table 7.2.3 MLGCM results for Differentiated Instruction in Indonesia

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect								
Intercept	2.872***	0.019	2.921***	0.025	2.920***	0.025	2.920	0.027
Time			-0.033**	0.012	-0.033**	0.012	-0.032	0.014
Random effects								
Level 4 variance (School)								
Intercept	0.009	0.003	0.008	0.003	0.008	0.003	0.008	0.003
Intercept x Time								
Time								
Level 3 variance (Teacher)								
Intercept	0.036	0.002	0.036	0.002	0.036	0.002	0.162	0.022
Intercept x Time							-0.091	0.015
Time							0.061	0.010
Note. + $p<.10$, * $p<.05$, ** $p<.01$, *** $p<.001$								

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Level 2 variance (Student)								
Intercept	0.183	0.003	0.183	0.003	0.140	0.007	0.137	0.007
Intercept x Time					0.015	0.003	0.014	0.003
Time					0.000	0.000	0.000	0.000
Level 1 variance (Time)								
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	15584.821		15576.742		15543.373		15463.795	
Note. $^+$ p <.10, * p < .05, ** p < .01, *** p < .001								

Table 7.2.4 MLGCM results for Differentiated Instruction in South Africa

	Model 0		Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
			Fixed effect					
Intercept	3.071***	0.016	2.652***	0.041	2.646***	0.041	2.735***	0.082
Time			0.170***	0.015	0.172***	0.015	0.138***	0.032
Time^2			0.000	0.000	0.000	0.000	0.000	0.000
			Random effects					
Level 3 variance (Teacher)								
Intercept	0.065	0.007	0.067	0.007	0.067	0.007	1.609	0.165
Intercept x Time							-0.611	0.063
Time							0.242	0.025
Level 2 variance (Student)								
Intercept	0.402	0.007	0.394	0.007	0.769	0.035	0.664	0.030
Intercept x Time					-0.076	0.007	-0.067	0.006
Time					0.000	0.000	0.000	0.000
Level 1 variance (Time)								
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	14867.350		14740.575		14635.796		13961.784	
Note. $^+$ p <.10, * p < .05, ** p < .01, *** p < .001								

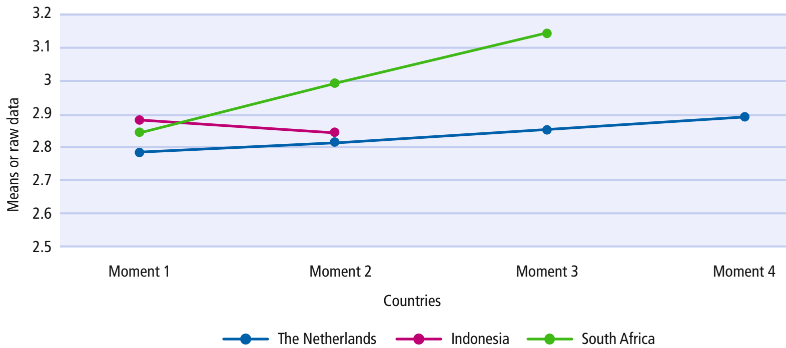

Figure 7.1.3 Changes in Differentiated Instruction practices over time across countries

Research question 5: What personal and contextual factors explain differences and growth in Differentiated Instruction when comparing countries (as perceived by students)?

Several personal and contextual factors could explain differences in the development of Differentiated Instruction over time (see Table 7.2.5). Student gender has a significant negative effect in the Netherlands. The effect is interacting with time. This suggests that girls, in general, perceived the quality level of teachers' Differentiated Interaction lower, but the change in their perceptions was steeper over time compared to boys. School type also has a significant effect on perceived Differentiated Instruction in the Netherlands in favor of vocational schools. Subject taught also has significant effect on Differentiated Instruction in favor of non-science teachers. In Indonesia, school denomination has a significant interaction effect with time on perceived Differentiated Instruction, indicating that perceived Differentiated Instruction in private schools developed faster over time compared to public schools.

In all three countries, perceived Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies are significant and strong predictors of Differentiated Instruction. Higher levels of Differentiated Instruction are associated with higher levels of the five effective teaching behavior domains.

Table 7.2.5 Differentiated Instruction, personal, and contextual factors across three countries

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with inter-action effect)	
	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
					Fixed effect							
Intercept	2.755***	0.036	-0.318***	0.017	2.943***	0.028	0.079**	0.029	2.706***	0.084	-0.035	0.046
Time	0.011	0.028	0.084***	0.012	-0.069***	0.015	-0.004	0.007	0.141***	0.032	0.035**	0.014
Time^2	0.000	0.006	-0.018***	0.003								
Time^3												
Student gender (ref = male)	-0.107***	0.012	-0.026***	0.003	-0.015	0.013	0.000	0.006	-0.013	0.014	0.005	0.010
School type (ref = general)	0.072*	0.035	0.007	0.007								
School denomination (ref = public)					-0.106^{+}	0.060	-0.024	0.030				
Subject taught (ref = science)	0.087*	0.034	0.009	0.005	0.004	0.013	-0.011^{+}	0.006	0.043	0.031	0.004	0.015
Moment x Student gender	0.023***	0.006										
Moment x School type	0.021	0.017										
Moment x School denom					0.135***	0.032						
Moment x Subject taught	-0.004	0.016										
Moment x Differentiation x Subject taught												

Table 7.2.5 continued

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Climate			0.134***	0.005			0.092***	0.010			0.087***	0.015
Management			0.077***	0.006			0.091***	0.012			0.113***	0.019
Clarity			0.129***	0.005			0.166***	0.011			0.120***	0.018
Activation			0.367***	0.006			0.307***	0.013			0.367***	0.021
Learning strategies			0.319***	0.004			0.303***	0.009			0.275***	0.014
Random effects												
Level 4 variance (school)												
Intercept	0.006	0.002	0.000	0.000	0.003	0.001	0.005	0.001				
Level 3 variance (Teacher)												
Intercept	0.264	0.014	0.020	0.002	0.158	0.022	0.004	0.005	1.606	0.166	0.170	0.030
Level 2 variance (Student)												
Intercept	0.326	0.002	0.141	0.005	0.139	0.008	0.060	0.003	0.669	0.031	0.162	0.012
Level 1 variance (Time)												
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	118782.503		55707.824		14867.414		4079.561		13690.905		4360.956	

Research question 6: What is the impact of (changes in) Differentiated Instruction on students' academic engagement (as perceived by students)?
6.1 Are there any differences regarding the impact of Differentiated Instruction between countries?
6.2 If so, which factors explain the differences?

For student engagement data, two types of student engagement were included: behavioral engagement and emotional engagement.

Regarding behavioral engagement in the Netherlands, the revealed proportion of explained variance at the school level was marginal. However, the variation at the school level in Indonesia was revealed to be relatively large. In the three countries. The largest proportion of explained variance was attributed to the student level (see Table 7.2.6).

Table 7.2.6 Proportion of variance across school, teacher, and measurement moment levels

Country	Level	Behavioral engagement
The Netherlands	School	1.93
	Teacher	12.86
	Student	85.21
	Moment	0.00
Indonesia	School	15.37
	Teacher	4.98
	Student	79.66
	Moment	0.00
South Africa	School	
	Teacher	13.31
	Student	86.77
	Moment	0.00

In all three countries, perceived Differentiated Instruction was strongly and positively related to perceived behavioral engagement (see Table 7.2.7). The higher students perceived the quality of their teachers' Differentiated Instruction, the higher they perceived their own academic engagement, and vice versa. In Indonesia, a positive interaction effect between time, perceived Differentiated Instruction, and school denomination on behavioral engagement was found, indicating that over time, a stronger link between perceived Differentiated Instruction and student engagement was more pronounced in private schools compared to public schools. In South Africa, a positive interaction effect between time, Differentiated Instruction, and student gender was found. This suggests that over time, a stronger link between perceived Differentiated Instruction and student engagement was more salient for girls than for boys.

Table 7.2.7 Differentiated Instruction, student behavioral engagement, personal, and contextual factors across three countries

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
					Fixed effect							
Intercept	2.023***	0.043	2.044***	0.050	2.256***	0.047	2.539***	0.082	2.537***	0.059	3.521***	0.186
Time	-0.212***	0.068	-0.218**	0.069	0.027**	0.010	-0.114**	0.047	-0.109***	0.020	-0.471***	0.077
Time^2	0.072*	0.033	0.071*	0.033					0.000	0.000	0.000	0.000
Time^3	-0.007	0.005	-0.007	0.005								
Student gender (ref = male)	-0.009*	0.004	-0.031	0.018	0.254***	0.008	0.007	0.008	-0.049***	0.012	0.291	0.266
School type (ref =general)	0.013	0.010	0.013	0.010								
School denomination (ref=public)					0.130+	0.072	0.169+	0.096				
Subject taught (ref = science)	0.021**	0.008	0.010	0.0025	0.007	0.008	0.005	0.008	-0.009	0.021	-0.002	0.021
Differentiation	0.412***	0.003	0.408***	0.009	0.254***	0.008	0.152***	0.025	0.364***	0.009	0.061	0.058
Moment x Student gender			0.010*	0.005							-0.269*	0.109
Moment x School type												
Moment x School denom							-0.035	0.023				
Moment x Subject taught			-0.000	0.009								
Moment x Differentiation			0.001	0.004			0.052***	0.016			0.110***	0.024

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Differentiation x Student gender			0.001	0.006							-0.153^{+}	0.085
Differentiation x Subject taught			0.004	0.006								
Moment x Differentiation x denom							0.120***	0.019				
Moment x Differentiation x student gender											0.104**	0.034
Random effects												
Level 4 variance (school)												
Intercept	0.004	0.001	0.004	0.001	0.029	0.008	0.028	0.008				
Level 3 variance (Teacher)												
Intercept	0.053	0.004	0.053	0.004	0.033	0.010	0.031	0.010	0.535	0.066	0.535	0.065
Level 2 variance (Student)												
Intercept	0.202	0.001	0.202	0.001	0.103	0.006	0.103	0.006	0.306	0.019	0.308	0.019
Level 1 variance (Time)												
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	84732.973		84727.812		11858.962		11804.824		10319.434		10195.946	

With respect to emotional engagement, marginal between-school variation was found in the Netherlands and Indonesia. In the Netherlands, a relatively large proportion of variation between teachers was revealed with regard to students' perceived Differentiated Instruction, a moderate proportion was found in South Africa, and a small proportion in Indonesia. In all countries, the largest variations are located between students (see Table 7.2.8).

Table 7.2.8 Proportion of variance across school, teacher, and measurement moment levels

Country	Level	Emotional engagement
The Netherlands	School	1.98
	Teacher	19.43
	Student	78.58
	Moment	0.00
Indonesia	School	6.43
	Teacher	6.48
	Student	87.09
	Moment	0.00
South Africa	School	-
	Teacher	12.40
	Student	87.60
	Moment	0.00

In the three countries, perceived Differentiated Instruction is strongly and positively related to student perceived emotional engagement (see Table 7.2.9). The higher students reported their teachers' Differentiated Instruction, the higher their reported emotional engagement, and vice versa. In the Netherlands, a positive interaction effect between time and perceived Differentiated Instruction on student emotional engagement was found, indicating that over time, the link between perceived Differentiated Instruction and student emotional engagement gets stronger. In Indonesia, a positive interaction effect between perceived Differentiated Instruction and school denomination on student emotional engagement was found. This suggests that a stronger link between perceived Differentiated Instruction and student emotional engagement is found in private schools compared to public schools.

In South Africa, the positive interaction effect between time, perceived Differentiated Instruction, and student gender on student engagement indicates that the longer the time, the stronger the link between perceived Differentiated Instruction on student engagement and this trend is more pronounced for girls than for boys.

Table 7.2.9 Differentiated Instruction, student emotional engagement, personal, and contextual factors across three countries

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
					Fixed effect							
Intercept	1.401***	0.053	1.446***	0.058	1.993***	0.040	2.102***	0.053	2.146***	0.054	2.956***	0.195
Time	-0.025	0.083	-0.048	0.084	-0.013	0.011	-0.016	0.011	-0.059**	0.018	-0.384***	0.080
Time^2	-0.009	0.041	-0.011	0.041								
Time^3	0.004	0.006	0.004	0.006								
Student gender (ref = male)	-0.006	0.004	-0.006	0.004	-0.042***	0.009	-0.082	0.051	-0.030**	0.012	0.418+	0.272
School type (ref =general)	0.019	0.012	0.019	0.012								
School denomination (ref=public)					0.106*	0.050	-0.264***	0.079				
Subject taught (ref = science)	0.015	0.010	0.015	0.010	0.009	0.009	0.008	0.009	-0.036*	0.019	0.226*	0.106
Differentiation	0.556***	0.003	0.540***	0.009	0.357***	0.009	0.320***	0.015	0.434***	0.009	0.137*	0.060
Moment x Student gender											-0.240*	0.111
Moment x School type												
Moment x Subject taught											-0.095**	0.036
Moment x Differentiation			0.009*	0.005							0.118***	0.024
Differentiation x Student gender							0.014	0.018			-0.176*	0.087
Differentiation x School denom							0.127***	0.021				
Differentiation x Subject taught											-0.006	0.019
Moment x Differentiation x Student gender											0.090*	0.035

Table 7.2.9 continued

	The Netherlands				Indonesia				South Africa			
	Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)		Model 1 (covariate)		Model 2 (covariate with interaction effect)	
	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE	Coeffi-cient	SE
	Random effects											
Level 4 variance (School)												
Intercept	0.004	0.001	0.004	0.001	0.013	0.004	0.013	0.004				
Level 3 variance (Teacher)												
Intercept	0.145	0.008	0.146	0.008	0.027	0.012	0.026	0.012	0.363	0.05	0.359	0.052
Level 2 variance (Student)												
Intercept	0.268	0.008	0.268	0.008	0.139	0.008	0.137	0.008	0.347	0.020	0.343	0.020
Level 1 variance (Time)												
Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deviance	99015.616		99011.656		13978.077		13941.900		10519.232		10428.589	

Chapter 8

Conclusions, recommendations, and implications

Contemporary classrooms throughout the world are filled with students with heterogeneous characteristics and backgrounds. Students vary in terms of learning needs because of differences in prior knowledge, readiness, background characteristics, and motivation. Differentiated Instruction has been proposed as a way to address varying learning needs of students in contemporary education (Maulana et al., 2020; Tomlinson, 2015). Differentiated Instruction has been proposed as a desirable approach towards fair educational systems (OECD, 2012; 2018).

Although Differentiated Instruction has gained global interest in the past decade, insights into Differentiated Instruction in teaching from international perspectives is still underrepresented in literature. Existing studies on Differentiated Instruction (and differentiation in general) are generally fragmented in at least two ways. First, research on Differentiated Instruction usually takes place in a limited, single-country context. Second, various studies on Differentiated Instruction typically use diverse research instruments with unequal elements of Differentiated Instruction, often limited in scope. These two limitations prevent direct comparisons of Differentiated Instruction practices across international contexts. In this project, uniform measures (observations and student questionnaires) were used across participating national contexts, making it possible for examining the usefulness of uniform measures for comparing Differentiated Instruction practice across diverse international contexts in a meaningful way in order to expose best practices.

The main focus of this international project was, therefore, targeted to produce knowledge regarding:

1. The comparability of responses gathered with instruments (observations and student questionnaires), developed in a Dutch context, for measuring Differentiated Instruction in diverse international contexts (**Step 1, Research Question 1**).
2. The comparison of the quality of Differentiated Instruction across diverse international contexts (**Step 2, Research Questions 2 and 3**).

3 Changes in Differentiated Instruction practices over time, as well as (longitudinal) links between Differentiated Instruction and academic engagement across diverse international contexts (**Step 3, Research questions 4-6**).

The research outcomes were expected to contribute to advance scientific knowledge on Differentiated Instruction, and to provide information for practice and policy in Differentiated Instruction in the Netherlands and beyond. Specifically, it was expected that:

1 The instruments (observations and student questionnaires) previously developed in the Dutch context for measuring Differentiated Instruction, would be largely applicable to other international contexts (measurement invariance). However, limitations to compare Differentiated Instruction across international contexts were expected due to differences in international contexts' characteristics.
2 The generated knowledge on measurement invariance as mentioned in item 1 would provide insights into the general usefulness of the instruments for comparing Differentiated Instruction across countries and would offer directions for each participating international context to improve the usefulness of the instruments, and practices subsequently, in the future.
3 Some personal and contextual characteristics of teachers and students were expected to explain differences in Differentiated Instruction, depending on a country's context. This knowledge was expected to provide hints for practice and policy with regard to which personal and contextual variables should be taken into account in the effort to improve Differentiated Instruction practices in diverse international contexts.
4 Differentiated Instruction practices are subject to change over time. The instability of Differentiated Instruction over time was expected to be evident across diverse international contexts. This knowledge was expected to provide useful information for teachers and schools in diverse international contexts to improve awareness, and plan for improvement over time.
5 Some personal and contextual characteristics of teachers and students were expected to explain differences in change of Differentiated Instruction over time. This knowledge was expected to provide useful information for schools and policy regarding relevant characteristics that matter for the development of Differentiated Instruction over time in diverse international contexts.
6 The relationship between Differentiated Instruction and student academic engagement was expected to be evident across diverse international contexts. The magnitude of the link between the two constructs could differ across different international contexts due

to differences in personal, contextual, and cultural contexts. This knowledge was expected to be useful for establishing the importance of Differentiated Instruction for students' academic engagement cross-nationally. Differences in the strength of the link between the two constructs were expected to underpin the importance of taking personal, contextual, and cultural factors into account in Differentiated Instruction and student outcomes.

8.1 Answers to research questions

The target population of this project is secondary education. Although the importance of Differentiated Instruction for student outcomes is much discussed in literature, policy documents, and various educational contexts, it became clear during the start of this project that there was no robust empirical evidence regarding the effectiveness of Differentiated Instruction in secondary education. A relatively recent meta-analysis of Differentiated Instruction in primary education shows that Differentiated Instruction has some potential for student outcomes, when implemented well (Deunk, Smale-Jacobse, de Boer, Doolaard & Bosker, 2018). However, these results may not generalize directly to secondary education due to contextual differences between primary and secondary education (Van Casteren et al., 2017). Evidence for the benefits of Differentiated Instruction in secondary education is scarce (Coubergs, Struyven, Engels, Cools & De Martelaer, 2013). Therefore, the decision was made to conduct a systematic review study to examine the effectiveness of Differentiated Instruction for student outcomes in secondary education. The results show that a majority of studies show small to moderate positive effects of Differentiated Instruction on student achievement, depending on types of differentiation and contexts of the studies (Smale-Jacobse et al., 2019). This study provides evidence regarding benefits of Differentiated Instruction for student outcomes in secondary education.

Research question 1

Are the Dutch measures of Differentiated Instruction in teaching reliable and valid to be used in other countries?

The first research question concerns the validation of the two Dutch instruments for measuring Differentiated Instruction. The first instrument is part of an observation instrument called International Comparative Analysis of Learning and Teaching (ICALT) and was previously developed and validated for use in the Dutch secondary education context by Van de Grift, Helms-Lorenz, and Maulana (2014). The second instrument is a student questionnaire called My Teacher Questionnaire (MTQ) and was constructed for use in the Dutch secondary education context (Maulana, Helms-Lorenz & Van de Grift, 2015). Differentiated Instruction is one of the domains included in the ICALT and MTQ instrument and is the main focus of investigation of this project. Because not all countries participating in the observation research also participated in the student survey research and vice versa, results based on observations and student questionnaires are presented separately, and the conclusions are derived from the outcomes of both measures together.

Regarding the **observation instrument** for measuring Differentiated Instruction, results show that, in general, the factor structure of the Differentiated Instruction scale was supported in ten diverse international contexts including *the Netherlands, Indonesia, Pakistan, South Africa, South Korea, Hong Kong – China, Spain, the USA, Mongolia, and the UK*. Based on these results, there is evidence to support that the Differentiation Instruction scale is, in general, a valid scale to be used in these ten participating countries. Subsequently, actual Differentiated Instruction practices in the ten national contexts can be measured using the observation instrument. This is particularly applicable for secondary education contexts. Although the factor structure of the Differentiated Instruction scale was supported in the ten participating countries, only eight out of the ten countries met the criteria for general comparison. The eight countries include *the Netherlands, Indonesia, South Africa, South Korea, Spain, the USA, Mongolia, and the UK***.** However, it is important to note that comparing South Korean and South African data with the other six countries should be done with caution due to some issues exposed in the analyses of these two countries. Furthermore, *Pakistan and Hong Kong – China* cannot be included in the comparison due to inadequacy in meeting measurement invariance requirements.

Regarding the **student questionnaire** for measuring students' perceptions of their teachers' Differentiated Instruction, results show that, in general, the factor structure of the perceived Differentiated Instruction scale was supported in eleven participating international contexts including *the Netherlands, Indonesia, South Africa, Mongolia, Malta, Türkiye, Spain, the UK, China, South Korea, and Brazil.* Based on these results, there is evidence to support that the perceived Differentiated Instruction scale is, in general, a valid scale to be used in these eleven participating countries. Therefore, student perceptions of Differentiated Instruction practices in the eleven national contexts can be measured using the MTQ questionnaire. This is also particularly applicable for secondary education contexts. Of the eleven countries, only the perceived Differentiated Instruction in nine countries could be compared. These nine countries include *the Netherlands, South Africa, Mongolia, Malta,* *Türkiye, Spain, China, South Korea, and Brazil*. Two sets of country data, those of *Indonesia and the UK*, do not adequately meet the requirements for comparison.

To conclude, evidence shows that the Differentiated Instruction scale is valid for measuring Differentiated Instruction (observation instrument) and perceptions of Differentiated Instruction (student questionnaire) in the participating countries with diverse cultural backgrounds, when used separately for each country's context (no direct comparison is made). For comparing Differentiated Instruction and perceptions of Differentiated Instruction, the instruments can be used in about 80% of the participating national contexts (8 out of 10 countries for observations, and 9 out of 11 countries for student questionnaires). These results provide preliminary support that Differentiated Instruction may be a universal concept recognized in diverse international contexts. Thus, comparing Differentiated Instruction across different national contexts is possible to a certain degree.

Research question 2

The second research question aims to compare Differentiated Instruction practices, as observed by observers and students, between the Dutch secondary education and other participating countries. The question is:

Are teachers in the Netherlands better at executing Differentiated Instruction in their classroom teaching compared to their colleagues in other countries?

Regarding the **observation instrument**, results show that, in general, Differentiated Instruction practices in Dutch secondary school classrooms were observed to be lower compared to Spanish, Mongolian, English, South African, and South Korean classrooms. On the other hand, Differentiated Instruction practices in Dutch classrooms were observed more frequently compared to American and Indonesian classrooms. Generally, Differentiated Instruction practices were observed most frequently in English classrooms, followed by South Korean, Mongolian, South African, Spanish, Indonesian, and American classrooms respectively.

With respect to the **student questionnaire**, results show that Differentiated Instruction practices in Dutch secondary school classrooms were perceived to be lower compared to South African, Mongolian, Maltese, Turkish, Spanish, Chinese, South Korean, and Brazilian classrooms. The level of teachers' Differentiated Instruction was reported highest by students in Brazil, followed by South Korea, China, Türkiye, Malta, Spain, Mongolia, South Africa, and the Netherlands, respectively. Compared to the other seven countries, the sample sizes in Brazil and Malta were very small. For this reason, caution should be taken when interpreting results of Brazilian and Maltese data. Additionally, in Brazil, the sample was highly dominated by students from private schools, which may explain the relatively high ratings.

Joint results derived from both observations and student surveys, have a general tendency for Differentiated Instruction in Dutch secondary schools to be relatively low compared to the majority of that of teachers in other participating countries. This result might be due to the relative lower level of teaching experience of the teachers in the Dutch sample.

Building upon previous research in the Netherlands using a sample of novice teachers showing that Differentiated Instruction appears to be one of the most difficult teaching behaviors displayed by teachers (Van de Grift et al., 2014; Maulana et al., 2015), a sub-aim of the second research question was to investigate whether this finding can be replicated when more experienced teachers are included in the Dutch sample, and whether this tendency is also visible in other participating countries. The sub-research question is:

Do teachers in other countries experience Differentiated Instruction in teaching as one of the most difficult teaching behaviors to execute?

To answer this question, scores from the domain of Differentiated Instruction were compared with other domains of effective teaching behavior including Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies. The comparison between Differentiated Instruction and the other five domains of effective teaching behavior requires the 6-factor structure of effective teaching behavior to be confirmed.

For the **observation instrument**, results indicate that the 6-factor structure was confirmed in six of ten countries. The six countries include: *the Netherlands, Indonesia, South Africa, South Korea, Pakistan, and the UK*. In Mongolia, Spain, Hong Kong – China, and the USA, the acceptable 6-factor structure was established after deleting several items and exercising relatively large model modifications. These four countries were therefore excluded from further comparisons. Compared to the other five domains of effective teaching behavior, Differentiated Instruction was observed to be the lowest (most complex) in the Netherlands, Indonesia, South Africa, and South Korea. In Pakistan, Differentiated Instruction was observed as the second lowest, after Teaching Learning Strategies. In contrast, Differentiated Instruction was observed to be the highest (least complex) in the UK.

For the **student questionnaires**, results show that the 6-factor structure (for the full set of the MTQ items) was confirmed in five out of eleven countries. The five countries include *South*

Korea, Mongolia, Türkiye, China, and Malta. This means that the factor structure of the six domains of effective teaching behavior, based on student perceptions, was confirmed in these five countries. For the other country data including that of *the Netherlands, Spain, South Africa, Brazil, the UK*, and *Indonesia*, adequate model fit was reached after deleting one or more items. The most problematic item is item 10 ("My teacher explains how I need to do things"), which caused a poor model fit in six sets of country data. After deleting item 10, the model fit in *the Netherlands and Brazil* was acceptable, but not in Spain, South Africa, the UK, and Indonesia. The decision was made to exclude item 10 so that the Netherlands and Brazil could be included in the country list for comparison. In the Netherlands, Teaching Learning Strategies was perceived to be the lowest, followed by Differentiated Instruction, Activating Teaching, Clarity of Instruction, Learning Climate, and Classroom Management, respectively. This implies that Differentiated Instruction seemed to be the second most difficult teaching behavior for Dutch teachers to display in their classroom practices, as perceived by their students. This trend is also similar for Brazil and Malta, in which Differentiated Instruction was perceived as the second lowest after Teaching Learning Strategies. In Türkiye, Differentiated Instruction was perceived as the third lowest after Teaching Learning Strategies and Activating Teaching. In contrast, in South Korea and Mongolia, Differentiated Instruction was perceived as the third highest after Learning Climate and Classroom Management. In China, Differentiated Instruction was perceived to be the highest.

Overall, relatively inconsistent results between observation and student survey outcomes regarding the difficulty level of Differentiated Instruction, as compared to other five domains, are visible. Based on the observation data, Differentiated Instruction seemed to be the most difficult in the Netherlands, Indonesia, South Africa, and South Korea, but not in Pakistan and the UK. Based on the student survey, Differentiated Instruction was not perceived as the most difficult teaching behavior in any of the countries included, although in the Netherlands, Brazil, and Malta Differentiated Instruction appeared to be perceived as second less frequent behavior exercised by teachers, after Teaching Learning Strategies.

Previous studies using Dutch novice teacher samples also show that Dutch novice teachers' level of Differentiated Instruction was relatively low (Van de Grift et al., 2014; Maulana et al., 2015). It was unclear whether this trend is similar for more experienced teachers in the Netherlands (country-specific) and in the other participating countries (more universal). The sub-research question is:

Are novice teachers in other countries less able to execute Differentiated Instruction in their teaching compared to experienced teachers?

This research question concerns the role of teaching experience, divided into inexperienced and more experienced groups, to explain differences in Differentiated Instruction across the diverse national contexts.

For the **observation instrument**, it was found that experienced teachers in *the Netherlands, South Korea*, and *Mongolia,* displayed higher levels of Differentiated Instruction compared to novice teachers. In contrast, experienced teachers in *Indonesia* and *Pakistan* showed lower levels of Differentiated Instruction compared to novice teachers. In the Netherlands and Pakistan, there more novice teachers were included in the data than experienced teachers. In contrast, less novice teachers were included in South Korea, Mongolia, and Indonesia than experienced teachers. This sample imbalance may explain the results to a certain extent. Data on teaching experience was not available in student questionnaire so whether or not differences can be found in Differentiated Instruction between experienced and novice teachers as perceived by students is unclear.

To conclude, there is a general indication that Differentiated Instruction practices may differ depending on teachers' teaching experience and national contexts. In the Netherlands, South Korea, and Mongolia, teaching experience seems to matter for Differentiated Instruction practices in the classroom, which supports the importance of gaining experience for higher quality of instructions. In Indonesia and Pakistan, on the other hand, less experienced teachers may have gained more benefits from having had more recent teacher training, in which classroom differentiation practices are part of their professionalization program.

Research question 3

The third research question concerns the examination of several background variables in explaining differences in Differentiated Instruction across the national contexts. The research question is:

Which personal and contextual factors explain differences between countries in differentiation in teaching?

For the **observation instrument**, the influence of teacher gender, teaching experience, school subject (subject taught), class size, and other five domains of teaching behavior were analyzed with regard to Differentiated Instruction. In general, teacher gender was related to

Differentiated Instruction in Mongolia only, in favor of female teachers. Teaching experience was significantly related to Differentiated Instruction in more countries, although its effect was rather small, and strongest in the Netherlands and Spain. In both countries, Differentiated Instruction was observed to be higher for novices compared to experienced teachers. This finding might be affected by the sample characteristics in these two countries. In the Dutch sample, the average teachers' teaching experience was three years (there was a significantly higher proportion of novice teachers). In the Spanish sample, the average teachers' teaching experience was twenty-one years (there was a significantly higher proportion of experienced teachers). Regardless of these sample differences, it is interesting to find that inexperienced teachers in these two countries showed moderately higher levels of Differentiated Instruction practices. One additional possible explanation may be that Dutch inexperienced teachers received induction support for novice teachers in their schools, which included support for Differentiated Instruction practices (as well as other effective teaching behaviors) as part of their professional development plan (Helms-Lorenz et al., 2019). Similarly, younger teachers in Spain tend to be better trained in their initial education and professionalization to address students' needs (Fernández-García et al., 2019). In Pakistan, the Netherlands and South Korea, a small negative effect of class size on Differentiated Instruction was found in favor of smaller classes. In the Netherlands, alfa and beta subjects were found to be related to better Differentiated Instruction practices compared to gamma subjects. Differentiated Instruction was related to other five domains of teaching behavior more strongly than other background variables. Particularly, Activating Teaching and Teaching Learning Strategies are significant and stable predictors of Differentiated Instruction.

For the **student questionnaire**, the variables student gender, subject taught, and school denomination were included as contextual factors and scrutinized with regard to Differentiated Instruction. School type data were available in Indonesia only. Thus, this variable was examined in this country only. Furthermore, teachers' teaching behavior including Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies were included as teachers' personal factor to the model. In The Netherlands, Mongolia, Spain, China, and to a smaller degree in Türkiye, student gender can explain differences in their perceptions of teachers' Differentiated Instruction. In the Netherlands and China, girls reported lower levels of perceived Differentiated Instruction compared to boys. On the contrary, girls reported higher levels of perceived Differentiated Instruction in Mongolia, Türkiye, and Spain.

School denomination could explain differences in perceived Differentiated Instruction in Indonesia and South Korea. In both countries, generally, Differentiated Instruction was reported to be higher in private schools compared to public schools. Subject taught could explain differences in Differentiated Instruction in the Netherlands, Mongolia, and Spain. In these three countries, results show that students reported lower levels of Differentiated Instruction in science classrooms compared to non-science classrooms. In general, student perceptions of Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies could predict their perception of Differentiated Instruction. The effects of these five domains are stronger than those of other personal and contextual factors. In all countries with the exception of the UK, the five domains of teaching behavior appeared to have a significant unique effect on Differentiated Instruction. In the UK, the effect of Learning Climate, Classroom Management, and Clarity of Instruction on Differentiated Instruction seems to be embedded in that of Activating Teaching and Teaching Learning Strategies. In all countries, generally, perceived Activating Teaching and Teaching Learning Strategies are the two strongest predictors of perceived Differentiated Instruction.

Overall, the relationships between Differentiated Instruction and the five domains of effective teaching behavior are stronger compared to the relationships between other personal and contextual characteristics, and these results are consistent across countries in both observations and student measures. Apart from the communalities across countries, some countries reveal specific (opposing) influences of personal and contextual factors on Differentiated Instruction.

Research question 4

The fourth research question aims to examine changes in Differentiated Instruction over time across the diverse national contexts. Initially, it was planned for all measurement moments of the participating countries to be at the same intervals. However, due to context and practical constraints, collecting longitudinal data with the same intervals across the participating countries proved to be highly difficult, if not impossible. Due to this design, comparisons regarding changes in Differentiated Instruction over time across countries should be made with caution. Nevertheless, the results can provide general information regarding the in/stability of Differentiated Instruction practices over time across countries, regardless of the time intervals. The research question is:

How does Differentiated Instruction in teaching develop over time between countries?

For the **observation instrument**, in general, changes in Differentiated Instruction practices across the diverse national contexts were visible. Differences in the pattern of change over time in countries were evident. For Pakistan, South Africa, and the USA, only two measurement moments were available, which allowed an examination of a linear trend of change only. In Pakistan and South Africa, the change of Differentiated Instruction practices showed a linear increase, which indicated that the teachers in these two countries showed positive improvement in their Differentiated Instruction practices. In the USA however, the time effect was not significant, indicating no significant change in Differentiated Instruction practices over time. In the Netherlands and Mongolia, the change in teachers' Differentiated Instruction practices showed a curvilinear (quadratic), inverted U-shaped like, pattern. The inverted U-shaped pattern in Mongolia was steeper compared to that of the Netherlands. In Indonesia, the change in Differentiated Instruction practices is best represented by a curvilinear (quadratic), U-shaped pattern. In UK, the change in Differentiated Instruction followed a curvilinear (cubic) trend. In general, teachers who started off lower in Differentiated Instruction practices during the first measurements showed steeper increases over time compared to those who started off higher at the end of the measurements, and vice versa. This trend is consistent in all countries except for the UK and the USA. In UK, teachers who started off lower in differentiated practices at the first measurement showed a lower increase over time compared to those who started off higher at the end of the measurement, and vice versa.

For the **student questionnaire**, student perceptions of Differentiated Instruction in the three countries changed in a linear fashion over time. In the Netherlands and South Africa, perceived Differentiated Instruction increased over time. In contrast, perceived Differentiated Instruction in Indonesia declined over time. In the three countries, teachers who were perceived lower in Differentiated Instruction in the beginning showed a steeper change of perceived Differentiated Instruction over time, and vice versa.

In sum, teachers' Differentiated Instruction practices change over time, regardless of the number of measurement moments, time intervals, and informants (observers vs. students). This confirms that Differentiated Instruction is a dynamic characteristic and is subject to changes over time. Some differences between countries in change, direction, and strength of change over time are visible, suggesting that teachers' Differentiated Instruction practices fluctuate over time.

Research question 5

This research question concerns the role of several background variables in explaining differences in general levels and growth in Differentiated Instruction over time across the diverse national contexts.

For observation, seven country data were included: the Netherlands, Indonesia, South Africa, Mongolia, Pakistan, the UK, and the USA. For student surveys, three countries were included: the Netherlands, Indonesia, and South Africa. The research question is:

Which personal and contextual factors explain differences and growth in Differentiated Instruction in teaching between countries?

For the **observation instrument**, teacher gender appeared to be a significant factor for Differentiated Instruction in the Netherlands and Mongolia. In the Netherlands, female teachers showed a steeper increase in Differentiated Instruction over time compared to male teachers. In Mongolia, female teachers showed generally higher levels of Differentiated Instruction compared to male teachers (no differences in growth over time). Teaching experience appeared to be a significant predictor of Differentiated Instruction in the Netherlands, Mongolia, Pakistan, and the UK. In the Netherlands and Mongolia, experienced teachers generally displayed higher levels of Differentiated Instruction compared to novice teachers (no differences in growth over time). In Pakistan and the UK, experienced teachers showed steeper growth in Differentiated Instruction over time. Subject taught showed a significant effect on Differentiated Instruction in the Netherlands and Pakistan, showing that the levels of Differentiated Instruction were higher in science classrooms compared to non-science classrooms.

For the **student questionnaire**, some personal and contextual variables could explain differences in the growth of Differentiated Instruction over time. In the Netherlands, girls perceived the quality level of teachers' Differentiated Interaction lower, but the change in their perceptions was steeper over time compared to that of boys. School type also has a significant effect on perceived Differentiated Instruction in the Netherlands in favor of vocational schools. Subject taught also has significant effect on Differentiated Instruction in favor of non-science teachers. In Indonesia, perceived Differentiated Instruction in private schools developed faster over time compared to public schools. In all three countries, perceived Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies are significant and strong predictors of Differentiated

Instruction. Higher levels of Differentiated Instruction are associated with higher levels of the five effective teaching behavior domains.

In conclusion, results from observation generally show that teacher gender favors female teachers; teaching experience favors experienced teachers; and subject taught is in favor of science teachers to explain differences, and in some countries also the growth over time. For the student questionnaire, student gender favors girls (in the Netherlands); school type favors vocational schools (in the Netherlands), and subject taught is in favor of non-science teachers (in the Netherlands). School denomination favors private schools (in Indonesia). This seems to suggest that effects of personal and background variables depend, to some extent, on the national context.

Research question 6

This research question concerns the longitudinal relationship between Differentiated Instruction and student academic engagement across the diverse national contexts. Furthermore, it also aims to examine differences in the relationship between Differentiated Instruction and student engagement, and background factors that may explain the differences across national contexts. The research question and sub-questions are:

What is the impact of (changes in) Differentiated Instruction in teaching on students' academic engagement?
Are there any differences regarding the impact of Differentiated Instruction in teaching between countries?
If so, which factors explain these differences?

To answer these research questions, longitudinal observation data from seven countries were included for analyses, including that of the Netherlands, Indonesia, South Africa, Mongolia, Pakistan, the UK, and the USA. Teacher gender, teaching experience, and subject taught were included as background variables. Furthermore, longitudinal student data from three countries were also included, covering the Netherlands, South Africa, and Indonesia.

For **the observation instrument**, for all seven countries, there is evidence that Differentiated Instruction is strongly and positively related to student academic engagement over time. The main effect of Differentiated Instruction on student engagement remains significant even after controlling for several background variables including teacher gender, teaching experience, and subject taught. In general, higher levels of Differentiated Instruction are related to higher levels of student engagement in the seven countries over time. However, some differences across countries were evident. In Indonesia, Pakistan, and the USA, no significant interaction effect between measurement moment and Differentiated Instruction was found. This suggests that in these three countries, the relationship between Differentiated Instruction and student engagement remains stable over time. The positive main effect of Differentiated Instruction on student engagement indicates that higher levels of Differentiated Instruction correspond to a higher level of student engagement, and vice versa. In the Netherlands, South Africa, Mongolia, and the UK, an interaction effect between time and Differentiated Instruction was found. In the Netherlands and South Africa, there is an indication that the effect of Differentiated Instruction on student engagement becomes weaker over time (negative relation between time and Differentiated Instruction on engagement). In Mongolia and the UK, the effect of Differentiated Instruction on student engagement increases over time (positive relation between time and Differentiated Instruction on engagement).

In the Netherlands, particularly, subject taught interacted together with time and Differentiated Instruction in explaining differences in student engagement. This is an indication that the effect of time and Differentiated Instruction on student engagement is more pronounced in non-science classrooms compared to science classrooms.

For the **student questionnaire**, evidence shows that perceived Differentiated Instruction was strongly and positively related to perceived behavioral and emotional engagement over time across countries (the Netherlands, Indonesia, and South Africa). The higher students perceived the quality of their teachers' Differentiated Instruction, the higher the reported behavioral and emotional engagement, and vice versa. In Indonesia, a stronger link between perceived Differentiated Instruction and student behavioral engagement was more pronounced in private schools compared to public schools over time. In South Africa, a stronger link between perceived Differentiated Instruction and student behavioral engagement was more salient for girls than for boys over time.

In the Netherlands, the link between perceived Differentiated Instruction and student emotional engagement gets stronger over time. In Indonesia, a stronger link between perceived Differentiated Instruction and student emotional engagement is found in private schools compared to public schools. In South Africa, the longer the time, the stronger the link between perceived Differentiated Instruction on student engagement and this trend is more pronounced for girls than for boys.

To conclude, results from observations and student questionnaires indicate that (perceptions of) Differentiated Instruction is a strong and positive correlate of (perceived) student engagement. These results are consistent across the diverse national contexts. For observations, the effect of Differentiated Instruction on student engagement depends on the time factor in some countries such as the Netherlands, Mongolia, South Africa, and the UK, with opposite directions depending on the countries (negative in the Netherlands and South Africa, positive in Mongolia and the UK). Personal background such as subject taught seems to play a role in explaining differences in the relation between Differentiated Instruction and student engagement, but this trend seems to be visible in the Netherlands only. For student perceptions, time, and some background variables such as school denomination (in Indonesia), student gender (in South Africa) play a role in explaining differences in the relation between Differentiated Instruction and student engagement.

8.2 Conceptual model

The validated model of the relationship between differentiation, other teaching behaviors, personal and contextual factors, and student engagement across countries is modelled in Figure 8.1.

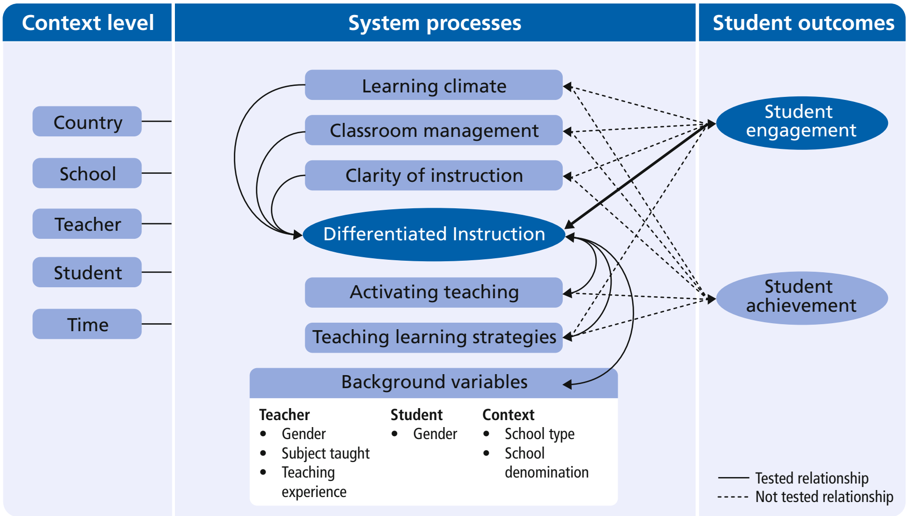

Figure 8.1 The validated model of the relationship between differentiation, other teaching behaviors, personal and contextual factors, and student engagement across countries

8.3 Recommendations

During the project period from November 2015 to March 2022, answers to research questions were provided, and multiple discussions with local (micro consortium) and international partners (macro consortium) were conducted. All these project outputs provide means for project recommendations as will be discussed below.

Recommendation 1: Refinement of the instruments to measure Differentiated Instruction more comprehensively

Although evidence was found that both instruments used in the project, both the observation instrument and the student questionnaire, were valid and reliable for use in the participating countries, and to a large extent both instruments can be used to measure and compare Differentiated Instruction (from observer and student perspectives), some novel findings were revealed during the project. Results from the literature review study indicated that Differentiated Instruction covers *the adaptation of content, process, product, learning environments or learning time* (Smale-Jacobse et al., 2019). When reviewing both instruments, it was found that the instruments only include some of the Differentiated Instruction components. For example, indicators for measuring Differentiated Instruction related to learning environments are missing. Furthermore, only limited main indicators (four items each in observation and student questionnaire are in the current measures. Although the current measures touch on most aspects of Differentiated Instruction in an efficient and practical way, which was the main intention during the creation of the instruments, both instruments are limited with regard to a comprehensive view of Differentiated Instruction. Furthermore, during the observation training in the participating countries, it was found that Differentiated Instruction indicators (i.e., high inference indicators) were recognized by trainees (e.g., master, or experienced teachers). However, some of the sub-indicators (i.e., low inference indicators, examples of good practices), were viewed as not applicable by some teachers in certain participating countries. Because the instrument was developed in the Dutch context, the low inference indicators are highly applicable to the Dutch context in the period in which the instrument was developed, and for other contexts sharing similar classroom teaching characteristics.

To summarize, a refinement and broadening of the scope of the existing instruments for measuring Differentiated Instruction is recommended. The refinement should aim to add more relevant indicators to the high and low inference levels, by considering generic and specific context relevance. This means that adding more generic dimensions and indicators may likely improve cross-national comparisons in Differentiated Instruction, while adding more specific dimensions and indicators pertaining to specific countries separately may likely improve the usefulness of the measures for tapping into important components of Differentiated Instruction that are unique and applicable to specific contexts or countries only.

Recommendation 2: Etic and emic studies in Differentiated Instruction

Following Recommendation 1, understanding about Differentiated Instruction practices and their importance for student outcomes more comprehensively across diverse national contexts requires more in-depth studies involving etic and emic aspects of cultural contexts shaping Differentiated Instruction philosophies and practices. This project provides macro-level insights regarding the promises and the challenges of comparing Differentiated Instruction across diverse national contexts. The instruments can be used to compare Differentiated Instruction in most participating national contexts. A few participating countries could not be included in the comparison due to indications that the interpretations of the indicators in measures were not largely similar in some countries. To improve the comparison across national contexts and to understand specific and unique aspects of Differentiated Instruction in particular national educational ecologies more comprehensively, including etic and emic studies in Differentiated Instruction, either separately or in combination, is recommended.

Recommendation 3: Improving equity within education by adapting Differentiated Instruction to relevant background and context variables

The project showed that some teacher, student and contextual factors such as teacher gender, student gender, teaching experience, subject taught, class size, and school type can explain differences, and to a limited extent the growth, in Differentiated Instruction skills. However, the effect of these variables is relatively small and depends on the national context. In line with the literature showing that the effect of background variables on teaching effectiveness is generally small, it does not mean that it is not important. Because there are many factors that can influence teaching effectiveness, the significance of background variables cannot be ignored, and differences related to background variables are indicators of educational inequity issues. In contemporary education, differences in the quality of teaching explained by any background variables are important issues to tackle to promote just and equitable education. It is therefore recommended that future studies should include these variables in studying Differentiated Instruction, but also including other potential factors that can explain differences in Differentiated Instruction. Some examples of potential factors may include, but are not limited to, school climate factors such as leadership support, classroom environment characteristics (physical and psychosocial), beliefs and values connected to teaching practices, and knowledge about differentiation. One of the project's limitations is that student SES and achievement, level background could not be included due to practical challenges in collecting these variables in all countries. It is recommended that a link to equity be made in the future to examine whether Differentiated Instruction is related to a higher level of equity (possibly by using student engagement as a proxy for equity).

Recommendation 4: Increasing sample size to improve power and accuracy of findings

Although the project cumulatively includes a very large sample size, the segregate of sample size per national context is relatively modest, except for the Dutch and Korean samples. Consequently, findings derived from this project cannot be generalized to country levels. Instead, findings should be viewed as a first indication of similarities and differences in Differentiated Instruction across diverse national contexts that need to be further validated in future projects or research. To allow for comparisons across country levels, it is recommended for more data to be collected and added until representative samples are reached to allow more valid inferences at country levels.

Recommendation 5: More attention needed for teachers' struggles

The findings of this project revealed that Differentiated Instruction was observed as the least frequent behavior displayed by teachers compared to other effective teaching behavior domains such as Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies. In addition, the quality level of Differentiated Instruction is relatively low. This finding is consistent across participating countries. Differentiation has been acknowledged in the international policy agenda, and yet in practice most teachers in diverse national contexts seem to struggle in implementing it in their classrooms. More attention to Differentiated Instruction is recommended by documenting reasons for why teachers struggle and finding effective ways to support teachers to implement Differentiated Instruction more frequently so that it can be strongly integrated in their classroom teaching repertoires.

Recommendation 6: Monitoring and supporting Differentiated Instruction Practices over time

Findings of the project revealed that Differentiated Instruction practices changed over time. This trend is generally consistent across the participating countries. This suggests that Differentiated Instruction tends to fluctuate over time. The ebbs and flows of Differentiated Instruction, coupled with the findings that teachers' Differentiated Instruction across the diverse national contexts is still at a low level, implies that systematic, structural, and longitudinal monitoring of Differentiated Instruction practices is recommended. The ebbs and flows were found within the school year as well as between school years. Presumably, within-year classroom practice repertoires are nested within between-year repertoires. It is therefore recommended that monitoring should at least be done at the within-school level at certain periods such as at the beginning, in the middle, and at the end of the school year. Determining the critical point of changes in Differentiated Instruction is important to prevent declines over time. Monitoring should be coupled with teacher support. At least three observations per measurement point in time compensates for observation biases (Van der Lans, 2017).

Recommendation 7: Teaching experience matters, in general more support is needed for inexperienced teachers

The project findings revealed that the general quality level of Differentiated Instruction across the participating national contexts is relatively low. Furthermore, teaching experience matters in explaining differences, and to some extent the growth, in Differentiated Instruction in most participating countries, in favor of experienced teachers. to the creation of a support system for improving Differentiated Instruction practices for all ranges of teaching experience is recommended, but special attention should go to inexperienced teachers. This can be done, for example, by integrating Differentiated Instruction in induction programs for novice teachers. For experienced teachers, it is seemingly necessary to update their knowledge and contemporary competences related to Differentiated Instruction regularly and integrate this in the professional development program for more experienced teachers.

Recommendation 8: Professional development in Differentiated Instruction in schools globally

In contemporary education, expectations of teachers are growing. Related to Recommendation 7, it is seemingly necessary to equip future teachers with sufficient relevant knowledge and understanding of Differentiated Instruction, and to some extent to prepare them with general skills to implement some strategies and practical guidance for Differentiated Instruction. Because Differentiated Instruction appears to be one of the most difficult skills to implement even for experienced teachers internationally, finding the right proportion for integrating Differentiated Instruction in the Initial Teacher Education (ITE) curriculum is recommended. ITE can integrate Differentiated Instruction as a separate course or as part of courses to which Differentiation is related and can be integrated. Furthermore, the creation of a feedback and training system may also boost Differentiated Instruction skills (see Helms-Lorenz & Visscher (2021) for training the most complex domains as initiated by the

University of Twente Group, and video graphing developed by Keppens et al. of the University of Ghent as promising approaches). This recommendation is in line with the international policy recommendation that responsive teacher education should integrate differentiation into the curriculum and treat it as an important asset, make room for action and reflection, and integrate relevant technologies for supporting innovation in differentiation practices (OECD working paper, 2019).

Recommendation 9: Differentiated Instruction as an approach to improve student engagement

The project findings revealed that Differentiated Instruction is strongly related to student engagement even after controlling for the tested personal and contextual factors in all participating national contexts. Student engagement is a global issue as documented in literature. Student engagement and motivation are a particularly bigger challenge in secondary education as these tend to decline across the secondary education period. The strong link between Differentiated Instruction and student engagement suggests that problems with low levels of student engagement can be solved, at least to certain extent, by exercising higher levels of Differentiated Instruction. Furthermore, there is also an indication that the decline in student engagement over time can be mitigated by high quality Differentiated Instruction. It is therefore recommended to include Differentiated Instruction in studies on engagement and in teacher professionalization programs to achieve increased academic engagement throughout the secondary education period.

Recommendation 10: International network to support and deepen our knowledge regarding Differentiated Instruction and knowledge dissemination

During the project duration from 2015 to 2021, the University of Groningen team established a solid international consortium by working together on Differentiated Instruction research. It was evident during our cooperation, manifested in various planned activities such as the observation training, national and international seminars, project meetings, visiting scholars, and incidental attendance of international conferences that all international partners enjoy cooperating on this topic very much. It was agreed that an international network will be established as a result of this project, so that our vision to contribute to the promotion of just and fair educational societies can be facilitated. For this purpose, our university has been cooperating with other universities to identify best practices in Differentiated Instruction. For education, this has been implemented in our plans which include the participation in Teacher Education Network of ENLIGHT (https://enlight-eu.org/) and in the working groups for co-creating teacher education programs with national and international partners (e.g., Master of International Teacher Education), in which Differentiated Instruction has focal attention.

8.4 Implications

8.4.1 Scientific implications

The outcomes of this project have several scientific implications.

Implication 1: Measurement for research

The project has implications for the educational measurement field. Categorical Confirmatory Factor Analysis (CFA) and Categorical Multi-Group Confirmatory Factor Analysis (MGCFA) proved useful for testing the factor structure of Differentiated Instruction and its correlates in diverse national contexts, and for identifying strong, weak, and problematic indicators of Differentiated Instruction in multiple as well as in specific national contexts. This implies that refinements and improvements of the instruments for measuring Differentiated Instruction more accurately and comprehensively for both general comparison (e.g., between countries) and specific local purposes (e.g., within a certain context) are promising.

Implication 2: Personal and social context of education

It was found that certain personal (e.g., gender, teaching experience, subject taught) and contextual characteristics (school type, school denomination) could explain similarities and differences depending on the national contexts. This implies that certain personal and contextual background variables matter for Differentiated Instruction, depending on the national/cultural contexts, which confirmed that teaching and learning do not happen in isolation, but interact in concert together with personal and social contexts where teaching and learning occurs.

Implication 3: Time matters for Differentiated Instruction

Differentiated Instruction practices change over time, and this trend is generally consistent across the diverse national contexts. This has implications on the conceptualization of Differentiated Instruction as a dynamic and malleable construct in educational contexts. Treating Differentiated Instruction as a static construct can be misleading in correlational research; it has ebbs and flows over time. This implies that longitudinal measurement is more preferred for studying Differentiated Instruction and its relations with various correlates (e.g., other effective teaching domains) and outcomes (e.g., engagement, motivation, well-being, and achievement).

Implication 4: Economic value of Differentiated Instruction

The review study conducted for this project reveals that Differentiated Instruction has meaningful effects on student achievement. Furthermore, a strong relation between Differentiated Instruction and student engagement across countries was found in our empirical studies. However, Differentiated Instruction was generally observed less frequently in the daily practice of teachers in the participating national contexts. Because teaching quality is related positively to economic factors in every educational system, this implies that improvements of Differentiated Instruction in every national context should be a priority. More effective teachers are assumed to contribute more to the economic development of nations.

Implication 5: Difficulty level of Differentiated Instruction

Observation results indicated that Differentiated Instruction was generally observed less frequently across the participating national contexts in comparison to other effective teaching behavior domains. This implies that sequences of difficulty levels of effective teaching behavior domains seem to be evident across various national contexts, which has consequences for the contemporary conceptualizations of Differentiated Instruction, and effective teaching behavior, in terms of sequential difficulties. This can contribute to enriching learning theories and developmental psychology regarding the acquisition of pedagogic-didactic skills for learning teachers.

Implication 6: Cross-cultural studies on teaching quality

This project also has implications for the field of cross-cultural studies in teaching. In the diverse national contexts, some similarities and differences in Differentiated Instruction, the role of personal and contextual characteristics, and links with student engagement were found. It is expected that some generic and specific cultural factors may explain some of the differences found. However, cultural factors were not included and tested in the project. The findings of the project offer the opportunity to connect Differentiated Instruction and its correlates with cultural factors, linking the teacher effectiveness strand and the cross-cultural field together.

8.4.2 Practical implications

This project has several practical implications. Some are derived from the direct findings of the project as set out in research questions, other implications are generated from the project execution process.

Implication 1: Measurement for practice

The project provides evidence that both instruments, the observations and the MTQ, are generally reliable and valid for measuring Differentiated Instruction in the participating national contexts. This implies that schools in the participating national contexts, and in other contexts sharing similar characteristics with the participating countries, can use the instruments as diagnostic tools, providing means to facilitate improvements of Differentiated Instruction in the school.

Implication 2: Data provision for teaching quality improvement

Data derived from this project can be used to inform participating schools about the general quality level of Differentiated Instruction in their schools. This can help schools and educational practitioners to set up realistic goals for improvements of Differentiated Instruction continuously. The participating schools can also promote the instruments to other schools to extend the practical impact of this project to a broader scale. Furthermore, the participating countries can also promote the instruments to other national contexts and countries, offering further cooperation with other countries beyond this project.

Implication 3: Personal and contextual factors and Differentiated Instruction

Findings that several personal and contextual characteristics could explain differences in (perceptions of) Differentiated Instruction practices imply that schools and educational practitioners should be mindful with these characteristics. When planning professional development programs for improving teachers' Differentiated Instruction skills, it is recommended that grouping be made considering a more balance proportion of group characteristics (e.g., male vs. female, public vs. private school teachers, inexperienced vs. experienced teachers, science vs. non-science teachers). Differences in the Differentiated Instruction quality of these characteristics are an asset for stimulating critical and productive exchange of knowledge and skills between the group members.

Implication 4: Creating awareness regarding the dynamics of Differentiated Instruction

Differentiated Instruction practices tend to change over time. The ebbs and flows of Differentiated Instruction imply that teachers, schools and educational practitioners should be made aware of this dynamic characteristic. Supporting individual awareness of the dynamic characteristics of Differentiated Instruction may stimulate teachers to integrate Differentiated Instruction in daily teaching repertoires regularly.

Implication 5: Information for teacher education

During internships, student teachers could be matched up with a recently qualified teacher of the same school subject. This buddy system could help student teachers gain a realistic view of the curriculum and the induction activities organized by schools after certification particularly related to Differentiated Instruction practices.

During teacher education more emphasis on how adolescents learn and how to support their learning might foster Differentiated Instruction practices. Research should contribute to answering the question how student teachers can be prepared optimally; by focusing on handling classes of learners (creating a safe climate, classroom management and direct instructions, and activating teaching) or by focusing on individual learning processes (differentiated instruction and fostering learning strategies). Or a combination of both.

Implication 6: Information for teacher recruitment

Schools are recommended to integrate equity and diversity principles. These aims could be reached by implementing Differentiated Instruction into the educational framework and agenda. To ensure that schools employ teachers who have sufficient knowledge about and are skilled at Differentiated Instruction, schools could assess Differentiated Instruction in the recruitment process. This is only recommended in situations where no teacher shortages prevail.

Implication 7: Difficulty level of Differentiated Instruction

Differentiated Instruction was generally observed the least frequently in general teaching behavior of teachers in the participating countries. This implies that schools and professional development programs of teachers should not provide support for Differentiated Instruction in isolation, without considering other important domains of effective teaching behavior such as Learning Climate, Classroom Management, Clarity of Instruction, Activating Teaching, and Teaching Learning Strategies.

Implication 8: Cross-cultural expertise in Differentiated Instruction

In this project, all partners involved have a general background in education, educational psychology, cross-cultural psychology, educational leadership, or educational comparison. The educational background diversity of partners has certainly been a big asset. During the project, we were often confronted with many cultural issues at the practical as well as content level. Although we were generally able to resolve the issues, contributions of cross-cultural experts in the field will likely enrich the project.

8.4.3 Policy implications

This project is also relevant for educational policy at various levels.

General implications

Implication 1: School policy

Some scientific and practical implications derived from the project outcomes provide useful information for school policy. Between-teacher as well as between-school differences in quality of Differentiated Instruction, generally, exist in the participating countries. Efforts to improve Differentiation Instruction practices and to reduce differences in the quality of Differentiated Instruction between certain groups in terms of gender, teaching experience, teaching subject, and school type should be considered in the school policy agenda.

Implication 2: Regional policy

There is evidence that not only teachers differ in the quality of Differenced Instruction practices, but also differences between schools are visible across the participating national contexts. This implies that programs for improving Differentiated Instruction can also be considered at a regional level. In countries where decentralization of education is applied such as in the Netherlands, regional education bodies can formulate intervention programs for their regions, in cooperation with other regions and the national education bodies.

Implication 3: Country and international policy

Worldwide, the issue of diversity and equity in education has gained significant attention. Nevertheless, cross-national studies on differentiation, particularly on Differentiated Instruction, are scarce. OECD has included diversity and equity issues in their policy agenda and activities (e.g., the TALIS study). However, Differentiated Instruction has not yet been addressed specifically as one of their core themes. This project is among the first attempting to map Differentiated Instruction, and examine its stability over time, across the diverse national contexts. Many countries acknowledge that Differentiated Instruction is important. Findings revealed that the general quality level of Differentiated Instruction in the participating national contexts is still worrying. Furthermore, the level of Differentiated Instruction in the participating countries, generally, tends to fluctuate over time. This implies that future cooperation to support teachers achieve higher levels of Differentiated Instruction across countries is called for. Some countries, such as South Korea and Nicaragua have included Differentiated Instruction, together with the other effective domains of teaching behavior, in their national agenda at the initial teacher education and in-service professional development levels. Indonesia will follow. It is desirable to build an international network providing a systematic and structural support system for Differentiated Instruction. Within European regions, this could be implemented in programs like ENLIGHT. Extending the regional coverage to the world will likely contribute to reducing the disparity in educational quality and outcomes across the nations.

Specific implications

Differentiated Instruction practices changed over time, generally increase especially during the first year. For the Dutch context in which the sample was highly dominated by novice teachers, this can have some implications for teacher policy:

1. Permanent employment could be shifted to be considered after three years of temporary employment.
2. Induction arrangements should not allow novice teachers to be asked to do extra work but should allow for time to learn and develop, and to practice deliberately.
3. Support provided in the second and third year should be more deliberate and less "loose".
4. Professional development should be continuous and career-long, and for all staff. This professional culture change could motivate beginners to keep up their efforts to improve their teaching practice especially in Differentiated Instruction.

Knowing that Differentiated Instruction practices are generally subject to change over time implies that countries should invest more in continuous professional development (CPD) support to ensure and sustain Differentiated Instruction practices continuously.

General limitation: sample sizes

In some countries, some response categories could not be used, indicating that some samples might have been too limited. The absence of full response categories variations created problems for analysis techniques like CFA and MGCFA, preventing cross-context comparisons in Differentiated Instruction with full sets of response categories. This reduces the amount of information about the actual variations of Differentiated Instruction in practice. This implies that more samples from more diverse population, at least in certain countries, will need to be collected and added in the future. This can confirm whether or not the absence of variations in response categories is related to the homogeneity or heterogeneity of the samples.

Publications, dissemination, and valorization

The project has generated a number of scientific publications and practical dissemination and valorization. Through the below project website, a large number of researchers internationally have shown their interest in our project findings and indicated their interest to join the network. Website: https://www.rug.nl/gmw/lerarenopleiding/onderzoek/psychometrisch/

In South Korea, the project has been disseminated nationally. The Korean center for the study of Differentiated Instruction and effective teaching practices has been established. The link to this project is: http://icalt.kr.

To further disseminate the project results more globally, a prototype of a project interactive website is currently in development: https://getlin.web.rug.nl/

The Differentiated Instruction instruments are made available in different languages, including Dutch, English, Chinese Mandarin, Indonesian (Bahasa Indoensia), Mongolian, Norwegian, Korean, Spanish, and Turkish.

Other scientific publications and disseminations of this project are presented in the form of article publications and conference presentations.

2022

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This book reports findings based on a large scale project on differentiated instruction across various education systems documenting evidence of its measurement, differences, changes, and links with student engagement. We document empirical findings of differentiated instruction practices in secondary education across diverse countries/education systems, covering student, teacher, school, and education system/country levels. Classroom observations and student surveys, both collected in authentic classrooms are the core measures of inquiry used. Findings on similarities and differences in differentiated instruction practices, changes over time, links with student engagement, and the role of some personal and contextual factors, contribute to advance the knowledge base particularly in the field of teaching effectiveness, learning environments research, and differentiation in education. Findings are relevant for research, practice, and policy.

University of Groningen Press

ISBN 978-94-034-2957-1

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