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What it Takes to Learn

This chapter introduces the concepts of student engagement, drive and self-belief, without which students are unable to make the most of learning opportunities in school and won't be ready to translate their potential into high-level skills. The chapter discusses the economic and social dynamics shaping the need to prepare students for lifelong learning and describes the structure of the volume.

"Eighty percent of success is showing up." (Woody Allen)

PISA has traditionally measured success in terms of students' performance in mathematics, reading and science, with the objective of examining whether students are able to take on an active role in society and be productive citizens in the future. But it is only when students are physically present, and are mentally ready to learn, that they can make the most of the opportunities schools provide. Students need to be engaged, motivated, willing to learn new things and feel they can succeed (Christenson, Reschly and Wylie, 2012); without those dispositions, they will be unable to translate their raw potential into high-level skills, no matter how intelligent and gifted they are, no matter how much effort and professionalism teachers put into their jobs, and no matter how many resources countries devote to education. Unless you show up to play, you cannot win; unless you try, you cannot succeed.

Students' engagement with school, the belief that they can achieve at high levels, and their ability and willingness to do what it takes to reach their goals not only play a central role shaping students' ability to master academic subjects, they are also valuable attributes that will enable students to lead full lives, meeting challenges and making the most of available opportunities along the way (Schunk and Mullen, 2013). In order to effectively meet the economic, political and social demands for competencies much more is required of students and adults than just cognitive proficiency (Levin, 2012). Consequently, education systems should be evaluated in terms of their capacity to develop all aspects of human potential, ranging from subject-specific achievement to socio-emotional, psychological, ethical and behavioural aspects. This volume conceptualises and examines the multifaceted nature of success in education, which includes overall subject-specific student achievement, equity in the distribution of educational opportunities, and students' engagement with school, their drive and self-beliefs.

A COMPREHENSIVE APPROACH TO MEASURING EDUCATIONAL SUCCESS AMONG 15-YEAR-OLDS

The international financial crisis of 2008 pushed policy makers in the most affected countries to make an economic case for investing in education and other public policies aimed at developing human capital. Initiatives like PISA that enable countries to measure the results of the schooling they provide are useful in this context. PISA can help countries understand what works in education and to promote evidence based policy making, but can do so most effectively only if attention, on the part of policy makers, teachers, educators, parents and the students themselves, is devoted to the broad set of outcomes that are measured in PISA and only if the multifaceted nature of education success is fully appreciated and considered. Educational achievement is in fact only one of the factors that can help countries maximise the economic value of investments in education.

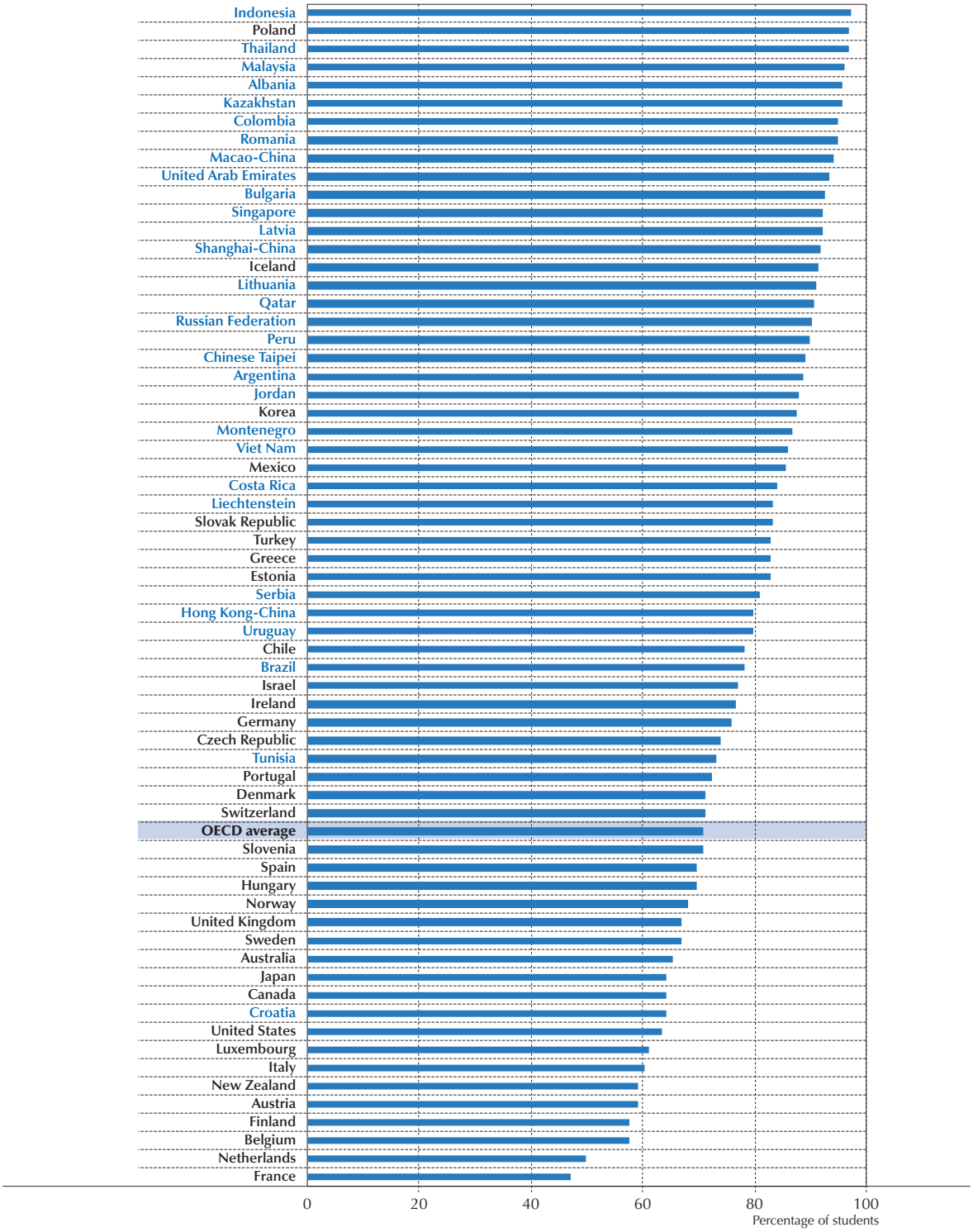
Longitudinal studies suggest that students' results on the PISA test, and tests like PISA, are highly correlated with how well students will do later on in life (OECD, 2010; OECD, 2012). Nevertheless, strong performance in standardised assessments explains only so much of how well students will do later in life (Stankov, 1999; Sternberg, 1995). Success and well-being in life also depend on a set of personal attributes that are only partially captured by test scores. Motivation, perseverance, community spirit and belief in oneself, for example, are also essential ingredients, though far more difficult to measure, particularly in an international context.

Most mathematics teachers in countries that participated in PISA 2012 believe that the social and emotional development of their students is as important as the acquisition of mathematics skills. School principals who responded to the PISA 2012 school background questionnaire were asked whether they agreed that mathematics teachers in their school consider the social and emotional development of students to be as important as students' mastery of mathematics skills and knowledge.[1] Figure III.1.1 illustrates the large variations across countries in the proportion of students who are in schools whose principal agrees or strongly agrees that there is a consensus that the social and emotional development of the students is as important as students' acquisition of mathematics skills and knowledge in mathematics classes.

On average, across OECD countries, 71% of students attend schools whose principals reported that teachers value the social and emotional development of their students as much as their students' academic proficiency. This percentage is especially high in Indonesia, Poland, Thailand, Malaysia, Albania and Kazakhstan, where 95% or more of students attend such schools. How can education systems best support teachers and school principals, but also families, in their efforts to promote the social and emotional development of students? This volume answers this question by examining the social and emotional factors that are associated with the broader outcomes of education.

▪ Figure III.1.1 ▪

Percentage of students who are in schools where there is a consensus on the importance of the social and emotional development of students



Note: The figure reflects the percentage of students who are in schools where the school principal agrees or strongly agrees that there is a consensus among mathematics teachers that the social and emotional development of students is as important as their acquisition of mathematical skills and knowledge in mathematics classes.

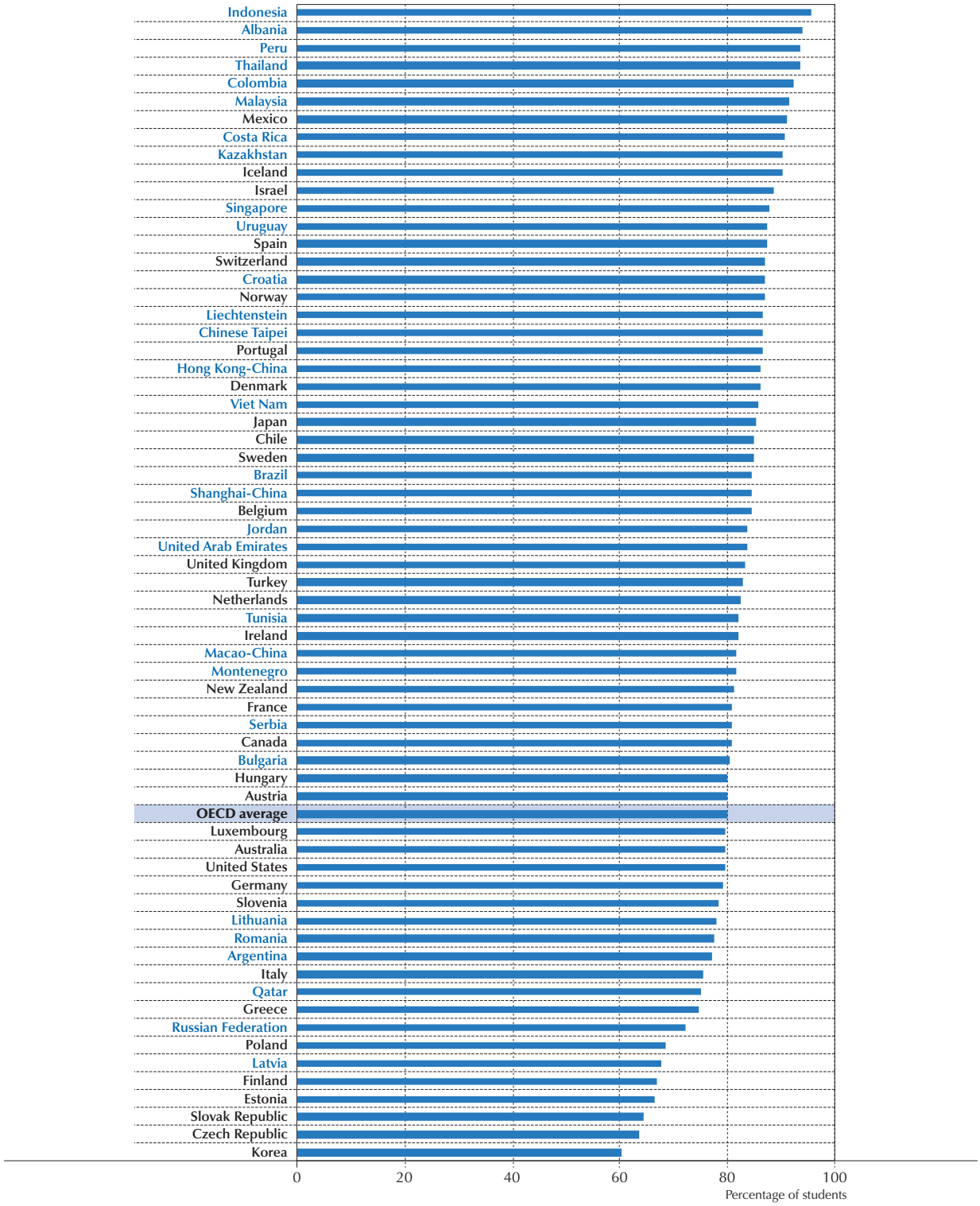
Countries and economies are ranked in descending order of the percentage of students who are in schools where there is a consensus on the importance of the social and emotional development of students.

Source: OECD, PISA 2012 Database, Table III.5.29.

StatLink http://dx.doi.org/10.1787/888932963787

▪ Figure III.1.2 ▪

Percentage of students who report being happy at school



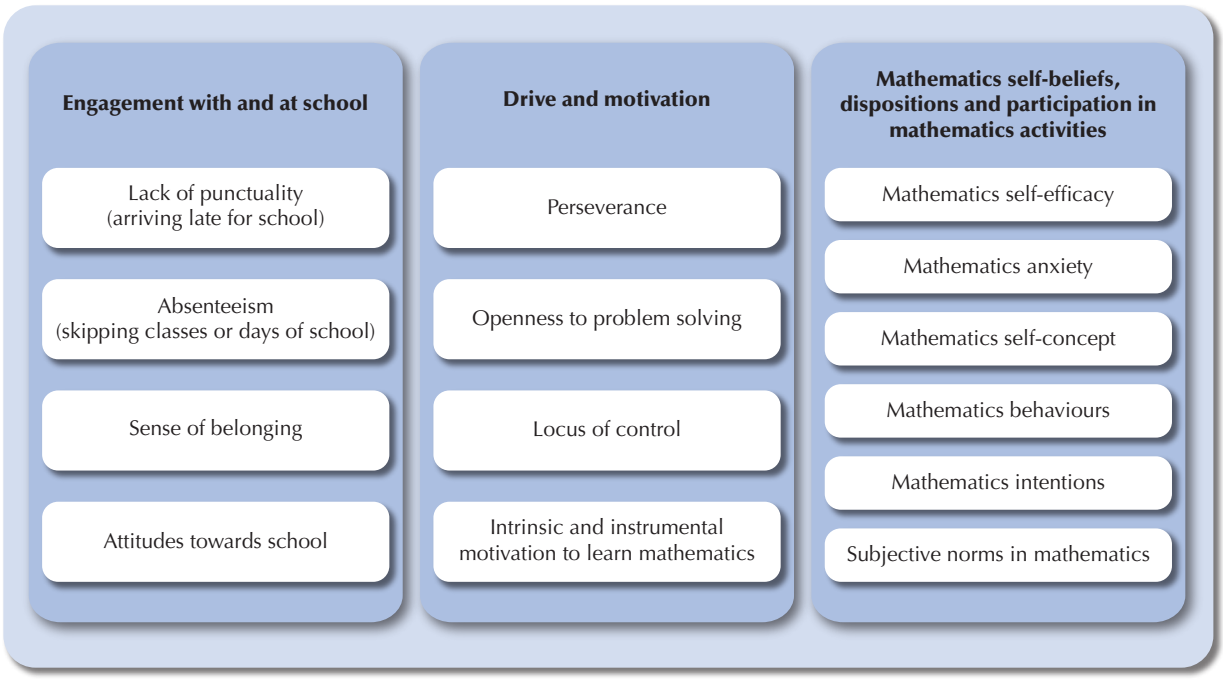
Note: The figure reflects the percentage of students who "agree" or "strongly agree" to the statement "I feel happy at school".
Countries and economies are ranked in descending order of the percentage of students who report being happy at school.
Source: OECD, PISA 2012 Database, Table III.2.3a.
StatLink http://dx.doi.org/10.1787/888932963787

For the first time, PISA 2012 asked students to evaluate their happiness at school. As schools are a, if not *the*, primary social environment for 15-year-olds, these subjective evaluations provide a good indication of whether education systems are able to foster or hinder overall student well-being. On average, students report feeling happy at school: across OECD countries 80% of students agree or strongly agree with the statement "I feel happy at school". The proportion of students who report being happy at school is highest in Indonesia, Albania and Peru and is lowest in Korea, the Czech Republic and the Slovak Republic (Figure III.1.2).

Students who participated in the 2012 PISA study were asked to report their level of engagement with and at school, their drive, and the beliefs they hold about themselves as mathematics learners, such as how capable they are in mathematics. Figure III.1.3 maps the range of outcomes that are analysed in this volume.

▪ Figure III.1.3 ▪

Students' engagement, drive and self-beliefs in PISA 2012



The outcomes analysed in this volume refer to the life and circumstances of those students who were enrolled in school in countries that participated in PISA in 2012. However, they can be considered proxies for these 15-year-olds' attitudes towards learning. They represent the foundation upon which students will be able to build their future and ground their ability to progress in their studies, in the labour market and in life. Although people can and do change over their lifetimes, by their teenage years they are likely to have formed a set of relatively stable dispositions and self-beliefs that will lead them to behave in consistent and predictable ways across a wide range of situations (Midgley, Feldlaufer and Eccles, 1989; Mischel, 1968; Thaler and Sustein, 2008; Bouchard and Loehlin, 2001; Canli, 2006; DeYoung et al., 2010).

Some may take the view that students' engagement with and at school, their drive and self-beliefs are highly influenced by inherent personality traits that cannot be influenced externally (see Plomin and Caspi, 1999). The evidence shows, however, that engagement with and at school, drive and self-beliefs are malleable and can be influenced by the circumstances individuals encounter and the opportunities that they are given (Guthrie, Wigfield, and You, 2012; Skinner and Pitzer, 2012) and PISA suggests that they vary considerably across countries. Terms such as perceived self-efficacy and learned helplessness stem from real psychological phenomena through which individuals gradually modify their perceptions of the world, of themselves, and of how they relate to others based on what they experience (Schunk and Pajares, 2009; Dweck and Master, 2009). Perhaps even more important, a growing body of evidence is emerging that suggests that educational interventions, particularly in early childhood, can change children's dispositions and self-beliefs in lasting ways (Heckman, Stixrud and Urzua, 2006; Heckman et al., 2010).

Most of the results presented in this volume are based on self-reported answers gathered from background questionnaires that students, school principals from the schools the students attended and, in some countries, the students' parents were asked to complete.[2] Therefore, although the aim is to capture behavioural differences and differences in how students approach learning in general, and mathematics in particular, the information that is available in PISA means that the volume captures a mixture of differences in students' behaviours, beliefs and attitudes, in students' understanding of what are considered desirable responses in this context, and in the willingness of students to act on such understanding by responding in ways that are deemed desirable. Moreover, a set of behaviours, beliefs and attitudes can be more or less appropriate depending on cultural contexts. In some countries, arriving late is a relatively common practice that is considered acceptable; in others, it is a sign of disrespect. In some countries, teenagers that express a high degree of interest in school subjects and spend considerable time studying are socially sanctioned by their peers; in others, such students command respect and are viewed as positive examples by other students (Ladd et al., 2012).

There are a number of conceptual and methodological challenges in mapping student engagement with and at school, their drive and the beliefs they hold about themselves as mathematics learners, particularly in an international context, and in assessing the role that education systems, individual schools and families play in shaping students' social and emotional growth. There is, for example, no clear definition of, or consensus on, what education systems should strive to develop beyond subject-specific skills. In many instances, outcomes that are linked to students' social and emotional development are defined in terms of what they are not, rather than what they are. Terms such as "non-achievement outcomes", "other outcomes", and "non-cognitive skills" are used, often interchangeably, to identify some of the other results of education, more broadly defined (Forster, 2004). This volume measures a well-defined set of outcomes in three key areas: engagement with and at school, drive and motivation, and students' beliefs about themselves as mathematics learners. By focusing on specific and well-defined constructs, the volume advances the agenda of mapping the broader outcomes of education respecting the technical rigour that is at the core of the PISA initiative.

THE ECONOMIC AND SOCIAL DYNAMICS SHAPING THE NEED TO PREPARE STUDENTS FOR LIFELONG LEARNING

Rapid globalisation and modernisation are posing new challenges to individuals and societies alike. Increasingly diverse and interconnected populations, rapid technological change in the workplace and in everyday life, and the instantaneous availability of vast amounts of information are just a few of the factors contributing to these new demands. In this globalised world, people compete for jobs not just locally but internationally. With the integration of labour markets, workers in wealthier countries are competing directly with people with much the same skills in lower-wage countries. The competition among countries now revolves around the quality of their human capital and their ability to create the institutional structures and opportunities to effectively use the skills and talents of their populations.

The result of technological progress has been a reduction in the demand for people who are only capable of doing routine work, and an increase in the demand for people who are capable of doing knowledge-based work or manual work that cannot be automated. This leads to a greater polarisation of labour market opportunities, both within and across countries, with a greater proportion of people who will need to be educated as professionals.

This transformation of labour markets is profoundly reshaping the nature of workplaces. Individuals are no longer expected to passively consume information coming from well-defined sources and to use the knowledge they accumulated in the same way and context as when they developed it. Information is now produced by a multitude of conflicting sources, and knowledge needs to be integrated, critiqued, transformed and applied to novel situations. The knowledge workers of today are required to have *deep knowledge*, but the knowledge workers of tomorrow will need *deep and wide knowledge*: knowledge that can be moulded and shaped to fit a constantly changing world. The need for deep and wide knowledge means that education systems will have to give students a *forma mentis*, or mindset, that is open to absorbing and filtering new information and is able combine that information with acquired knowledge in innovative ways. More than ever, education systems need to help students learn how to learn: only if students have the capacity, motivation and enthusiasm to be lifelong learners will they be able to remain active and productive citizens throughout their lives (Christenson, Reschly and Wylie, 2012).

In order to meet the growing needs for deep knowledge, a key objective of education policies in most OECD and partner countries has been to promote and sustain increases in the educational attainment of successive generations. Education policy, together with major social, demographic and institutional shifts have all contributed to large increases in educational attainment over the past century in many countries around the world (OECD, 2013). However, a country's competitive advantage in the world economy of tomorrow will be based on its population's deep and wide knowledge,

and its ability to continue learning. Only education systems that will be able to develop the flexibility of thinking that this entails will be able to create and sustain a flexible workforce, one that will be highly adaptable to change, rather than be forced to match the demand with the supply of skills in times of crisis.

The importance of equipping students with the ability to be lifelong learners is compounded by demographic trends. Declining fertility and increasing life-expectancy worldwide mean that populations are ageing. Economic growth and stability will depend on the ability of workers to remain in the labour force and be productive for a longer period of time. Since the base of young, active workers will shrink in the coming years, it will be increasingly important for education systems to dismantle the barriers that prevent some of today's students from achieving their full potential tomorrow. For example, socio-economically disadvantaged boys too often drop out of formal education with few skills and, even more worryingly, little willingness or desire to develop them in the future (Finn and Zimmer, 2012). Education systems have also so far been unable to make sure that the large number of girls who have the ability to excel in mathematics are willing and given the opportunity to fully develop their potential to go on and pursue occupations in rapidly developing science, technology, engineering and mathematics (STEM) industries (Wang, Eccles and Kenny, 2013). Unless education systems develop and capitalise on the talent of each and every student, demographic changes mean that countries as a whole will likely suffer skills shortages in the future. Never before have equity of education opportunities and economic efficiency been so closely intertwined.

In this context, governments need to create education systems that are accessible to everyone, not just a favoured few; that are globally competitive in quality; that provide people from all classes a fair chance to get the right kind of education to succeed; and that achieve all this at a price that the country can afford. The aim is no longer just to provide a basic education for all, but to provide an education that will make it possible for everyone to become "knowledge workers". Even more ambitious, an education that will make it possible for everyone to develop a wide range of skills, including the curiosity, ability, perseverance and endurance to learn throughout their lives, the willingness to seek challenges and to rise to the occasion, to thrive and find pleasure in solving complex problems, the ability to see patterns in information that computers cannot see, to work with others productively, and to be able to both lead and be a good team member when necessary.

STRUCTURE OF THE VOLUME

Chapter two examines students' engagement with and at school. It examines whether students arrive late for school and whether they skip classes or days of school. The chapter then examines students' level of social connectedness and sense of belonging by exploring whether students feel happy and that they belong at school, whether they have friends or feel lonely and isolated. Finally, the chapter maps students' beliefs about the value of schooling and learning: whether, for example, students believe that school has given them the confidence to make decisions, has been a waste of time, or that trying hard at school will get them a good job later on. The chapter suggests that in some countries sizable proportions of students are at risk of not participating in and benefiting from school; for example socio-economically disadvantaged students are particularly likely to have low levels of engagement. The chapter also examines the relationship between engagement with and at school and student performance. Unless students have a basic level of engagement, such as being physically present in class, they cannot learn.

Chapter three examines students' drive and motivation. It explores students' self-reports about their stamina, capacity for hard work, and perception that success or failure depends on their behaviour. The chapter advances the understanding of an inclination towards hard work and the difference it makes to individual outcomes by identifying which students are more likely to be motivated and to persevere, and how those attributes are related to mathematics performance. Analyses discussed in the chapter indicate that, within countries, students who have drive and motivation and who display a constructive approach to educational experiences perform better in mathematics, and that this relationship is more pronounced among the highest-achieving students. Drive and motivation are strongly associated with performance among both high- and low-achieving students; but stamina and hard work seem to make more of a difference in performance among the highest-achieving students than among the lowest-achieving students.

Chapter four examines students' beliefs of themselves as mathematics learners and their engagement with mathematics-related activities. The data suggest that in some countries sizable proportions of students are at risk of holding particularly negative beliefs about mathematics and of themselves as mathematics learners, putting them at a disadvantage in a global economy where mathematics-related knowledge and, in particular, the capacity to apply such knowledge to solve practical problems, is highly valued and sought after. The chapter illustrates how the relationship between mathematics-related self-beliefs and mathematics performance is particularly strong at the top of the performance distribution: students who achieve at the highest levels are those who feel capable of doing so. In order to become truly proficient, students need to believe in their own abilities and identify with the material they are learning.

Chapter five examines the school practices and education policies that are associated with students' engagement with and at school, their drive, and the beliefs they hold as mathematics learners. For example, it explores whether students whose teachers use different strategies to engage them are more likely to arrive late, skip classes or days of school, show perseverance and drive, value learning mathematics, and/or have a positive image of themselves as mathematics learners. The chapter also builds on the observation that, for most students, school is a primary social environment, where comparisons with peers help students to define themselves and recognise their own strengths and weaknesses. The chapter discusses the associations among students' relative performance, the performance of a student's peers, and the level of engagement, drive and the types of beliefs that different groups of students develop.

Chapter six recognises the family as the first learning environment and examines family characteristics and parental behaviours that are strongly associated with the development of student engagement with and at school, students' drive and motivation and the beliefs they hold as mathematics learners. It considers that schools can and often do collaborate with families to aid students' social and emotional growth as well as their subject-specific learning. Parents can influence their children's dispositions, self-beliefs and behaviours by acting as role models, providing intellectual stimulation, and demonstrating positive attitudes, themselves, towards mathematics.

Chapter seven builds on analyses illustrating socio-economic and gender disparities in mathematics performance developed in Volumes I and II and tries to establish what role, if any, students' engagement with and at school, their drive and self-beliefs play in shaping such disparities. On average, girls and socio-economically disadvantaged students tend to score lower in mathematics than boys and socio-economically advantaged students. Levels of engagement, drive and self-beliefs differ significantly between boys and girls, and between socio-economically advantaged and disadvantaged students. The chapter illustrates how mathematics-related self-beliefs are implicated in the gender gaps in performance in mathematics, particularly among the highest-achieving students, while lack of punctuality and truancy reinforce socio-economic-related disparities in achievement, particularly among the lowest-achieving students.

Chapter eight presents a plan of action. It develops an analysis of how education policies and practices can help all students to achieve their full potential – as learners and as human beings – and aid students' emotional and social growth and well-being.

Notes

1. School principals were asked to what extent they strongly agreed, agreed, disagreed or strongly disagreed to a series of statements about teachers in their school. Among the statements presented school principals were asked whether "There is consensus among mathematics teachers that the social and emotional development of the students is as important as their acquisition of mathematical skills and knowledge in mathematics classes."

2. The following countries administered the parental questionnaire: Germany, Hungary, Chile, Belgium, Portugal, Mexico, Korea, Italy, Hong Kong-China, Croatia and Macao-China.

References

Bouchard, T.J. and **J.C. Loehlin** (2001), "Genes, evolution and personality", *Behavior Genetics* 31(3): pp. 243-273.

Canli, T. (2006), "When genes and brains unite: Ethical implications of genomic neuroimaging", in J. Illes (ed.), *Neuroethics in the 21st Century*, pp. 169-183, Oxford University Press, New York.

Christenson, S.L., A.L. Reschly and **C. Wylie** (eds.) (2012), *Handbook of Student Engagement*, Springer, New York.

DeYoung, C.G. et al. (2010), "Testing predictions from personality neuroscience: Brain structure and the Big Five", *Psychological Science*, Issue 21, pp. 820-828.

Dweck, C.S. and **A. Master** (2009), "Self-theories and motivation: Students' beliefs about intelligence", in K.R. Wentzel and A. Wigfield (eds.), *Handbook of Motivation at School*,, Taylor Francis, New York, pp. 121-140.

Finn, J.D. and **K.S. Zimmer** (2012), "Student engagement: What is it? Why does it matter?" in S.L. Christenson, A.L. Reschly and C. Wylie (eds.), *Handbook of Student Engagement*, Springer, New York pp. 97-131.

Forster, M. (2004), "Measuring the social outcomes of schooling: What does ACER research tells?" conference paper: Supporting student well-being, pp. 85-89.

Guthrie, J.T., A. Wigfield and **W. You** (2012), "Instructional contexts for engagement and achievement in reading", in S.L. Christenson, A.L. Reschly and C. Wylie (eds.), *Handbook of Student Engagement*, Springer, New York.

Heckman, J.J., J. Stixrud and **S. Urzua** (2006), "The effects of cognitive and non-cognitive abilities on labor market outcomes and social behaviour", *Journal of Labor Economics*, 24(3), pp. 411-82.

Heckman, J.J. et al. (2010), "The rate of return to the HighScope Perry Preschool Program", *Journal of Public Economics*, Vol. 94, pp. 114-28.

Ladd, G.W. et al. (2012), "Classroom peer relations and children's social and scholastic development: Risk factors and resources", in A.M. Ryan and G.W. Ladd (eds.), *Peer Relationships and Adjustment at School,* Information Age Press, Charlotte, North Carolina, pp. 11-49.

Levin, H.M. (2012), "More than just test scores", *Prospects*, 42(3), pp. 269-84.

Midgley, C., H. Feldlaufer and **J.S. Eccles** (1989), "Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school", *Child Development*, Vol. 60, pp. 981-92.

Mischel, Walter (1968), *Personality and Assessment*, Wiley, London.

OECD (2013), *Education at a Glance 2013: OECD Indicators,* OECD Publishing, Paris.
http://dx.doi.org/10.1787/eag-2013-en

OECD (2012), *Learning beyond Fifteen: Ten Years after PISA*, PISA, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264172104-en

OECD (2010), *Pathways to Success: How Knowledge and Skills at Age 15 Shape Future lives in Canada*, PISA, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264081925-en.

Plomin R. and **A. Caspi** (1999), "Behavioral genetics and personality", in L.A. Pervin and O.P. John (eds.), *Handbook of Personality Theory and Research*, Guildford, New York, pp. 251–276.

Schunk, D.H. and **C.A. Mullen** (2013), "Motivation", in J. Hattie and E.M. Anderman (eds.), *International Guide to Student Achievement*, Routledge, New York, pp. 67-69.

Schunk, D.H. and **F. Pajares** (2009), "Self-efficacy theory", in K.R. Wentzel and A. Wigfield (eds.), *Handbook of Motivation at School*, Taylor Francis, New York, pp. 35-53.

Skinner, E.A. and **J.R. Pitzer** (2012), "Developmental dynamics of student engagement, coping, and everyday resilience", in S.L. Christenson, A.L. Reschly and C. Wylie (eds.), *Handbook of Student Engagement*, Springer, New York, pp. 21-44.

Stankov, L. (1999), "Mining on the 'No Man's Land' between intelligence and personality", in P.L. Ackerman, P.C. Kyllonen and R.D. Roberts (eds.), *Learning and Individual Differences: Process, Trait, and Content Determinants*. American Psychological Association, Washington, DC., pp. 315-38.

Sternberg, R.J. (1995), *In Search of the Human Mind*, Harcourt Brace, Orlando, Florida.

Thaler, R.H. and **C.R. Sustein** (2008), *Nudge: Improving Decisions about Health, Wealth and Happiness*, Penguin Books, New York.

Wang, M., J.S. Eccles and **S. Kenny** (2013), "Not lack of ability but more choice: Individual and gender difference in choice of careers in sciences, technology, engineering, and mathematics", *Psychological Sciences,* 24(5), pp. 770-75.