Trends Shaping Education 2016

Centre for Educational Research and Innovation

OECD

Trends Shaping Education 2016

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Foreword

Trends Shaping Education 2016 provides an overview of key economic, social, demographic and technological trends and raises pertinent questions about their potential impact on education. This compilation makes use of a variety of robust international sources of data, including the OECD, the World Bank and the United Nations.

The first edition of this book was published in 2008 and subsequent editions appeared in 2010 and 2013. In preparation for this 2016 edition the content was significantly updated and extended to new countries, with a special emphasis on the emerging economies of Brazil, China, India and the Russian Federation. The 2016 edition also challenged itself to extend coverage to the interactions between the trends, themes and links to education. As a result, a great number of completely new indicators have been added, along with new sections on nations and cities, the interactions between trends and a more in-depth exploration of the relationships to education.

This book is designed to give policy makers, researchers, educational leaders, administrators and teachers a robust, non specialist source of international comparative trends shaping education. Its aim is to inform strategic thinking and stimulate reflection on the challenges facing education, whether in schools, universities or in programmes for older adults. It will also be of interest to students and the wider public, including parents.

The process of identifying and compiling relevant trends and data on such disparate subjects was necessarily a collaborative one, and this volume benefits enormously from the support and suggestions of a number of different individuals and institutions. The authors thank the Flemish Ministry of Education for consistently supporting this work since its inception and for making possible two expert workshops in 2015. Enormous thanks also to the dedicated, dynamic and multidisciplinary group of experts who took part in those Brussels workshops: Queralt Capsada, Bernhard Chabera, Catrin Finkenauer, Toma Grinyté, Jan Herczynski, Jan Hylén, Shahdiya Kureshi, Shayne Maclachlan, Eamonn Noonan, Leonore Riitsalu, Tom Schuller, Hanne Shapiro, Manuel Suoto-Otero, Henno Theisens, Rianne Valkenberg, Kristen Weatherby and Harald Wilkoszewski.

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Executive summary

Did you ever wonder if education has a role to play in stemming the obesity epidemic sweeping across all OECD countries? Or what the impact of increasing urbanisation might be on our schools, families and communities? Or whether new technologies really are fundamentally changing the way our children think and learn?

Trends Shaping Education examines major trends affecting the future of education. This work does not give conclusive answers: it is not an analytical report nor is it a statistical compendium, and it is certainly not a statement of OECD policy. It is instead a stimulus for thinking about major tendencies that have the potential to influence education, and conversely, the potential of education to influence these trends.

While the trends are robust, the questions raised for education in this book are intended to be illustrative and suggestive. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning. We invite users to look further and include examples of developments from their own countries or regions in their discussions.

This book has been written in a deliberately accessible manner with a broad audience in mind. It is relevant for anyone active in the field of education, including policy makers, officials, advisors, researchers and policy analysts; leaders of educational institutions and other stakeholders; teacher educators; and teachers, parents and students themselves.

WHAT IS IN THIS PUBLICATION?

The trends in this book start with "big picture" global changes before honing in on nations and cities, and then turn to the more "micro" level of families and children. Although new technologies affect and are affected by all of these different layers, they are presented in the concluding, stand-alone chapter.

Globalisation

Chapter 1 looks at the important trend of globalisation. Facilitated by fast changing technology and decreasing transport costs, individuals are moving more freely across countries and continents, bringing greater ethnic, linguistic and cultural diversity to OECD countries. Politically, this has been accompanied by the recognition that globalisation is here to stay, as evidenced in the growing numbers of countries that permit citizens to hold more than one nationality. Economically, this is reflected in the rise of international trade, foreign direct investments and other markers of worldwide financial integration, including the spread of multinational companies with a truly global reach. We also face new global challenges, such as climate change.

All of these trends are projected to continue in the near and medium term future. As global challenges, they do not stop at national borders and cannot be solved by the actions of a single government or actor. Rising inequality between and within countries even in times of greater affluence makes it clear that more work must be done in order to help make the next phase of globalisation work for all. This will require a new approach to economic policies, but also a new broad emphasis on social cohesion. Tackling challenges that require co-ordinated and co-operative responses requires a new commitment to global governance and multilateralism. Education has a role to play in providing the skills and competencies needed to operate in this new world.

The future of the nation-state

The urgency of the global challenges outlined above has raised the question of the role of the traditional nation-state. **Chapter 2** focuses on the central role the state still plays in ensuring the well-being and security of its citizens. One of the major challenges facing OECD countries, and indeed most countries worldwide, is how to balance public spending in difficult economic times. How will rising health and pension costs associated with living longer affect budgets available for other spending areas, such as education and defence? In recent years a trend towards reductions in military spending across the OECD has opened the door to other ways of maintaining and improving national security such as economic trade agreements, regional co-operation and a growing emphasis on cybersecurity.

Another key role of the nation-state is developing the productivity of its labour force and ensuring the skill needs of the nation are met. Within the labour market, one of the most significant social transformations of the past half century has been the move towards equality of the sexes. In recent years, greater female labour force participation has been associated with higher fertility rates as parents are no longer forced to choose between work and family. However, there are persistent challenges: the continuing difficulty of reconciling family and working life, unequal representation of women in managerial, entrepreneurial and parliamentary roles, and a persistent gender wage gap. Educators need to be aware of the advanced skills their students will need to flourish in more knowledge-intensive labour markets, as well as the potential impact of changing security, health and spending priorities.

Are cities the new countries?

Chapter 3 explores the rise of the megacity. Major urban areas like Mexico City have seen their populations grow to over 20 million, larger than many small countries such as Denmark and the Netherlands. Some have argued that cities are now the most relevant level of governance, small enough to react swiftly and responsively to issues and large enough to hold economic and political power. And indeed city life is distinctive, to the extent that cities in two very different countries, such as New York City and Shanghai, will tend to have more in common with each other than with rural communities in their own country.

Yet urban environments are confronted with a paradox: they concentrate productivity and employment opportunities, but they can also host high levels of poverty and labour-market exclusion. The liveability of a city can be enhanced through safer streets, better infrastructure and reductions in commuting time. Improving public transportation systems, for example, can decrease time spent commuting as well as reduce urban

pollution and noise. Safer streets and reductions in crime rates can help residents feel more at ease in their communities. This is especially important for families who may be concerned about the safety of their children. Education can and does play a role in all of this, by teaching civic literacy, providing the skills needed for community engagement, and supporting creativity and innovation throughout the lifespan.

Family matters

The dominant family model in the twentieth century – characterised by a breadwinning father and a mother taking care of the household and a number of children – has changed. **Chapter 4** takes a look at this transformation: over the past 50 years the number of reconstituted families and single parent households has risen, families have become smaller and individuals are deciding to have children later in life, or not at all. Numbers of divorces are rising even as marriage rates are declining. As our concept of the institution of marriage transforms, so too does our thinking about families and family structures.

Governments are increasingly playing a role in supporting families: public spending on family benefits and weeks of parental leave has increased across most OECD countries over the past three decades. They are creating regulatory structures and also funding interventions to help people make healthier choices. Similarly, safer environments and better healthcare have allowed child mortality rates to steadily decrease across most OECD countries. Despite these efforts, there is more work to be done. Household debt has been rising across most OECD countries, and youth are now at a greater risk of living in poverty than their older counterparts. There is also a worry that the modern world has created new stresses for our societies, and especially for our children. Child obesity, cyber-risks (such as online bullying) and reported levels of stress have all increased in the last decade. There is an important series of questions about how education can best support children and families, especially the poorest and most disadvantaged.

A brave new world

Chapter 5 looks at how technology is transforming our lives. Increasingly mobile and adaptive technologies allow us to buy our groceries, pay our bills, watch films and attend meetings without ever leaving our homes. In fact, we increasingly do many of these things at once: Internet users are more and more likely to perform multiple online activities simultaneously.

Technological advances are not exclusive to the Internet. Innovations in biotechnology, for example in genome sequencing, have the potential to revolutionise our lives. Yet new technology can also give rise to previously unknown risks and dangers. Hacking, cyberbullying and identity theft are only some examples of new emerging trends. As adolescents and children are the most frequent users of online services and social networks, schools and teachers are increasingly faced with the challenges of educating and guiding students through the advantages and disadvantages of the virtual world, without always having the necessary skills themselves. The impact of these trends on education is obvious, and a great deal of work has already been done on how education can better use technology in the classroom. However difficult questions remain, and education systems will have to adapt to address worries about decreasing attention spans and cyber-risks such as online bullying and fraud.

AND EDUCATION?

Trends Shaping Education 2016 covers a rich set of topics related to globalisation, nation-states, cities, modern families and new technologies. At the end of each section a series of questions are posed linking the trend to education. It is important to remember that these trends are themselves shaped by education and manifest within it. This publication is intended to complement the indicators that measure the developments taking place within education and training systems themselves. For policy makers, teacher educators, practitioners and any others interested in education, we hope that this publication can act as an inspiring resource to inform thinking about the future of education. We invite all readers to ask themselves: "What does this trend mean for my education system and my work?"

Overview: The impact of trends on the future of education

Did you ever wonder if education has a role to play in stemming the obesity epidemic sweeping across all OECD countries? Or what the impact of increasing urbanisation might be on our schools, families and communities? Or whether new technologies really are fundamentally changing the way our children think and learn?

Trends Shaping Education examines major trends affecting the future of education and sets the background on upcoming challenges for policy makers and education providers alike. This work does not give conclusive answers: it is not an analytical report nor is it a statistical compendium, and it is certainly not a statement of OECD policy on these different developments. It is instead a stimulus for thinking about major tendencies that have the potential to influence education, and conversely, the potential of education to influence these trends.

While the trends are robust, the questions raised for education in this book are intended to be illustrative and suggestive. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning. We invite users to look further and include examples of developments from their own countries or regions in their discussions.

WHAT CAN BE FOUND IN THIS PUBLICATION?

This resource contains 25 topics, each illustrated by two figures. The material is organised in five main chapters focused on globalisation, the nation-state, cities, modern families, and technologies. Each of the five chapters is accompanied by visualisations of the interactions between the themes and the interactions between the trends and education. While all the trends included are relevant to education, not all relevant trends are in this resource – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence. The focus is on OECD countries and the BRIICS (Brazil, China, India, Indonesia, the Russian Federation and South Africa) where data are available.

The diversity of the topics covered means that in some cases the trends are charted over a decade; in others, longer term trends of up to 50 years are available. The trends that cover the shortest amount of time look at emerging technologies, where developments occur at a very fast pace.

This book has been written in a deliberately accessible manner with a broad audience in mind. It is relevant for anyone active in the field of education, including: 1) policy makers, officials, advisors, researchers and policy analysts; 2) leaders of educational institutions and other stakeholders; 3) teacher educators; and 4) teachers, parents and students themselves.

WHY DO WE NEED TRENDS SHAPING EDUCATION?

The future is inherently unpredictable. Yet everyone – including policy makers and school leaders in education – needs to take the future into account. Looking at trends informs our ideas about what might happen as we better understand what is already changing in education's wider environment.

Using trends is not straightforward. Opinions differ on historical developments and, even when there is agreement, the future is rarely just a smooth continuation of past patterns. Moreover, we do not know in advance which trends will continue and which will change course.

"It will be years - not in my time - before a woman will become Prime Minister."
- Margaret Thatcher, who later became Prime Minister of England, in 1969

Similarly, it is not guaranteed that the trends that were important in the past or seem so now will remain influential; emerging trends, barely visible at the moment, may become of central importance in the future. For example, in 1968 Time Magazine declared that:

"Remote shopping, while entirely feasible, will flop."
- Time Magazine, 1968

Hence, bringing an awareness of trends to bear on our professional lives in education is not so much a science as a means of broadening our horizons and informing the base of decision making. This book is a starting point for consideration about what is setting directions for the future.

TRENDS SHAPING EDUCATION 2016

The trends in this book start with "big picture" global changes before honing in on societies and cities, and then turn to the more "micro" level of families and children. Although new technologies affect and are affected by all of these different layers, they are presented in a stand-alone chapter.

Globalisation

Chapter 1 looks at the important and pervasive trend of globalisation. In essence, globalisation is the widening, deepening and speeding up of connections across national borders. Facilitated by fast changing technology and decreasing transport costs, individuals are moving more freely across countries and continents, bringing greater ethnic, linguistic and cultural diversity to OECD countries. Politically, this has been accompanied by the recognition that globalisation is here to stay, as evidenced in the growing numbers of countries that permit citizens to hold more than one nationality, as well as increasing democratisation of our countries. Economically, this is reflected in the rise of international trade, foreign direct investments and other markers of worldwide financial integration, including the spread of multinational companies with a truly global reach.

The dynamics of globalisation: New economic balances, global integration and more diverse populations, inequality and environmental challenges including climate change

The global economic balance is also changing. The emerging economies of Brazil, China and India now place comfortably among the world's ten largest economies. These countries play an increasingly important political role in global affairs, for example, through the G20. These changes are not just cosmetic, but rather a fundamental transformation in the balance of economic power and world finance. At the same time, the magnitude of global inequality – the gap between richer and poorer world regions – is increasing. This plays out on both a national and an individual level within OECD countries: the gap between rich and poor is at its highest level in 30 years.

Global challenges – for example, climate change – call for global solutions. Projected average temperature increases of just a few degrees would lead to water shortages for billions of people, reduce agricultural yields, increase malnutrition related deaths by millions and lead to the extinction of a large part of animal species. These devastating effects on the natural environment, and the uncertainty they create, could lead to conflict and economic and political instability, particularly in the developing world. The global community is moving to act now, before the damage done to our planet is irreversible. Paris has just hosted COP21, a UN convention on climate change. Its goal: to forge a universal, legally binding agreement that will enable our governments and citizens to effectively combat climate change and help transition to resilient, low-carbon societies. Education can and should play a role in changing the behaviours, attitudes and expectations that make a difference.

All of these global trends –economic integration, migration, climate change and rises in inequality are projected to continue in the near and medium term future. As global challenges, they do not stop at national borders and cannot be solved by the actions of a single government or actor. Rising inequality between and within countries even in times of greater affluence makes it clear that more work must be done in order to help make the next phase of globalisation work for all. This will require a new approach to economic policies, but also a new broad emphasis on social cohesion. Tackling challenges that require co-ordinated and co-operative responses requires a new commitment to global governance and multilateralism.

The 20th century provided an extended period of peace and prosperity as well as co-operation and stability in much of the world and, in particular, in OECD countries. However the supremacy of individual nations co-ordinating through post-war institutions, each with its own (usually short-term) interests at heart is now no longer workable. The challenges confronting global decision makers are now more complex, intertwined, and growing in intensity and urgency. Traditional methods of co-ordinating responses and negotiating action to combat shared threats are challenged by the speed and power of new technologies, which allow individuals and organisations to stay one step ahead of formal regulations. Hackers penetrating military databases, terrorists using social media, and fishing companies using satellite information on the location of fish stocks to plunder international waters are all examples of issues which are currently challenging our nations and our global world.

Education has a role to play in providing the skills and competencies needed to operate in this new world. It has the potential to influence the life outcomes of the most disadvantaged, and is a powerful tool to reduce inequity. It can also help in the integration of migrants, teaching basic skills as well as instilling values and helping to define identity. Some of the ways education can affect and be affected by global trends are obvious and immediate, for example through the teaching of foreign languages, global competencies for business and trade, and raising awareness of climate change effects and science. Others are less obvious, or more long-term, for example the impact of climate change on planning and school infrastructure, or addressing the issue of brain drain in lower income economies as the best educated and most talented citizens choose to leave and study (and potentially live) abroad. These issues require strategic thinking and planning, and also a holistic approach which examines the impact and interplay of global trends with education as a whole, on the system level.

The future of the nation-state

The speed and urgency of the global challenges outlined above has raised the question of the role of the traditional nation-state. **Chapter 2** focuses on the central role the state still plays in ensuring the health and security of its citizens. National security is reinforced by strong economic ties and regional military co-operation, as well as a strong military. In recent years a trend towards reduction in military spending across the OECD has opened the door to other ways of maintaining and improving national security such as economic trade agreements, regional co-operation and a growing emphasis on cybersecurity. However the recent rise in extremism and global instability has led to an increase in military spending in a number of countries. Still, countries struggle to recruit soldiers with the skills required for modern warfare, and fewer and fewer people report being willing to fight for their country. Given this trend, what is the future of national security?

The role of the state: establishing spending priorities, labour markets and skills, ensuring security, health and well-being, and supporting entrepreneurship

One of the major challenges facing OECD countries, and indeed most countries worldwide, is how to balance public spending in difficult economic times. How will rising health and pension costs associated with living longer affect budgets available for other spending areas, such as education and defence? And what new trends will emerge that will further affect the health sector, such as the increased prevalence of certain diseases? Due to improved medical technologies and better awareness and prevention, the rates of major causes of death, such as cancer and circulatory illnesses have been generally decreasing in the last 60 years. At the same time, new causes of death and new health concerns have emerged that are likely to have a further impact on health spending and care.

For example, diabetes and dementia are now the fastest growing causes of death across OECD countries. Rising rates of diabetes are related to the obesity epidemic: As more "plump" children become obese adults, diabetes rates continue to grow, along with heart disease and certain cancers. Rates of dementia are related to our ageing population

and better awareness of mental health issues. Both of these emerging trends will continue to have an impact on the health and well-being of our populations, and nations must develop plans of action (and funding) to address them.

Another key role of the nation-state is developing the productivity of its labour force and ensuring the skill needs of the nation are met. Here, one of the most significant social transformations of the past half century has been the move towards equality of the sexes. Women's labour force participation has steadily risen across the OECD. In recent years, greater female labour force participation has been associated with higher fertility rates as parents are no longer forced to choose between work and family. However, there are persistent challenges: the continuing difficulty of reconciling family and working life, unequal representation of women in managerial, entrepreneurial and parliamentary roles and a persistent gender wage gap.

Other challenges for nations revolve around the necessity to compete in an increasingly knowledge based global economy. As transport prices have fallen and trade barriers have lifted, the production of basic goods has to a large extent been taken over by developing countries with lower wage costs. OECD countries have maintained their competitive edge by producing goods and services that require high levels of knowledge, skill, creativity and innovation. To this end, governments are moving to streamline procedures required to start businesses, lightening the administrative load and incentivising entrepreneurship. Similarly, international scientific collaboration is increasing and the number of patents filed within OECD member countries continues to grow, although the traditional dominance of the OECD countries is now waning. China, in particular, has appeared as a major force in research and development (R&D), accompanied by Brazil, India, and the Russian Federation.

Educators need to be aware of the advanced skills their students will need to flourish in more knowledge-intensive labour markets, without neglecting the development of other important competencies. These include 21st century skills such as global languages, advanced digital skills, as well as social and emotional intelligence. Education can also play a role in helping economies equal the playing field for women, encouraging female entrepreneurship and continuing to reskill ageing workers.

Other obvious and immediate links are for example the impact of increasing obesity on the health and well-being of students and teachers, and conversely, the potential of education to raise awareness of healthy lifestyles. Less obvious or more long-term issues relate to the possible impact of reduced defence spending on a nation's R&D capacity, and the importance of developing national strategies to combat cyberattacks and cybercrimes such as hacking. Education can and should play a role in all of the aforementioned issues, and it is important to address both the obvious and immediate issues as well as the emerging ones.

Are cities the new countries?

Chapter 3 explores the rise of cities. Major urban areas like Mexico City have seen their populations grow to over 20 million, larger than many small countries such as Denmark, Hungary and the Netherlands. Some have argued that cities are now the most relevant level of governance, small enough to react swiftly and responsively to issues and large enough to hold economic and political power. And indeed city life is distinctive, to the extent that cities in two very different countries, such as New York City and Shanghai, will tend to have more in common with each other than with the rural communities in

their own country. This has become clear in a number of ways, and for the last several years the leaders of key cities from across the globe meet at roundtables and fora in order to discuss issues of common interest.

Are cities the new countries? Increasing urbanisation and citizen engagement and the impact on liveability, innovation and risk

Today, more than half of the world's population lives in cities and this ratio is projected to increase to seven out of ten people by 2050. Urban environments attract people from rural areas and foreign countries hoping for better economic prospects and easier access to public services such as education and healthcare, as well as a wider variety of cultural institutions. This concentration of human capital can stimulate research and development, making cities a regional nucleus for growth and innovation. The concentration of resources found in cities makes it easier to conduct business through provisions such as ample office space, proximity to inputs, accessibility of clientele and customers, and an abundant skilled labour force. For businesses and innovation, location matters, and more and more often that location is a city.

However, urban areas are confronted with a paradox: they concentrate productivity and employment opportunities, but they can also host high levels of poverty and labour-market exclusion. These difficult conditions can contribute to more tenuous social networks and disconnection from family and community, which can engender social alienation, low levels of trust and violence. This makes engaging and involving citizens in their communities particularly important.

Citizen involvement has become a major force in urban policy and planning. The Internet is helping spur citizen engagement by facilitating co-ordination and action within and across communities. New and innovative applications allow residents to report problems in their community, and permit governments to respond quickly and efficiently to their concerns. Citizen involvement is thus an important element of local accountability and community building. These initiatives are not necessarily only local: protests such as Occupy Wall Street, initiated at the city level in New York in 2011, eventually spread across more than 1 500 cities worldwide.

What sort of city and community do we live in? Do we feel safe going about our daily lives and social interactions? The liveability of a city often influences where people choose to settle down. Liveability can be enhanced through safer streets, better infrastructure, and reductions in commuting time. Improving public transportation systems, for example, whether by adding new modes or refining old systems, can decrease time spent commuting as well as reduce urban pollution and noise. Safer streets and reductions in crime rates can help residents feel more at ease in their cities and communities. This is especially important for families who may be concerned about the safety of their children.

Despite the efforts made to increase liveability, city living is also associated with certain risks. Lack of green space and a greater concentration of people, traffic and industry are linked with higher air pollution, which creates risks for respiratory health and cardiovascular disease. Higher noise levels, for example near major roads or airports, have been associated with sleeping problems as well as difficulty concentrating at work or school. In addition, the close proximity of city-dwellers, including densely packed public transport, facilitates the rapid spread of viruses and disease. And these physical risks can

be accompanied by mental ones: a growing body of research indicates that being raised in a large urban area is associated with greater lifetime risk for anxiety and mood disorders for adults as well as young people.

Mayors and cities across the OECD (and indeed the world) are tackling these issues through a number of innovative and community based solutions. And education can and does play a role, teaching civic literacy, providing the skills needed for community engagement, and supporting creativity and innovation throughout the lifespan. However, education will also need to be prepared for a number of trends that arise from increasing urbanisation, such as planning for increasing (or declining) neighbourhood populations, and protecting school buildings and infrastructure from extreme climate events, expected to disproportionally affect large urban centres. Education will also continue to be responsible for ensuring the safety of students, especially those in the most disadvantaged neighbourhoods and monitoring physical and emotional well-being in the face of potentially new or growing urban stresses. Designing liveable urban spaces and encouraging smart transport in increasingly dense cities will require urban planners and engineers, as well as the research and innovation hubs needed to fuel their work. Education can and should be prepared to adjust and grow as needed for all of these issues.

Family matters

The dominant family model in the twentieth century – characterised by a breadwinning father and a mother taking care of the household and a number of children – has changed. **Chapter 4** takes a look at this transformation over the past 50 years: the number of reconstituted families and single parent households is rising, families are becoming smaller and individuals are deciding to have children later in life, or not at all. One major change is to the institution of marriage. Numbers of divorces are rising even as marriage rates are declining. On average couples are waiting longer to get married, or choosing another form of civil partnership. Governments across the OECD are in the process of legalising same-sex marriages. As our concept of the institution of marriage transforms, so too does our thinking about families and family structures.

Family matters: Transforming family structures, balancing household budgets, and personal health and welfare

Governments are increasingly playing a role in supporting families: public spending on family benefits has increased across most OECD countries over the past three decades. Children between 0 and 5 years old (the most vulnerable age group) are especially targeted. By increasing expenditure on young children and strengthening other programmes such as parental leave (for both mothers and fathers), governments are trying to ease the burden on families with children. This trend might also reflect governments' attempts to increase birth rates across OECD countries, amidst worries of our ageing populations.

Governments are also funding interventions to help people make healthier choices, for example by including more information on nutrition fact labels and providing more smoke-free areas. These public health measures have been successful in many OECD countries: tobacco consumption is decreasing, and safer environments and better healthcare have allowed child mortality rates to steadily decrease across most OECD countries.

Despite these efforts, there is more work to be done. Household debt has been rising across most OECD countries, and youth are now at a greater risk of living in poverty than their older counterparts. There is also a worry that the modern world has created new stresses for our societies, and especially our children. Child obesity, cyber-risks (such as online bullying) and reported levels of stress have all increased in the last decade. And although suicide rates have decreased, thanks in part to improved awareness of mental health issues, more can still be done.

The importance of social background in shaping achievement (in education, in work, and even in old age) across the lifespan remains one of the best-charted relationships in social research. Good quality education can be an important tool to reduce inequality and narrow the gap between low- and high-income students, but it cannot act alone. There is a difficult debate about the rights and responsibilities of parents and schools, and worries about schools and education systems more generally being asked to take on responsibilities that should be those of parents and families. The trends in this chapter are thus especially important to consider in light of a broader societal response to change and new ways of living and being.

There is a clear role for schools in promoting acceptance of new family structures and encouraging tolerance and diversity. There is also an important series of questions of how education (starting with early childhood and extending across the lifespan) can best support families, especially the poorest and most disadvantaged among them. Equally important, but perhaps less obvious, is the issue of trust between parents and teachers and the impact this might have on the learning environment as well as teacher recruitment and retention. All of these issues must be discussed and considered from both an immediate as well as a longer term perspective.

A brave new world

In contrast to many of the trends in this book that are relatively gradual and often linear, the pace of technological development is exponential and its impact much less predictable. **Chapter 5** looks at how technology is transforming our lives. The development of the information and communication technology (ICT) sector has changed the way we communicate, work and even socialise. Increasingly mobile and adaptive technologies allow us to buy our groceries, pay our bills, watch films and attend meetings without ever leaving our homes. In fact, we increasingly do many of these things at once: Internet users are more and more likely to perform multiple online activities simultaneously.

A brave new world: new technologies changing human lifestyles, the cutting edge of biotechnology and virtual reality, and the dark side of cyberspace – revenge porn and fraud

Finnish Prime Minister Alexander Stubb tweeted in 2014: "*Most people who criticise Twitter are often not on it. I love this place. Best source of info. Great way to stay tuned and communicate.*" Once used exclusively by the tech-savvy, social media has pervaded all aspects of modern life in just a few short years. World leaders and international organisations have increasingly taken advantage of social media as a channel of diplomacy, communication and engagement. Businesses have created their own websites

and social media profiles as a form of interacting with customers, advertising and selling their products and services.

Technological advances are not exclusive to the Internet. Although it might seem like science fiction, major developments in biotechnology may change our lives in dramatic ways. Biotechnology is used in medicine to combat disease, in agriculture to produce higher yields and more resistant crops, and in the environment to develop cleaner energy. One example of how biotechnology is becoming more integrated in our lives comes from genome sequencing, where prices have been dropping exponentially in the last decade. This increasingly allows individuals to map their genes and identify whether they carry potentially life-threatening mutations. As a result of advancements in biotechnology and its applications, the sector has experienced a rise in the numbers of patent applications, making it an increasingly important field of study both scientifically and economically.

However, new technology can be a double-edged sword: despite its positive impacts, it can also give rise to previously unknown risks and dangers. Cyberfraud, hacking, cyberbullying and identity theft are only some examples of new concerns that have had an impact on both individuals and governments. One of the most difficult challenges for governments will be staying abreast of the evolution of technology and human behaviour: for example, more and more countries are enacting specific laws against revenge porn in an effort to close loopholes in current legislation. An increase in the number of cybersecurity certificates and courses offered is one way to increase the skill level needed. As adolescents and children are the most frequent users of online services and social networks, schools and teachers are increasingly faced with the challenges of educating and guiding students through the advantages and disadvantages of the virtual world, without always having the necessary skills themselves.

The impact of these trends on education is obvious, and a great deal of work has already been done to identify how and where education can better use technology in the classroom. However difficult questions remain, for example regarding the co-construction of knowledge as it relates to the educational objective truth: whose voice counts? And how does "textbook learning" interact with and perhaps compete with the easy answers available at the simple push of a button? Certainly education systems will have to adapt to digital environments to address worries about decreasing attention spans, digital withdrawal disorder and fear-of-missing-out syndromes. And continuing advances in biotechnology and cognitive performance enhancing drugs raise difficult technical and ethical questions. All of these issues need to be considered as part of a long-term strategy to help education keep pace with modern society.

A FINAL WORD

Trends Shaping Education 2016 covers a rich set of topics related to globalisation, nation-states, cities, modern families and new technologies. At the end of each section a series of questions are posed linking the trend to education. In addition, visualisations explore the connections between the trends as well as potential links to education. These are intended as creative fuel for reflection and should not be interpreted as a set of recommendations.

It is important to remember that these trends are themselves shaped by education and manifest within it. This publication is intended to complement the educational indicators that measure the developments taking place within education and training

systems themselves. The following questions are intended to help draw out how the trends may be addressed and interpreted.

Is this trend relevant in my context?

Trends may differ both in size and direction in different countries, regions, districts or even schools. Ageing populations, for example, may be a bigger problem in rural than in urban areas or concentrated in certain parts of the county or districts in a city. And although obesity rates have increased in all countries, some countries are much more vulnerable to the issue than others. International trends may have different impacts in different places according to geographical, historical, political or cultural circumstances.

Are there other trends to take into account?

The trends in this resource are certainly not the only relevant ones, and not all of them apply equally in each location or context. There may be other, perhaps local, trends that will be just as important to consider. Indeed, previous *Trends Shaping Education* publications present interesting trends that are not included in this version but that are still relevant.

How predictable is this trend?

Trends differ as to the predictability of their continuation. Some trends, for instance, those related to population growth or the environment, lend themselves more easily to long-term planning. Others are less predictable, such as those to do with technology, youth culture or international conflict. For these, devising scenarios of what would happen if a particular trend would develop in a certain way may well be more appropriate than extrapolation.

What is the pace of this trend?

Some trends develop slowly (global temperatures went up around 0.8˚C in the last 100 years) while other trends are more dynamic (the number of active Facebook users went from zero to one billion in eight years). Slow trends allow more time to think about what they mean and how to respond but they may also be relatively impervious to change. The potential impact of more dynamic trends, on the other hand, needs to be addressed faster.

Can we influence this trend?

Even if trends are not predictable it may still be possible to influence them. Universities have great difficulty in predicting the number of students who will choose a certain study programme. However, they can attempt to influence the numbers of students applying through advertising campaigns and funding arrangements, by establishing, for example, targeted scholarship programmes.

Can we react to these trends?

If both predicting and influencing are impossible, creating the flexibility to be able to react after events occur may be the best option. For example, emergency planning to handle extreme weather events in cities will include a variety of scenarios, each of which

may or may not be deployed in the event of a major crisis. The important element is to maintain flexibility and responsiveness even under unforeseen circumstances.

Finally

Above all, we hope that the different users to whom this report is targeted will ask the question: "What might this trend mean for my work?" or better still, "How do these trends taken in combination redefine the context in which I am making decisions?" A large body of CERI work has been founded on the need for educational decision making to be better informed by evidence, by awareness of what is taking place in other countries, and by the need to consider the bigger, long term picture. This volume follows proudly in that tradition.

We hope that you will find it useful and thought-provoking.

Chapter 1

Globalisation

Globalisation trends: A visual overview *– a display of the trends in this chapter and the connections between them.*

Global integration and governance *– discusses the steady transition to more democratic governments worldwide and the global expansion of multinational companies.*

People on the move *– focuses on the increase in the share of immigrants and the changing nature and authorisation of dual-citizenships.*

Interconnected financial markets *– the increase in the share of foreign direct investment has been accompanied by a rise in exports, especially in middle-income countries.*

Increasing affluence, increasing inequality *– as the income gap widens within regions, GDP per capita is widening between low-income, middle-income and OECD countries.*

The global threat of climate change *– the rise in greenhouse gas emissions and the potential of renewable energies.*

Infographic: Globalisation and education *– a visual exploration of the links between the trends in this chapter and education.*

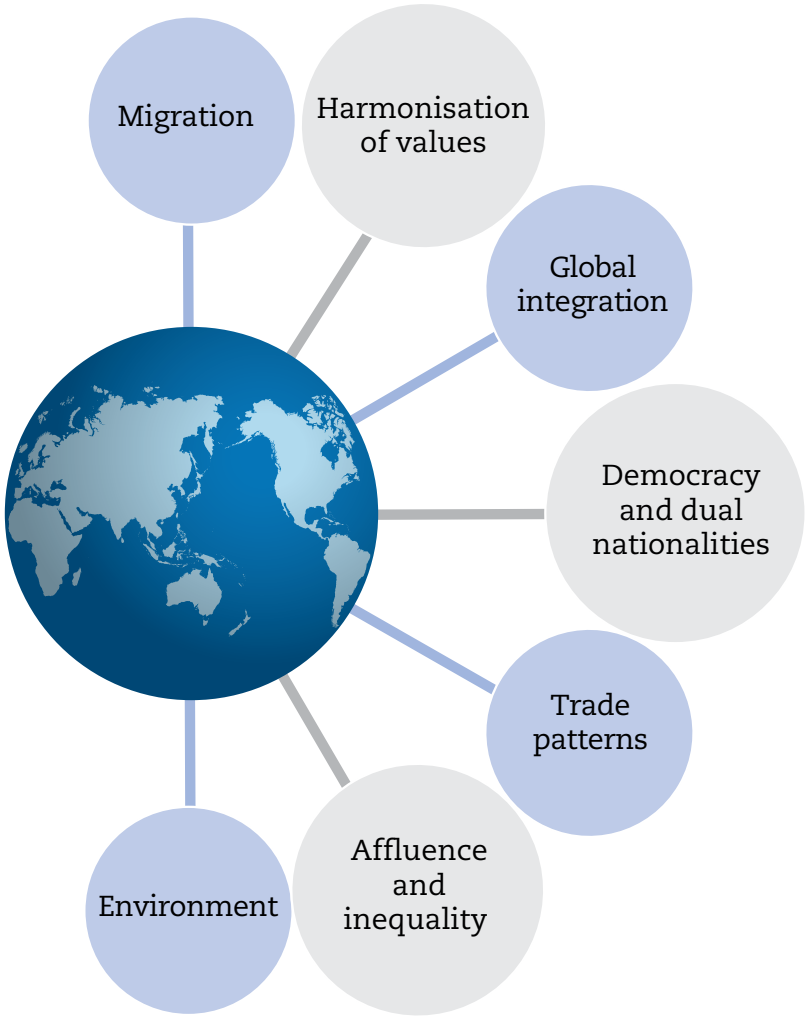
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

GLOBALISATION TRENDS: A VISUAL OVERVIEW

Facilitated by fast changing technology and decreasing transport costs, individuals are moving more freely across countries and continents, bringing greater ethnic, linguistic and cultural diversity to OECD countries. Politically, this has been accompanied by the recognition that globalisation is here to stay, as evidenced in the growing numbers of countries that permit citizens to hold more than one nationality. Economically, this is observed in the increase of international trade, foreign direct investments and other markers of worldwide financial integration.

This chapter examines a set of key global trends. While they are all relevant to education, not all pertinent trends are included – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence.

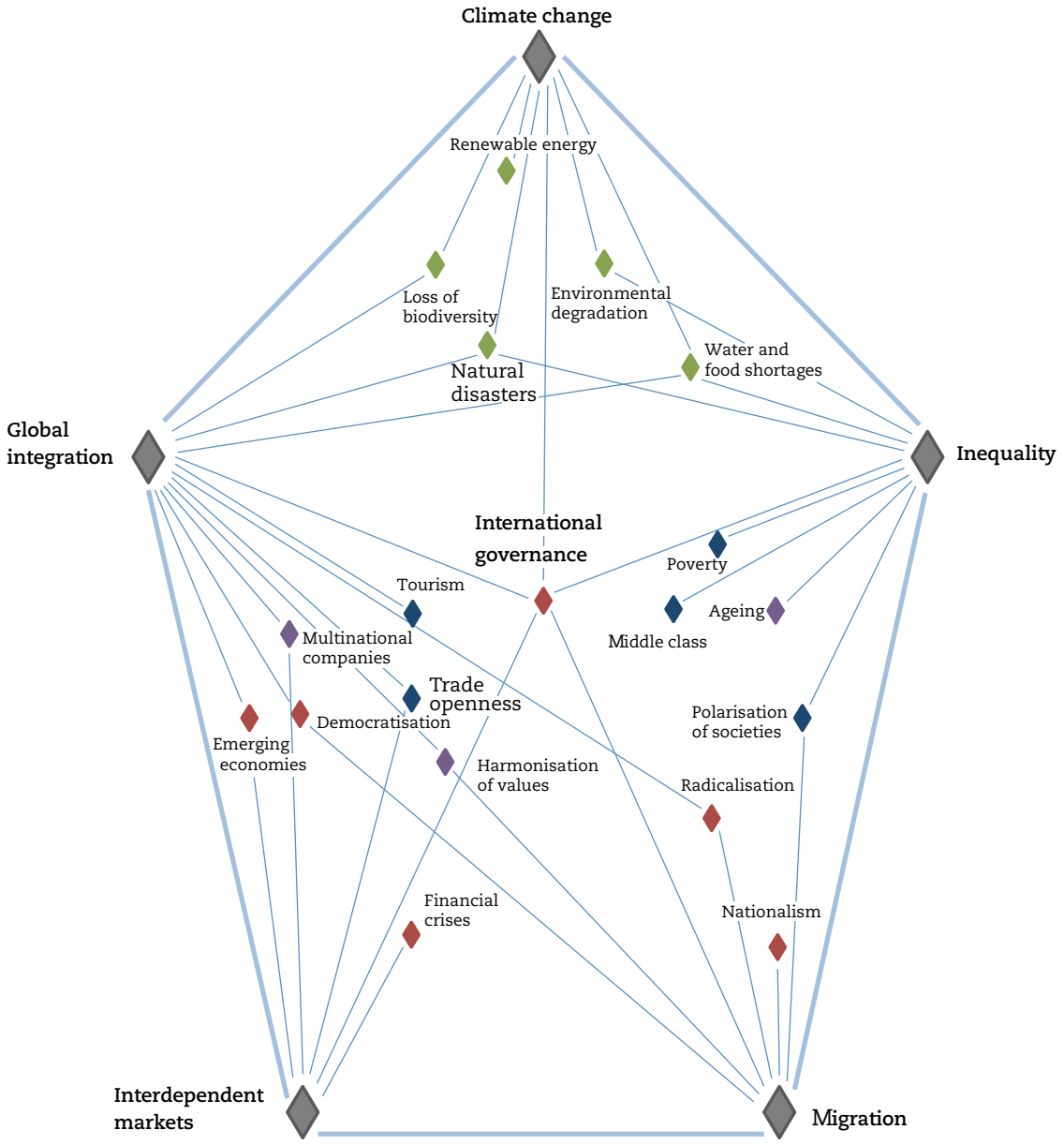
Figure 1.1. **Globalisation trends: A visual overview**



Interactions between the trends

These trends do not exist in isolation. Global challenges – for example, climate change or rising inequality – call for global solutions. They do not stop at national borders and cannot be solved by the actions of a single government or actor. Tackling issues that require co-ordinated and co-operative responses requires a new commitment to global governance and multilateralism. The trends themselves are interrelated and influence each other, sometimes in unpredictable ways. Some of the connections between the trends in this chapter are illustrated below.

Figure 1.2. **Interactions between globalisation trends**

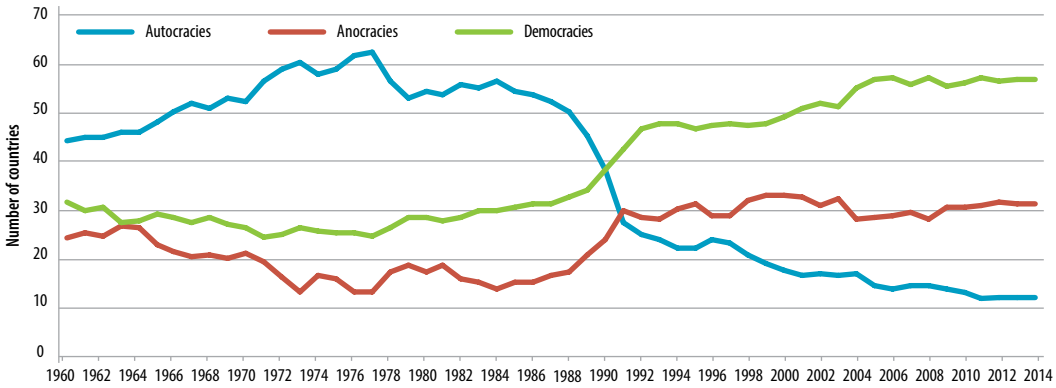


GLOBAL INTEGRATION AND GOVERNANCE

Our world is becoming more and more connected. International agreements and technological advances bring people, goods and services together ever more quickly and inexpensively. Multinational firms work across national boundaries to manufacture goods – increasingly assembled with geographically disperse component pieces – which are then sold in multiple markets. This growing integration of economies and products has been accompanied by a growing uniformity of experience and values. One interesting trend is the transition to more democratic governments, moving away from the autocracies that were prevalent half a century ago. For education, increasing global integration may create a need for the development of new 21st century skills and global competencies for both children and adults.

Figure 1.3. **From autocracy to democracy**

Categorisation of type of political system 1960-2014



Note: Data for 97 countries in 1960 and 167 countries in 2014, which includes all independent countries with total population greater than 500 000. Original data source includes data back to 1920.

Source: Center for Systemic Peace, *Integrated Network for Societal Conflict Research (INSCR), Polity IV: Regime Authority Characteristics and Transitions Datasets.*

StatLink http://dx.doi.org/10.1787/888933315992

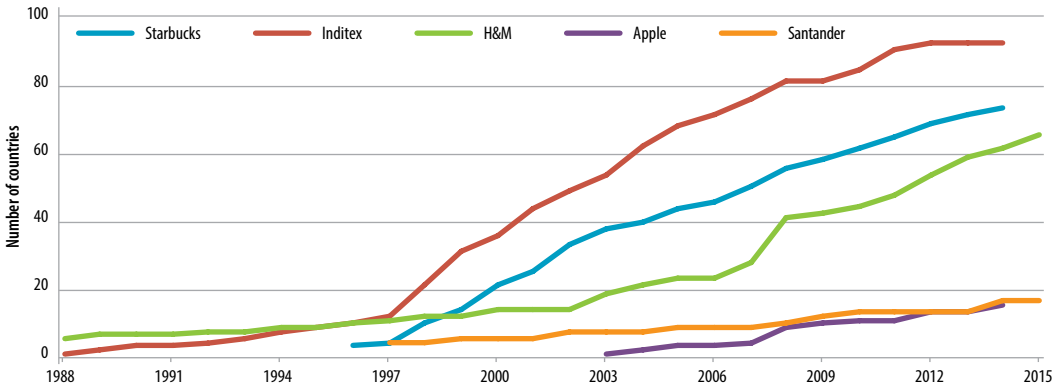
Fifty years ago the most common form of governance regime across the world was best described as an *autocracy*, where political power rested primarily in the hands of one person. Only roughly thirty percent of countries were considered democracies at that time. Since the late 1980s the number of democracies has risen, and democracy is now the most common form of national government. However, a number of countries lie somewhere between the two categories. Since the late 1980s, the number of *anocracies* – countries that are best categorised as lying somewhere on the spectrum between autocracy and democracy – has remained more or less stable at about 30 % of all countries.

Since the 1990s multinational companies have expanded into an increasing number of markets around the world. Major players in the food services, garment retail, banking and technology have become truly global, moving from a presence in only a handful of countries before the mid-1990s to operating in multiple nations in 2014. Inditex, for example, the most ubiquitous of the companies graphed below, has a presence in over

80 national markets worldwide in the form of well-known brands such as Zara and Massimo Dutti. The rise of these and other global companies has reshaped our consumer experience, providing standardised and recognisable products almost anywhere in the world. While important in terms of bringing reliable goods and services to every high street, these trends also have implications for diversity of products and the viability of small and medium enterprises in many OECD countries.

Figure 1.4. **Global expansion of multinational companies**

The global reach of five companies in food services, garments, banking and technology, 1988-2015



Note: Starbucks store count includes Starbucks Coffee, Seattle's Best Coffee, Teavana and Evolution Fresh retail; Intidex includes Zara, Pull&Bear, Massimo Dutti, Bershka, Stradivarius, Oysho, Zara Home and Uterqüe brands.

Source: H&M (2015), *H&M Worldwide website*; Inditex (2015), *Our History*, Inditex website; Tarzian, J.M. (2015), *Santander Corporate Communication – International Media Relations*; Starbucks (2015), *Company Information, Starbucks website*; Hoover, J. (2015), *Apple Investor Relations*; Spencer, G. (2015), *Contributor, Macstories*.

StatLink http://dx.doi.org/10.1787/888933316009

And education?

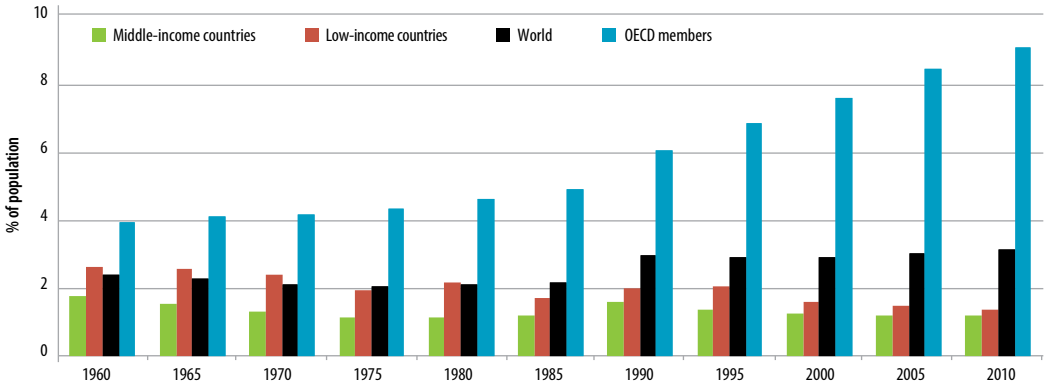
- Should schools and universities be aware of labour market demands at the global level in order to prepare their students to work abroad and in multinational companies? In addition, what elements of inter-cultural sensitivity and co-operation can be taught?
- Do students educated abroad have a responsibility to return to work in their home country in order to transfer their knowledge back to their nations and peers? What role do OECD countries have in minimising brain drain?
- The internationalisation of higher education has created new opportunities for individuals and new markets for institutions. Is this likely to serve to standardise the subjects and programmes of study on offer? Is there still room for context dependent and locally-tied programmes and specialities?

PEOPLE ON THE MOVE

The mobility of individuals and families is driven by the search for a better life. Increasingly affordable and accessible methods of transportation – of goods but also of people – open up new markets and new ways of being. Reflecting this reality, more and more countries are allowing their citizens to hold multiple citizenships, acknowledging the greater mobility of their populations. The increasing cultural and linguistic diversity that emerges out of these trends has a strong impact on our schools and classrooms, which need to prepare students for a global life. Emphasising multiculturalism as well as supplying appropriate resources for students of different backgrounds will continue to be a priority within school systems. Lifelong learning is also an important component to keeping our societies abreast of the new challenges and opportunities that arise from an increasingly mobile world.

Figure 1.5. **Increasing immigration across the OECD**

Immigrants as a share of national population 1960-2010



Note: International migrant stock is the number of people born in a country other than that in which they live.

Source: World Bank (2015), "Trends in Migrants Stock (as a % of population)", *World Development Indicators*.

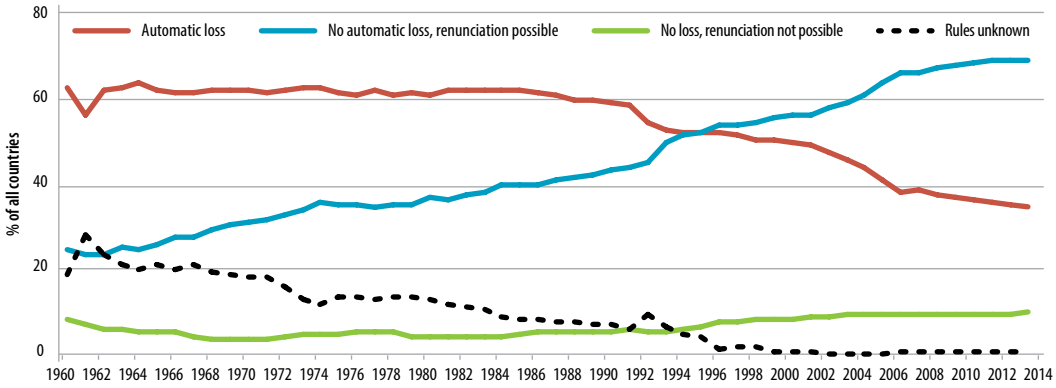
StatLink http://dx.doi.org/10.1787/888933316011

The number of international migrants as a percentage of the population has been increasing in OECD countries. Although this trend has been observed since the 1960s, the speed and rate of this increase has grown significantly since 1985. In contrast, low- and middle-income countries have seen their already small share of stock of immigrants drop in that time period. For example, on average across low- and middle-income countries in 1960, migrant stock made up only three percent and two percent of the population respectively, a proportion that had fallen to one percent by 2010. It is important to note that there are sizeable variations between countries, with some OECD countries remaining centres of emigration rather than immigration. Still, the profile is evolving. Traditional OECD countries of immigration, such as Australia and Canada, have been joined in recent years by countries that have experienced little immigration until recently, like Ireland, Italy and Spain.

The increasing diversity in OECD countries has been accompanied by a change in the rules of citizenship as more countries acknowledge the greater mobility of their populations. In 1960, the acquisition of a new citizenship automatically resulted in the loss of the person's prior citizenship in almost 60% of countries around the world, including 22 OECD countries. Only 6 OECD countries – Greece, Hungary, Ireland, Israel, New Zealand and the United Kingdom – did not require automatic loss of citizenship at that time. By 2013, 16 more OECD countries – including Canada, France and the United States – permitted dual citizenship, and over 60% of countries worldwide did not strip an individual of his/her citizenship if they acquired the citizenship of another country. Increasing migration and mobility has important implications for education: many immigrants intend to stay for the long term and have children who will be attending schools and universities in their communities. This increased diversity in classrooms raises questions as to whether schools, teachers, and students are sufficiently prepared for the new challenges this creates.

Figure 1.6. **World citizens**

Rules on loss of citizenship after voluntary acquisition of another citizenship in 200 countries, 1960-2014



Source: Vink, M., G.R. de Groot and C. Luk (2013), *MACIMIDE Global Dual Citizenship Database, Version 1.02*, Maastricht University, Maastricht.

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And education?

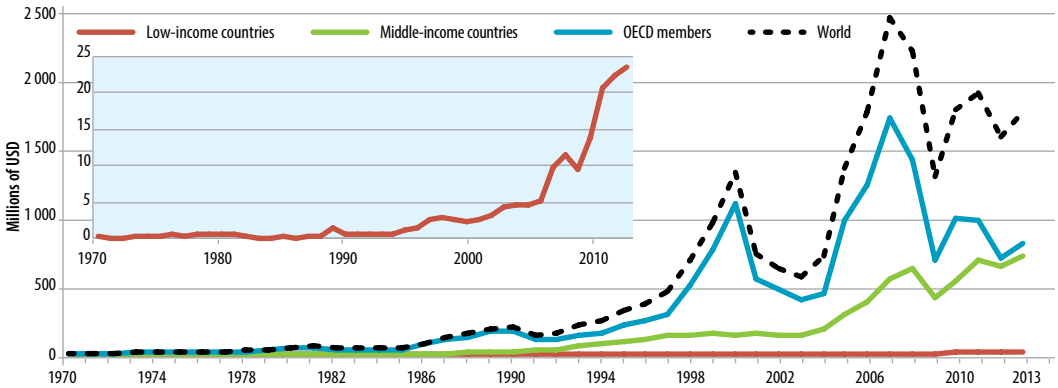
- How can schools better prepare for the inflow of students from various backgrounds, socio-economic classes and cultures? How can they better distribute their resources to aid students who need extra help, for example new immigrants, in the language of study?
- What responsibility do schools have in communicating and teaching the values of society? How can they better identify and stop radicalisation or tensions among groups? And how can teachers be supported in this task?
- Transferability of skills and experience is one of the big challenges for a diverse and mobile world. Are our educational and labour systems able to adequately recognise prior learning and qualifications? How should this be accomplished?

INTERCONNECTED FINANCIAL MARKETS

The global economy is changing, with the traditional dominance of OECD economies increasingly challenged by new players. Brazil, China, India and the Russian Federation now place comfortably among the world's ten largest economies. As markets are becoming increasingly global, countries and their economies are becoming more intertwined and interdependent. The growth in international trade and capital flows of OECD countries is slowing relative to middle-income countries, demonstrating the new-found importance and impact of these economies on world economic well-being. These changes are not just cosmetic, but rather a fundamental transformation in the balance of economic power. For education, this may provoke changes in the teaching of marketing, business, accounting and finance, as well as a new importance of global competencies.

Figure 1.7. **Increasingly global and volatile investment patterns**

Foreign direct investment in reporting country, in millions of USD, 1970-2012



Note: Foreign direct investment refers to direct investment equity flows in the reporting economy and is the sum of equity capital, reinvestment of earnings and other capital.

Source: World Bank (2015), "Foreign direct investment", *World Development Indicators*.

StatLink http://dx.doi.org/10.1787/888933316037

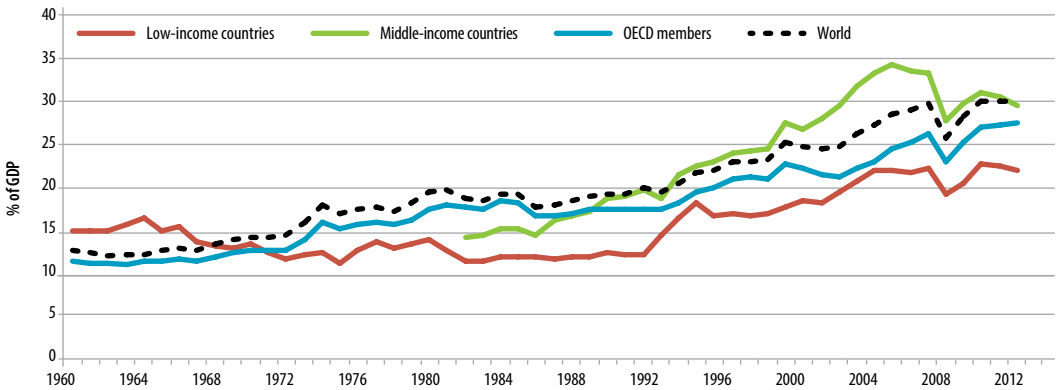
Foreign direct investment (FDI) is a type of cross-border investment in which a resident in one economy has control or influence on the management of a business registered in another economy. Between 1970 and 2013, world values for FDI increased by 170%. Most of this growth is due to middle-income countries, which experienced an increase in FDI of almost 500%. Low-income countries in comparison have had a much lower growth rate of 160% in that time, and as a result trail further behind their middle-income counterparts. Although FDI is expanding, these investments are affected by market shocks and evidence a cyclical pattern, especially in OECD countries which experienced the largest fluctuations in FDI following the 2007-2008 financial crisis. Indeed the most recent data from 2013 indicate that FDI in middle-income countries is nearing the level of that from OECD members, demonstrating the growth in economic power of these rising economies.

The percentage of GDP constituted by exports has grown worldwide since the early 1970s. Since the early 1980s, the fastest growth in exports has been observed

in middle-income countries, again indicating their growing economic strength and international influence. In fact, since 1990 the percentage of GDP constituted by exports has been largest in middle-income countries, replacing the OECD countries which previously had a larger share. This pattern has been consistent for more than two decades, although middle-income countries are still struggling to return to pre-financial crisis levels of exports to GDP.

Figure 1.8. **Rising exports**

Exports as a percentage of GDP, low-income, middle-income, OECD countries and world, 1960-2012



Note: Exports of goods and services includes the value of all goods as well as services such as communication, financial, information, business, personal and government services. They exclude compensation of employees and investment income and transfer payments.

Source: World Bank (2015), "Export of goods and services (% of GDP)", *World Development Indicators*.

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And education?

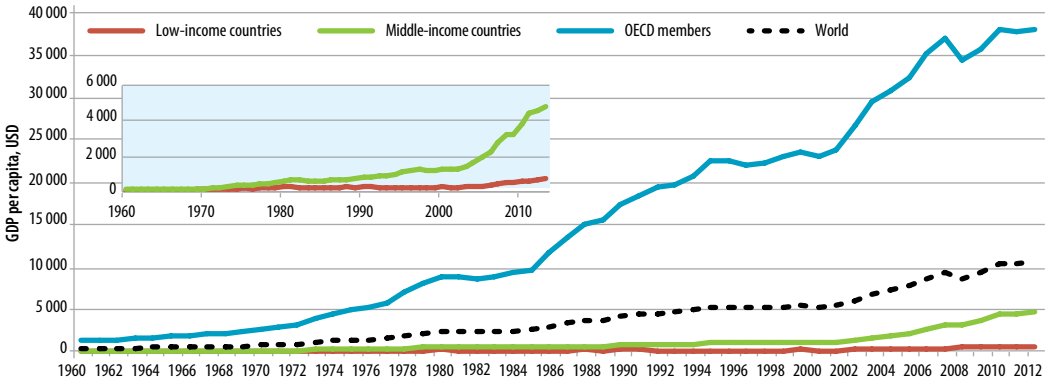
- Economies are becoming increasingly intertwined and interdependent. How can education nurture the kind of transferable skills to cope and adapt to economic uncertainty and change?
- Increasing competition in global markets has promoted the widespread notion that countries need constant innovation to maintain their competitive position. Does education foster and value the creativity necessary to be innovative?
- Just as our world has changed, so too has education, becoming increasingly mobile and flexible. How well do initiatives such as online learning, MOOCs, and lifelong learning deliver on their promises? How can they be strengthened?

INCREASING AFFLUENCE, INCREASING INEQUALITY

Affluence has increased in OECD countries in the last 30 years, but so has global inequality. There is a widening income gap between richer and poorer countries, and between richer and poorer individuals within countries. In most countries, the gap between rich and poor is at its highest level in 30 years. This increase in income inequality raises economic as well as social and political concerns. Inequality within countries hinders GDP growth, as better educational resources and opportunities are more widely accessible to higher-income individuals. One of the key means to promote equity and decrease inequality is through education, but for regions still struggling to build schools or ensure the security of their children in the classroom, ensuring quality education that is accessible for all is a difficult goal.

Figure 1.9. **Gap between richer and poorer regions widens**

GDP per capita by national income level and OECD member countries, 1960-2014



Note: GDP per capita is gross domestic product divided by midyear population. Data are in current US dollars.

Source: World Bank (2015), "GDP per capita", *World Development Indicators*.

StatLink http://dx.doi.org/10.1787/888933316056

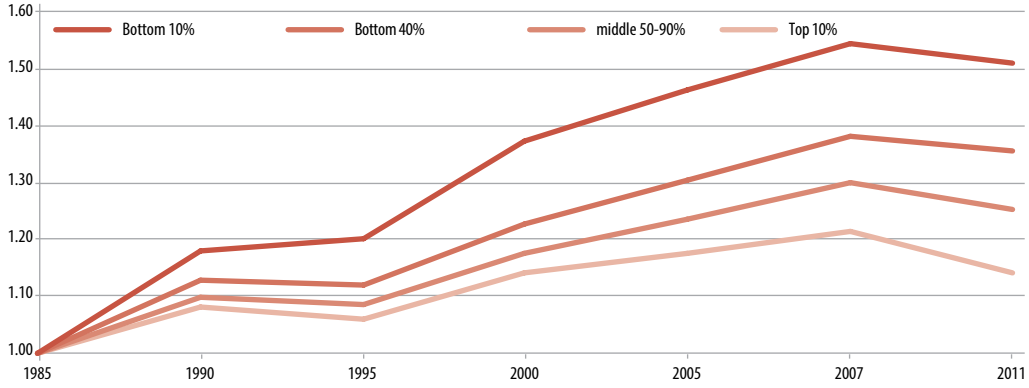
While per capita income levels for all countries have risen since 1960, so has the level of income inequality. Between 1960 and 2013, GDP per capita for middle-income countries experienced the largest growth, over 3 500%, while GDP per capita of low-income countries grew by only 700% in that time period. However, the GDP per capita of OECD nations has also grown in that time, and still largely outstrips the rest of the world. In fact despite the impressive growth of the middle-income countries, GDP per capita in 2014 was still roughly comparable to that of OECD member countries in 1975, 40 years ago. And despite all the progress made by middle-income countries, the gap between the richer and poorer regions is not decreasing.

In addition to an increase in inequality between countries, levels of income inequality have also increased within countries themselves. Today, in OECD countries, the richest 10% percent of the population earn 9.6 times the income of the poorest 10%. While all households have seen an increase in income levels since 1985, those in the top ten percent have seen a far larger increase than those in the bottom 10% and even the bottom 40%.

This pattern is sustained and increases over time. Moreover, even though the 2007-2008 financial crisis had an impact on all households, it also served to increase inequality between the highest and lowest income brackets: households with income in the bottom 10% saw the greatest decreases in levels of real household income.

Figure 1.10. **Lower and lowest incomes increasingly left behind**

Trends in real household incomes at the bottom, the middle and the top, OECD average, 1985 = 1



Note: Income refers to disposable household income, corrected for household size.

Source: OECD (2015) *In It Together: Why Less Inequality Benefits All*, http://dx.doi.org/10.1787/9789264235120-en.

StatLink http://dx.doi.org/10.1787/888933316065

And education?

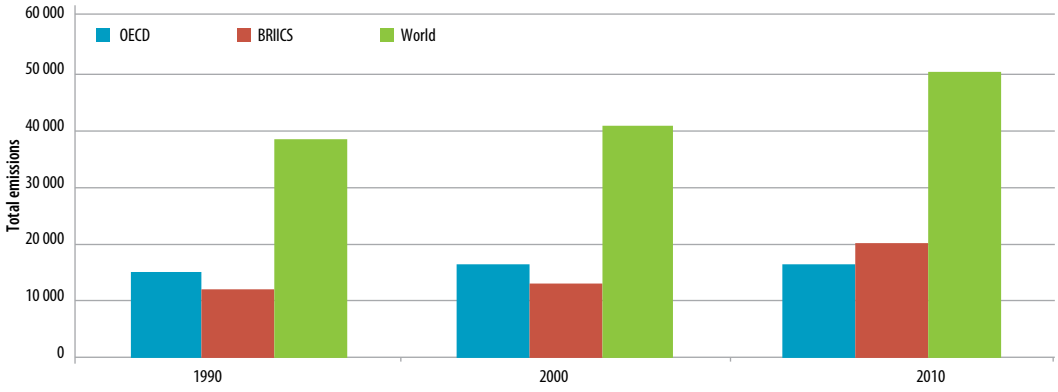
- Initial education and lifelong learning play a role in lifting people out of poverty by, for example, providing them with the right kinds of skills for the labour market. What kinds of incentives would strengthen this function of education? And what is the role of non-formal learning in this process?
- What responsibility do education systems have in teaching students about the challenges present in struggling and conflict ridden countries, and creating a sense of empathy, concern and support?
- Should OECD countries expand the role of tertiary education systems in sponsoring students from low-income countries? Could greater emphasis be placed on supporting tertiary offerings in poorer regions of countries?

THE GLOBAL THREAT OF CLIMATE CHANGE

Our natural world is at risk. Projected average temperature increases of just a few degrees would lead to water shortages for billions of people, reduce agricultural yields, increase malnutrition related deaths by millions and lead to the extinction of a large part of animal species. These devastating effects on the natural environment, and the insecurity they create, could lead to conflict and political instability, particularly in the developing world. The global community is moving to act now, before the damage done to our planet is irreversible. Paris has just hosted COP21, a UN convention on climate change. Its goal: to agree on a universal, legally binding agreement that will enable our governments and citizens to effectively combat climate change and help transition to resilient, low-carbon societies. Education can and should play a role in changing the behaviours, attitudes and expectations that could make a difference.

Figure 1.11. **Increasing greenhouse gases worldwide**

Emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, 1990-2010



Source: IEA (2014), *CO_2 Emissions from Fuel Combustion Statistics.*

StatLink http://dx.doi.org/10.1787/888933316074

One of the ways in which science has been charting the impact of human behaviour on the climate has been through tracking the levels of greenhouse gases. Greenhouse gases (for example, carbon dioxide [CO_2], methane [CH_4] and nitrous oxide [N_20]) absorb energy from the sunlight that reaches the Earth's surface, slowing or preventing it from being released back into the atmosphere. This causes the Earth's temperature to rise over time. Burning coal and the use of natural gas and oil for electricity and heat is the largest single source of global greenhouse gas emissions.[1] As seen in the figure above, the levels of greenhouse gases have risen considerably even in the last two decades, despite greater environmental awareness and early efforts to lower emissions. Much of the recent rise is due to increasing industrial and agricultural activity outside the OECD countries.

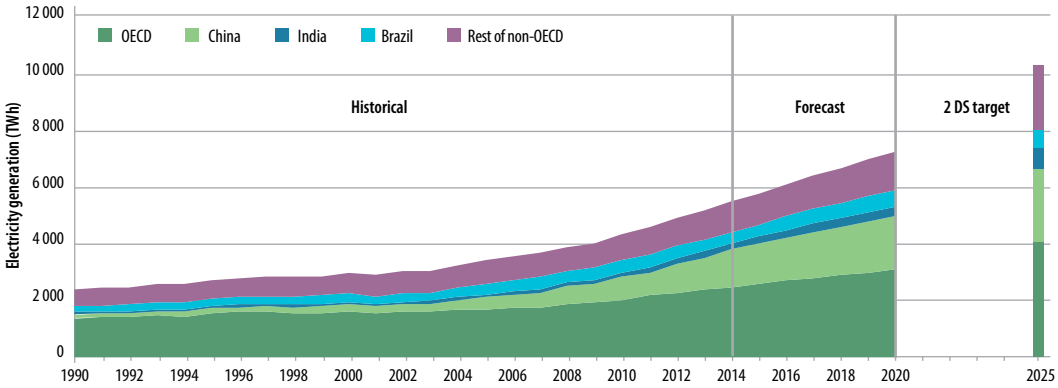
One of the ways to reduce emissions of greenhouse gases is to reduce the use of fossil fuels (such as coal and oil) and increase the use of renewable energies. Renewable energies generate power from wind, solar, hydro and other infinite resources. The generation of such clean energy has been increasing across the OECD, led by countries such as Canada, Germany and the United States. China has also emerged as an important player in this

A corrigendum has been issued for this page. See
http://www.oecd.org/about/publishing/Corrigendum-TrendsShapingEducation2016.pdf

market. However despite forecasts of continued growth, Figure 1.10 demonstrates that we are still not on track to meet the 2025 target required to limit the global increase in temperatures to no more than two degrees Celsius. This is the level that has been identified as necessary to minimise the risk of damaging our environment, potentially irreversibly.

Figure 1.12. **Total renewable power generation by region**

Total renewable electricity generation by region, Terawatt-hours (TWh), 1990-2025



Note: 2DS is the 2 degrees scenario of energy technology perspective created by the OECD/IEA.

Source: IEA (2015), *Medium-term Renewable Energy Market Report 2015*; IEA 2015a: http://dx.doi.org/10.1787/renewmar-2015-en; IEA (2015), *Energy Technology Perspectives 2015*, IEA 2015b: http://dx.doi.org/10.1787/energy_tech-2015-en.

StatLink http://dx.doi.org/10.1787/888933316086

And education?

- What kind of tertiary and post-secondary training might be needed to provide the skills needed for a green economy?
- How can education foster the necessary attributes and knowledge to foster the international co-operation to devise a plan for co-ordinated action on global climate change?
- What is the role of formal education in raising awareness and creating responsible citizens with civic values, critical thinking skills and sustainable consumption habits?

INFOGRAPHIC: GLOBALISATION AND EDUCATION

What are some of the ways the global trends presented in this chapter interact with education? And how can education affect these trends? Some answers are obvious and immediate, for example the impact of increasing migration on the school system, and conversely, the potential for education to influence the life outcomes of the most disadvantaged. Others are less obvious, or more long-term, for example the impact of climate change on planning and school infrastructure.

This section is an invitation for readers to consider how the trends interact with education, both in terms of the effect they might have on education, and also the effect education might have on the trends. While the trends presented are robust, the links with education are illustrative and suggestive. They are not intended as conclusive answers to policy questions. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning.

Global citizenship

- Encouraging foreign language learning and intercultural business skills
- Developing global competencies such as tolerance, co-operation and cultural awareness
- Fostering creativity and innovation

Migration

- Providing language courses for students and parents
- Teaching understanding and acceptance of diverse cultural values
- Recognising prior learning and qualifications

Emerging economies

- Using new technologies to extend the reach of education, including online tertiary education
- Encouraging international exchange programmes with low-income countries
- Addressing issues of brain drain

Inequality

- Building country-level human capacity through education and skills systems
- Providing high-quality early childhood and care, especially for low-income households
- Funding mechanisms and incentives for disadvantaged students to complete tertiary education

Climate change

- Learning and building awareness of global climate challenges and solutions
- Encouraging the study of science, including environmental sciences
- Planning school infrastructure around sustainability and conservation as well as preparing for extreme weather events

Brainstorming the links between global trends and education

Readers are encouraged to use this visual as a point of departure for the question: "What do these trends mean for my education system and my work?"

Figure 1.13. **Infographic: Globalisation and education**

NOTES

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FIND OUT MORE

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Definitions and measurement

- **2 Degree Scenario (2DS)**: A scenario under which the evolution of the energy system is consistent with limiting the long-term increase in global temperatures to 2° C.
- **Anocracy**: Countries and political systems that are categorised as lying somewhere on the spectrum between autocracies and democracies. These systems contain certain elements of both political systems and could not be characterised as being entirely democratic or autocratic. Anocracy is loosely defined as being part-democracy and part-autocracy.
- **Autocracy**: Political system in which power is concentrated in the hands of a single person or a group. This concept is loosely used to refer to totalitarian, absolutist, fascist among other forms of political regimes.
- **COP21**: The 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change hosted in Paris at the end of 2015. It aimed to reach a legally binding international agreement to keep global warming below a 2°C increase.
- **Democracy**: Political system in which citizens are allowed to participate in the political decision making and discussions. Politicians are typically elected by the citizens in free and fair elections, and serve therefore as representatives of the people.
- **Foreign direct investment (FDI)**: FDI is a type of cross-border investment in which a resident in one economy has control or influence on the management of a business registered in another economy.
- **Globalisation**: Globalisation is the widening, deepening and speeding up of connections across national borders. It is generally used to describe an increasing internationalisation of markets for goods and services, the means of production, financial systems, competition, corporations, technology and industries.
- **Greenhouse Gases (GHG)**: Greenhouse gases – for example, carbon dioxide CO_2, methane CH_4, nitrous oxide N_20, perfluorinated compounds PFC and sulfur hexafluoride SF_6 – absorb energy from the sunlight that reaches the Earth's surface, slowing or preventing it from being released back into the atmosphere, causing the Earth's temperature to rise.
- **Gross domestic product (GDP)**: GDP is a standard measure of the value of the goods and services produced by a country. Gross means that no deduction has been made for the depreciation of machinery, buildings and other capital products used in production. Domestic means that it is production by the residents of the country. As many products in a country are used to produce other products, GDP is calculated by summing the value added for each product.
- **Gross domestic product per capita ("GDP per capita")**: GDP per capita is gross domestic product divided by population. It is a core indicator of economic performance and commonly used as a broad measure of average living standards or economic well-being.
- **Gross national income (GNI)**: GNI is defined as GDP plus net receipts from abroad of wages and salaries and of property income plus net taxes and subsidies receivable from abroad.
- **High-income country**: The World Bank defines high-income economies as those with a GNI (Gross national income) per capita of 12 736 USD or more. Most OECD member countries would be defined as high-income countries.

- **Immigration**: The act of entering a country where one was not born with the intention of living there. Countries define immigration by measuring either foreign nationals or foreign-born.
- **International migrant stock**: The number of people born in a country other than that in which they live.
- **Low-income country**: The World Bank defines low-income countries as countries whose GNI per capita is of 1 045 USD or less in 2014. No OECD member country is categorised as a low-income country.
- **Middle-income country**: The World Bank defines middle-income countries as countries whose GNI per capita is more than 1 045 USD but less than 12 736 USD in 2014. The 4 125 USD GNI per capita threshold separates lower-middle and upper-middle income countries. Of the OECD members, Mexico and Turkey are classified as upper-middle income countries.
- **Multinational companies (multinationals)**: Multinational firms own assets or have facilities in at least one country other than their home country. They work across national boundaries to manufacture goods which are then sold in multiple markets worldwide.
- **Terawatt-hours (TWh)**: Unit of energy equivalent to 10^{12} watts/hour. It is commonly used to measure the annual energy consumption of countries.

Chapter 2

The future of the nation-state

The future of the nation-state trends: A visual overview *– a display of the trends in this chapter and the connections between them.*

Tightening the belt: Prioritising national spending *– social expenditure has increased across all OECD countries as life expectancy increases, although retirement age has remained the same.*

Securing our national borders *– illustrates the reductions in military expenditure associated with a parallel decline in the willingness to fight for one's country.*

Women at work *– reflects a larger female presence in the labour market, including in top managerial positions.*

Entrepreneurship and knowledge societies *– examines government policies to incentivise entrepreneurship and a growing geographical dispersion of innovation.*

The picture of health *– looks at old and new health challenges, such as Alzheimer's disease, diabetes and obesity.*

Infographic: The nation-state and education *– a visual exploration of the links between the trends in this chapter and education.*

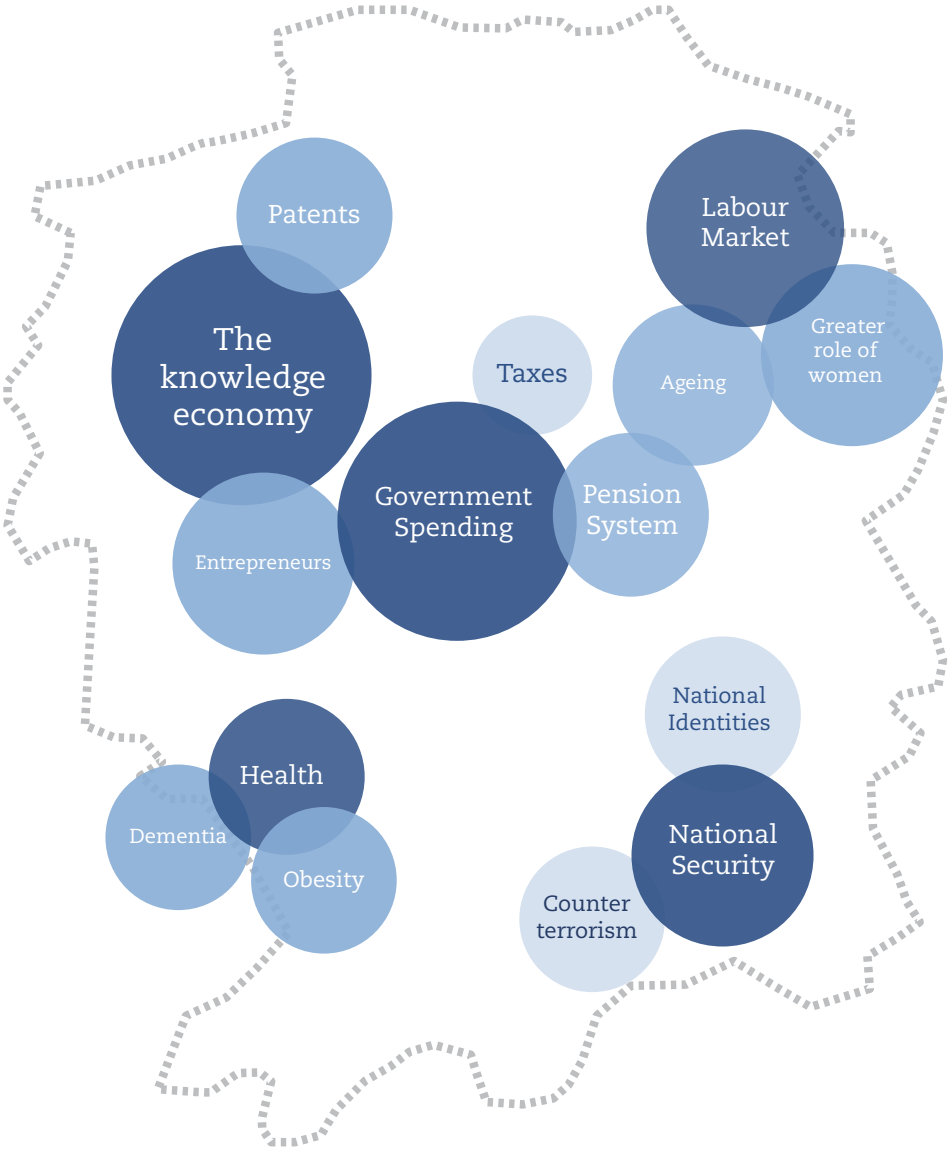
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

THE FUTURE OF THE NATION-STATE TRENDS: A VISUAL OVERVIEW

Urgent global challenges of the 21st century, such as climate change and growing inequality, require global solutions. However the nation still plays a central role in ensuring the well-being and security of its citizens as well as developing and maintaining the labour market and economic productivity. Nation-states now face a series of new challenges: our population is ageing, a thriving economy demands constant innovation and fewer citizens report being willing to fight for their own countries.

This chapter examines a set of key trends affecting nations. While they are all relevant to education, not all pertinent trends are included – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence.

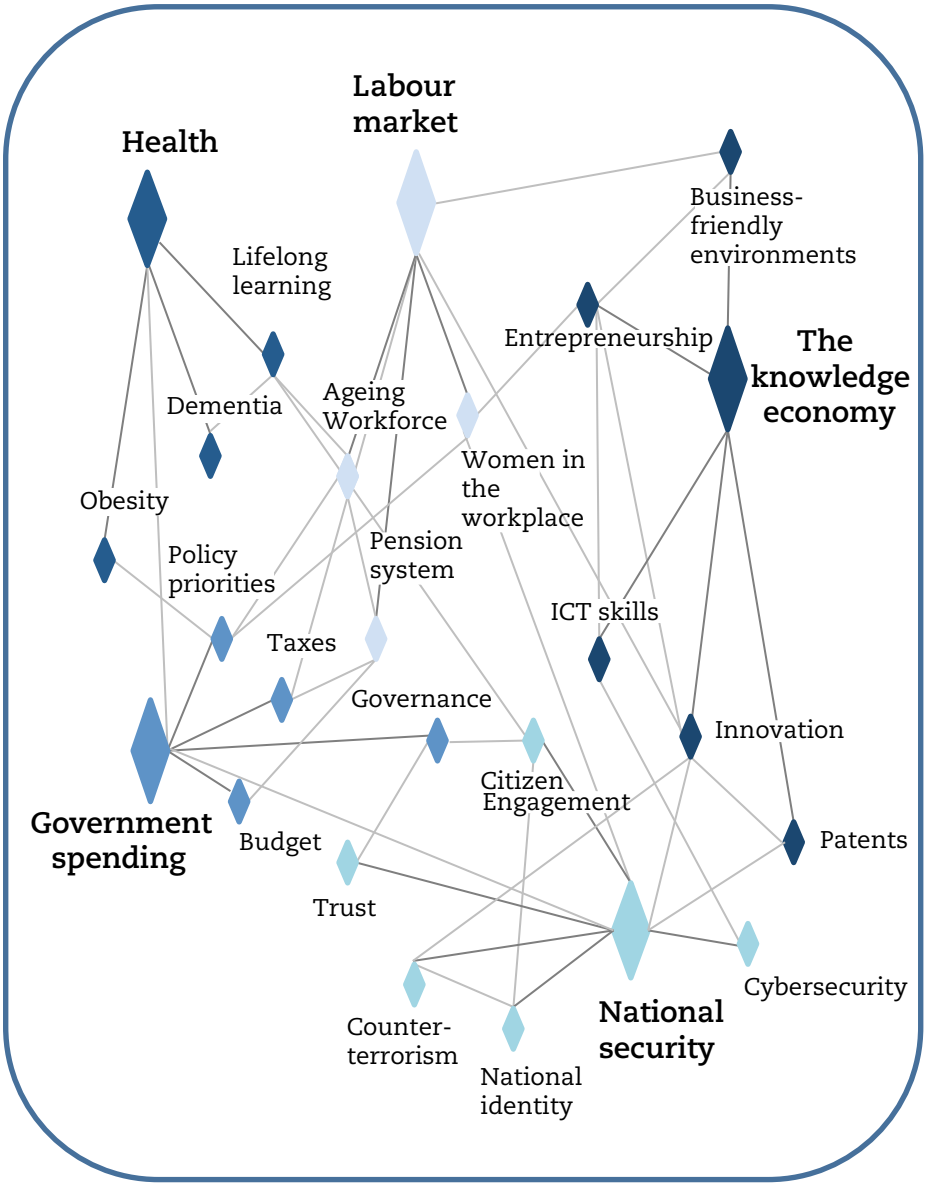
Figure 2.1. **The future of the nation-state trends: A visual overview**



Interactions between the trends

These trends do not exist in isolation. One of the major challenges facing OECD countries, and indeed most countries worldwide, is how to balance public spending in difficult economic times. How will rising health and pension costs associated with living longer affect budgets available for other spending areas, such as education and defence? How might government sectors co-ordinate with each other to tackle the new public policy challenges? The trends themselves are interrelated and influence each other, sometimes in unpredictable ways. Some of the connections between the trends in this chapter are illustrated below.

Figure 2.2. **Interactions between nation-state trends**

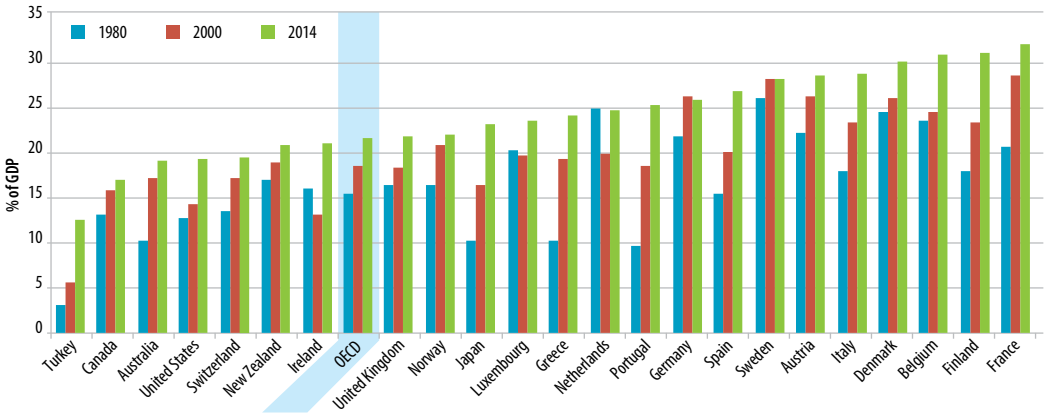


TIGHTENING THE BELT: PRIORITISING NATIONAL SPENDING

Although global challenges such as climate change and migration require global solutions, national governments still have important responsibilities to fulfil. They must protect the safety and well-being of their citizens as well as the sovereignty of their borders. They must also manage the economy, ensuring stability and planning for the nation's long-term fiscal priorities. This section explores the impact of changing demographic trends on government expenditure in OECD countries. One of the great policy challenges is how to deal with increased health and pension expenditures associated with ageing while still covering other essential funding, for example in education. How will rising health and pension costs affect budgets available for other spending areas? And how can education partner with other sectors in order to tackle these issues from an intra-governmental perspective?

Figure 2.3. **Increases in social expenditure**

Social expenditure as a percentage of GDP in 1980, 2000 and 2014



Note: 1995 data for Turkey were used instead of 2000. 2011 data were used for Japan, 2012 data for Mexico, 2013 data for Chile, Israel, New Zealand and Turkey instead of 2014 data.

Source: OECD (2015), *Social Expenditure - Aggregated data*, OECD Stat, https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG.

StatLink http://dx.doi.org/10.1787/888933316098

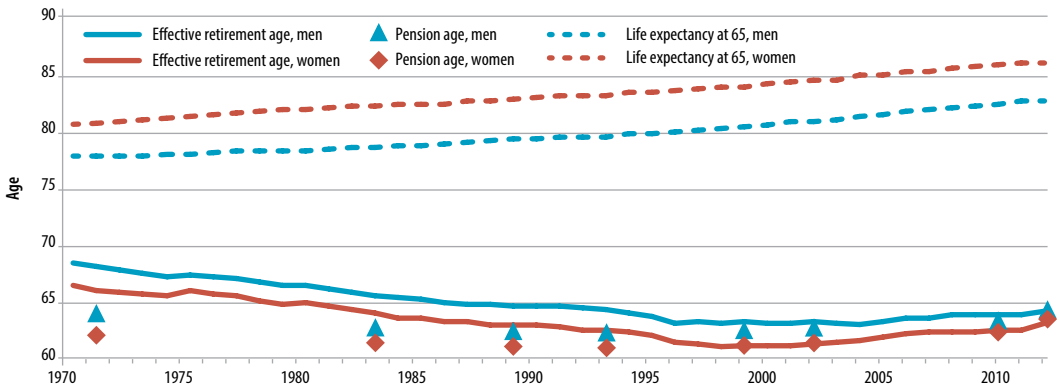
On average across the OECD, public social expenditure rose from just over 15% of GDP to almost 22% of GDP between 1980 and 2014. This average belies wide country variation: in 2014, social expenditure comprised over 30% of GDP in Belgium, Denmark, Finland and France, while it accounted for less than 13% of GDP in Turkey. Despite these country differences, however, the trend is clear: social expenditure as a percentage of GDP rose in all countries since 1980. The biggest increases in that time period were in Turkey, which quadrupled its social expenditure as a percentage of GDP, followed by Greece, Japan and Portugal, which each doubled their social expenditure as a percentage of GDP.

In OECD countries, the average life expectancy for both men and women is increasing. Ageing populations are associated with higher costs for healthcare, assisted living and pensions, all of which are expected to increase social expenditure. Despite these

intersecting trends, there has been very little change in the average age at which someone can officially become a pensioner (up from 64 to 65 years old for men and from 62 to 64 years old for women since 1970). Interestingly, the effective retirement age in OECD countries has declined slightly in this time period, as older people stop working earlier than before. These trends result in more free time as a senior: in 1970, men used to spend less than ten years in retirement on average, an average that had increased to nearly 20 years in 2012. For women, the trend is more pronounced: in 2012, women in OECD countries spent an average of over 22 years in retirement.

Figure 2.4. **Longer life, longer retirement**

Longevity, effective retirement age and legal age at which one can become a pensioner, OECD country average, 1970-2012



Note: Effective retirement age calculated as a weighted average of (net) withdrawals from labour market at different ages over a 5-year period for workers initially aged 40+. Red lines derived from census data rather than annual labour force surveys.

Source: OECD (2015), *Health Status*, OECD Stat, https://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT; *OECD (2011), Pensions at a Glance 2011:* http://dx.doi.org/10.1787/pension_glance-2011-en.

StatLink http://dx.doi.org/10.1787/888933316107

And education?

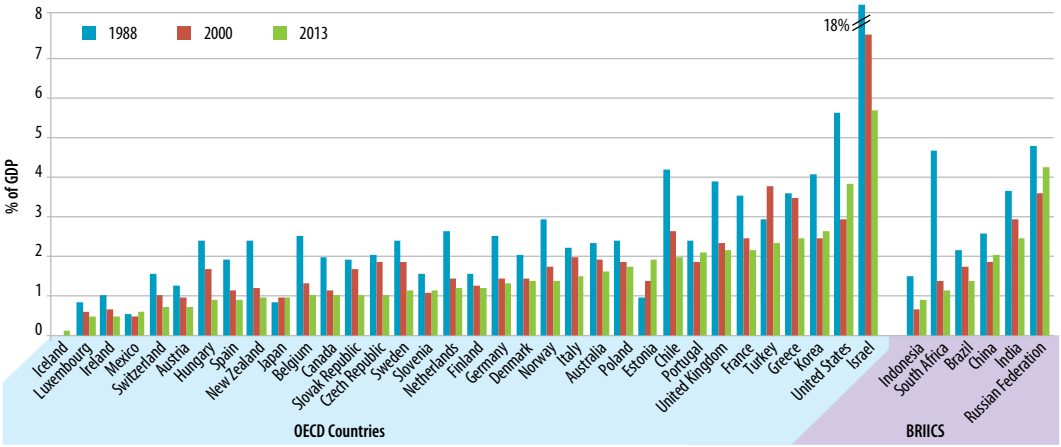
- As health and pension expenditures increase, national governments are expected to face increasingly tight budgets. How might education co-operate with other sectors to tackle the public policy challenges from a cross-governmental perspective? Should other actors, such as citizens and companies, help finance the education system?
- With workers living longer and spending more time in the labour market, how can current education systems prepare their students with the skills necessary to adapt to constantly changing labour market demands?
- Ageing populations and later retirement age in many OECD countries mean that the proportion of the population within working age range (15-65 years) will increase in the future. What is the role of lifelong learning (formal and informal) in reinforcing and supporting the skills and mental health of the oldest workers? Of the retired?

SECURING OUR NATIONAL BORDERS

The nation-state is responsible for ensuring the security of its citizens. National security is reinforced by strong economic ties and regional co-operation as well as a strong military. Economic trade agreements, regional co-operation, and reductions in military spending across the OECD and the BRIICS help maintain and improve national and international security. Yet countries struggle to recruit quality soldiers with the skills required for modern warfare, and fewer people report being willing to fight for their country. What is the future of national security? Will rises in extremism and global instability lead to increased military spending, reversing this long-standing trend? And how can education systems contribute to preparing military personnel with the necessary skills and knowledge to participate in today's conflicts?

Figure 2.5. **Military expenditure decreasing**

Military spending as a percentage of gross domestic product (GDP) in OECD and BRIICS countries, 1988, 2000 and 2013



Note: 1989 data shown for China, 1990 for Poland, 1991 for Hungary, 1992 for the Russian Federation, 1993 for the Czech Republic and Slovak Republic, and 1995 for Estonia and Slovenia instead of 1988. 2012 data shown for Iceland instead of 2013. Additionally, Israel is off the chart at over 18% in 1988.

Source: World Bank (2015), "Military expenditure (% of GDP)", *World Development Indicator.*

StatLink http://dx.doi.org/10.1787/888933316118

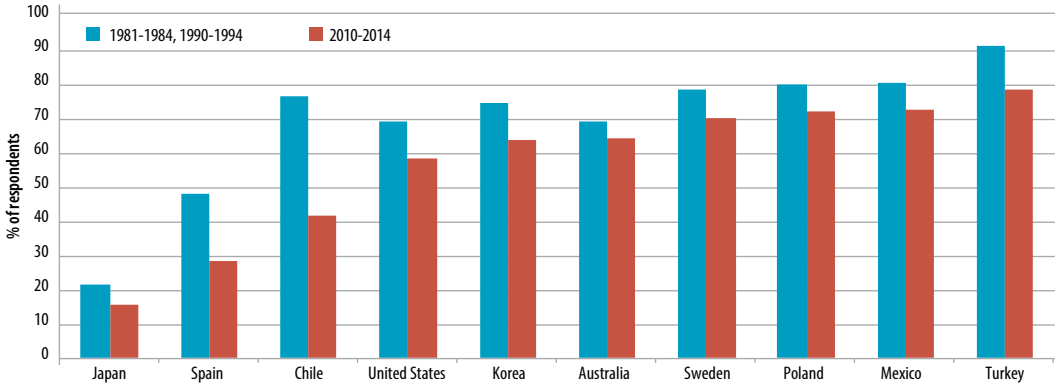
Military spending[1] has been decreasing across most of the OECD and BRIICS countries in the last 25 years. For a number of countries, including Chile, Israel and much of Europe, military spending has consistently decreased across that time period. In countries such as Iceland, Luxembourg, Mexico and Switzerland, military expenditure is less than one percent of gross domestic product (GDP). For others, notably the United States, military spending decreased between 1988 and 2000, but increased again from 2000 to 2013. In the short term, the reduction in military spending has helped ease some of the burden of economic cuts and deficits in overall government spending. Continuing uncertainty and global tensions suggest that it is too early to be sure if the reduction in spending will continue in the future. Indeed, there is evidence that in some countries this trend is reversing: military expenditure as a percentage of GDP grew in Estonia, Japan, Mexico and the Russian Federation between 2000 and 2013.

From 1981 to 2014, reported willingness to fight for one's country declined in all ten nations for which the data were available. Of those ten countries, respondents in Turkey report being the most willing – at nearly 80% – to fight for their country, although this figure decreased from almost 90% in 1990. On the opposite end of the spectrum, respondents in Japan reported the lowest willingness to fight for their country in both 1981 and 2014, at just under 20% and 15%, respectively. The biggest decline over the last 30 years was reported in Chile, where willingness to fight for your country fell by almost half.

These data are telling in terms of what they reveal about values and national identity, and they also quantify a very real challenge facing the armed forces of our nations. As the threats faced by nations transform with the modern world, so too do the skills they require of their soldiers. Falling voluntary applications for service in the armed forces is accompanied by a rise in concerns about maintaining the quality of military recruits.

Figure 2.6. **Fewer willing soldiers**

Percentage of respondents declaring willingness to fight for one's country in a selection of OECD countries, 1981-2014



Note: Data from 1981 to 1984 for Australia, Japan, Korea, Mexico, Sweden and the United States. Data from 1990 to 1994 for Chile, Poland, Spain and Turkey. Interviewees were asked "Of course, we all hope that there will not be another war, but if it were to come to that, would you be willing to fight for your country?".

Source: World Values Survey (2015), *Waves 1981-1984, 1990-1994 and 2010-2014*.

StatLink http://dx.doi.org/10.1787/888933316122

And education?

- Defence spending on research and development has produced major technologies (for example, the Internet, jet engines and satellite navigation). Will decreases in defence spending have an impact on national and international innovative capacity? What is the role of tertiary education in supporting innovative research, and where will the funds come from?
- Civic education has been linked to increased tolerance, trust and supporting nation building. Is this potential being fully exploited by our schools? Can we do more?
- New threats such as cyberattacks and biological weapons require new strategies to defeat them. How can education systems produce the highly-skilled and flexible workforce with the skills necessary (ICT, problem solving, critical thinking, languages, etc.) to secure our nations?

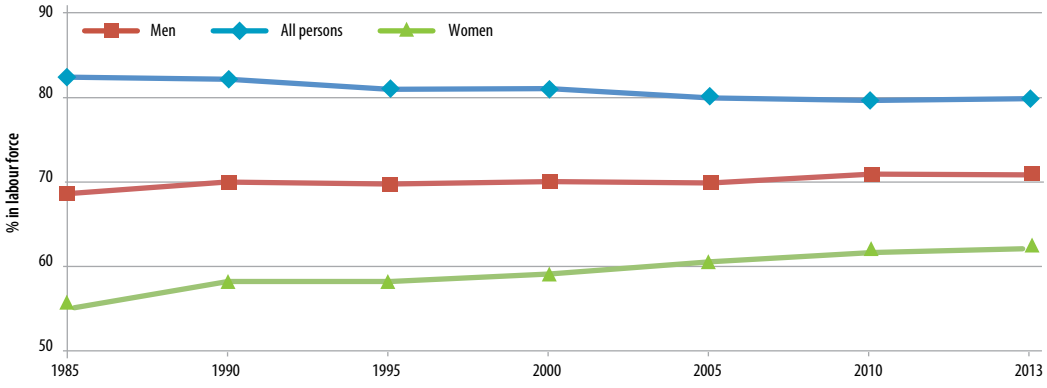
A corrigendum has been issued for this page. See
http://www.oecd.org/about/publishing/Corrigendum-TrendsShapingEducation2016.pdf

WOMEN AT WORK

One of the most significant social transformations of the past half century has been the move towards equality of opportunity for women. Women's labour force participation has steadily risen in that time period. In many countries, higher labour force participation is also accompanied by higher fertility rates as young parents are no longer forced to choose between work and family. However there are persistent challenges: the continuing difficulty of reconciling family and working life, unequal representation of women in managerial and entrepreneurial roles and a continuing gender wage gap. For education, this suggests that we need to make sure that women are being given the education and leadership skills they need to excel in the modern workplace. But it also means we must pay attention to the boys, who are struggling to shine educationally in many countries.

Figure 2.7. **Closing the gender gap?**

Labour force participation rate by gender in OECD countries, 1985-2013



Note: Labour force participation includes full and part-time work.

Source: OECD (2015c), "Labour Market Statistics : Labour force statistics by sex and age: indicators", *OECD Employment and Labour Market Statistics* (database), http://dx.doi.org/10.1787/data-00310-en.

StatLink http://dx.doi.org/10.1787/888933316133

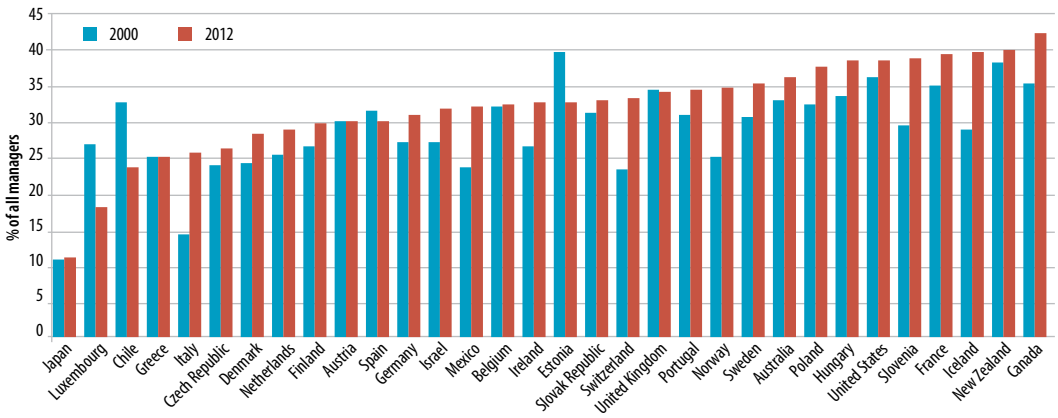
In the last 30 years the average labour force participation rate for women in OECD countries has been increasing modestly, from 56% in 1985 to 63% in 2013. At the same time, labour force participation rate for men has very slightly decreased, dropping almost three percent over those years. Despite this, there is still a gap: in 2013, the labour force participation rate for women was 17% lower than for men. In addition, women still earn substantially less than men and over the last ten years the gender based wage gap has only marginally decreased. Working to reduce the gap in labour force participation and wages is important for social and political reasons as well as economic growth. A report by the International Monetary Fund (IMF) argues that the gender gap in the labour market accounts for up to 27% of lost GDP per capita. Raising female labour market participation to male levels could raise GDP in the United States by 5%, in Japan by 9% and in Egypt by as much as 34%.

Given that the labour force participation rate for women has been increasing, it is not surprising that the share of managerial positions held by women in the public and

private sectors increased between 2000 and 2012 in most OECD countries. However there is wide country variation: in 2012, 42% of managerial positions in Canada were occupied by women, whereas only 11% of managers in Japan were women. And while the share of women managers rose by as much as 10% in countries like Italy, some countries show the opposite trend: between 2000 and 2012 the percentage of female managers decreased by over 7% in Chile, Estonia and Luxembourg. Women are also far less likely to become entrepreneurs: across the 27 EU countries, only 25% of business owners with employees are female, a figure that has not significantly changed in the last decade. Education can play a role in encouraging leadership and entrepreneurship skills in all children and adults.

Figure 2.8. **More female managers**

Percentage of managerial positions held by women in private and public sectors, 2000-2012



Note: Due to availability of data, 2009 figures are given in place of 2000 for Japan.

Source: International Labour Organization (2015) *Global Report, Women in Business and Management Gaining Momentum*.

StatLink http://dx.doi.org/10.1787/888933316146

And education?

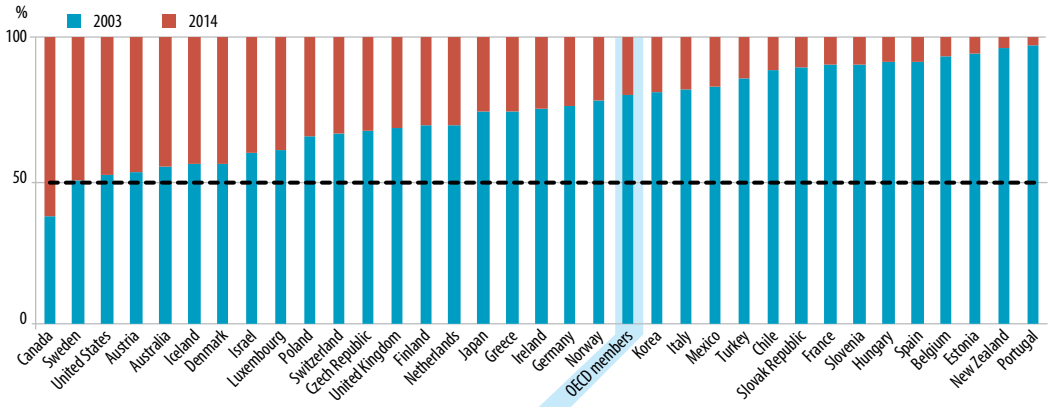
- Given the persistence of wage inequality across the OECD, what are the ways that both male and female students can be supported to develop the behaviours and attitudes they need to succeed in the workplace (for example, critical thinking skills, self-assertiveness, etc.)?
- What impact do ever-greater numbers of mothers with full professional careers have on education? Do countries have the quality and capacity needed in their early childhood education and care for both parents to work full time?
- Social and gender stereotypes can often play out in the workplace. What is the role of education in challenging negative assumptions and behaviours that are part of these stereotypes? Should there be more male teachers in kindergartens? More women in positions of school leadership?

ENTREPRENEURSHIP AND KNOWLEDGE SOCIETIES

Entrepreneurship and research and development (R&D) levels are good indicators of innovation in a nation. This section examines two interconnected trends: the number of days required to start a business and increasing globalisation of the knowledge society as measured by international scientific collaboration. Governments are moving to streamline procedures required to start a business, lightening the administrative load and incentivising entrepreneurship. Additionally, international scientific collaboration is rising across OECD countries as global networks of researchers become increasingly important. Educators need to be aware of the advanced skills their students will need to flourish in more knowledge-intensive and international labour markets without neglecting the development of other important competencies, such as citizen engagement and social skills.

Figure 2.9. **Incentivising entrepreneurship**

Number of days required to start a business in 2014 relative to the number of days required in 2003



Note: 2004 data shown for Iceland and 2007 data for Luxembourg instead of 2003 data. Time required to start a business is the number of calendar days needed to complete the procedures to legally operate a business.

Source: World Bank (2015), "Time required to start a business (days)", *World Development Indicators*.

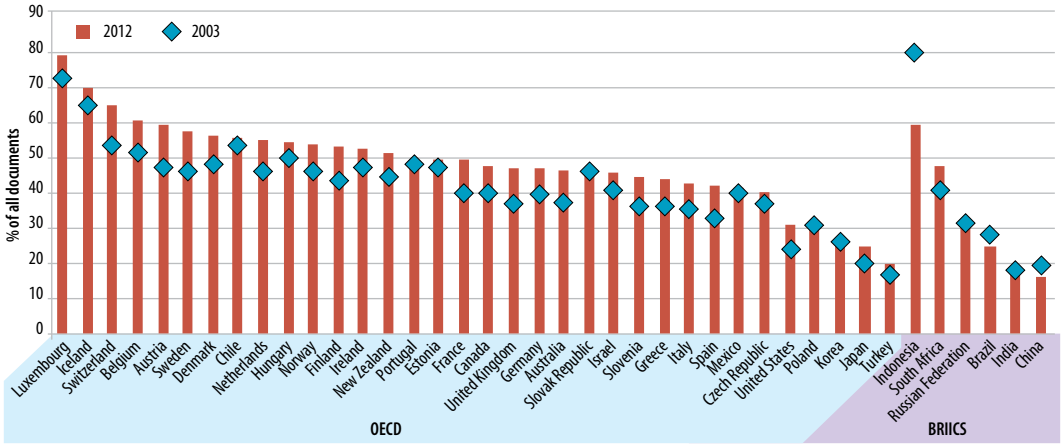
StatLink http://dx.doi.org/10.1787/888933316159

Over the last decade entrepreneurs have been able to start businesses faster in the vast majority of OECD countries. Whereas on average in 2003 it required over 36 days to start a business, by 2014 this had decreased to just under 9 days. Some of the transformations of this process are dramatic: in Portugal, for example, nearly 3 months were required on average to start a business in 2003. This had been reduced to only 3 days on average in 2014. Similarly Estonia reduced the length of the process from 72 days in 2003 to under 5 in 2014. In contrast, Canada was the only country where the number of days to start a new business *increased* in that time period, although the process is still quite swift, growing from 3 days in 2003 to 5 days on average in 2014. Although it is just one measure, time to start a business is suggestive of both the support given to entrepreneurs and the alignment of the various licensing and government departments needed.

Although OECD countries are moving to streamline and incentivise entrepreneurship, remaining at the forefront of the global knowledge economy requires more. Researchers are increasingly working in collaboration with colleagues from other countries. As measured by the numbers of publications with international co-authors, almost all OECD countries increased their international scientific collaboration between 2003 and 2012. The United States experienced a 33% increase in the percentage of documents produced through international collaboration, the largest increase of any country within the OECD and BRIICS. 77% of documents produced in Luxembourg utilised international collaboration, the highest percentage among OECD and BRIICS countries. All BRIICS countries except for South Africa experienced a drop in the percentage of documents using international collaboration, with the largest drop seen in Indonesia. Education systems will not only have to guarantee that students are able to master the technical skills required by the knowledge economy but also that they foster international and scientific co-operation.

Figure 2.10. **International scientific collaboration**

International scientific collaboration as a percentage of all documents, 2003 and 2012



Note: International collaboration is defined as the proportion of publications involving institutional affiliations with other countries or economies, as a proportion of publications attributed to authors with an affiliation in the reference economy.

Source: OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015: Innovation for Growth and Society*, http://dx.doi.org/10.1787/sti_scoreboard-2015-en.

StatLink http://dx.doi.org/10.1787/888933316164

And education?

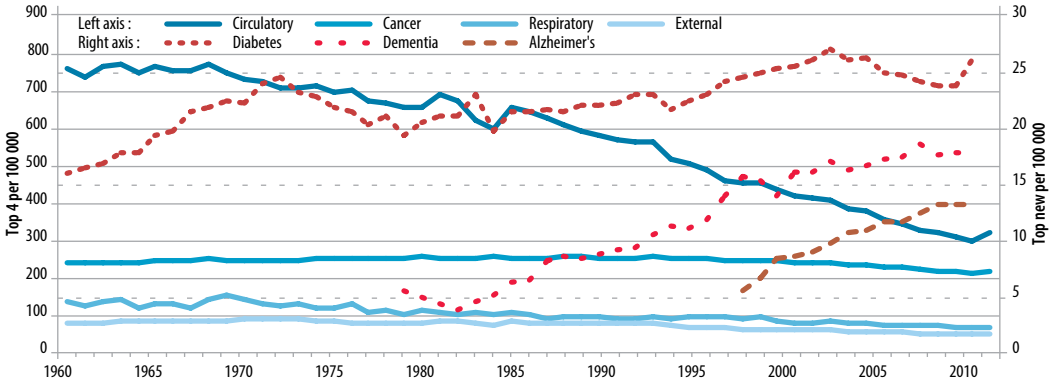
- Technological advances and increased R&D investment have helped develop a global market for research. Should governments target funding to incentivise specific areas of research in order to maximise the competitiveness of their higher education sector?
- What is the role of education in promoting entrepreneurship and providing the skills required to be self-employed, such as decision making, risk-taking and creativity?
- Are the policies of governments and tertiary institutions sufficiently aligned to provide the funding and training needed to power the knowledge-intensive economies of the future?

THE PICTURE OF HEALTH

The nation-state is charged with establishing healthcare spending and priorities. Being able to identify and treat new threats to public health and well-being is an important aspect of that responsibility. Due to improved technologies and better awareness and prevention, the rates of major causes of death have been generally decreasing in the last 60 years. At the same time however, new causes of death and new health concerns have emerged, which require specific attention. Diabetes and dementia are now the fastest growing causes of death across OECD countries. Rates of diabetes are related to the obesity epidemic:[2] *As more "plump" children become obese adults, diabetes rates will continue to grow, along with heart disease and certain cancers. Rates of dementia are related to our ageing population and better awareness of mental health issues. Education has a role to play in preventing and treating these health conditions.*

Figure 2.11. **Changing causes of death**

The top causes of death (left axis) and the fastest growing causes of death (right axis) in OECD countries, 1960-2012



Note: Circulatory diseases include strokes and heart attacks; respiratory diseases include bronchitis and emphysema; external includes suicide, accidents and homicide. Alzheimer's is a type of dementia which accounts for over 60% of dementia cases.

Source: OECD (2013), *Health Status: Causes of Mortality*, OECD Stat, https://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

StatLink http://dx.doi.org/10.1787/888933316178

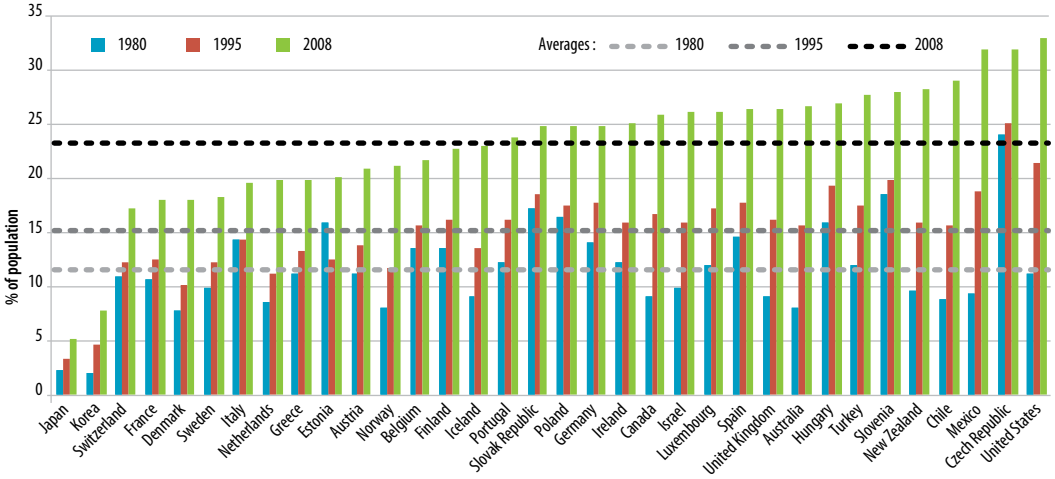
Due to improved technologies, better awareness and shifts in lifestyles, the major causes of death in OECD countries are changing. In 1960, the top four causes of death were circulatory disease, cancer, respiratory disease and external causes such as accidents or assault. Since 1960, however, the rates of death from all four of these conditions have decreased, most notably for circulatory diseases which have more than halved. At the same time, other causes of death are growing in importance, relating to changes in lifestyle and demography. The fastest growing new causes of death are diabetes and dementia (in red above). While they still account for far fewer deaths than the four top causes of death, they highlight new areas of public and personal concern. Diabetes is linked to increasing obesity in our nations and changes in lifestyle patterns such as

reduced physical activity. Dementia and Alzheimer's are linked to our ageing population as well as increased awareness and reporting of mental illness.

These new patterns point to areas of serious concern for our governments, from both a spending and public health perspective. The obesity epidemic is real: the percentage of the population that was obese increased in nearly all OECD countries between 1980 and 2008. Even Japan and Korea, the two OECD countries with the lowest levels of adult obesity, have child obesity rates that are at or above the OECD average. Obesity can produce long-term adverse psychological and social outcomes as obese people are more likely to suffer from poor self-esteem, anxiety and depression. Research shows that society perceives obese people less positively, which could have an impact on perceived competence for employment, community work and public office. Indeed, obese workers earn on average less than their non-obese counterparts. Education can play a big role in reversing this unhealthy trend, by stimulating physical activity and healthy eating patterns.

Figure 2.12. **The obesity epidemic**

Percent of population in OECD countries considered obese, 1980, 1995 and 2008



Source: Stevens, G. et al (2012), "National, regional and global trends in adult overweight and obesity prevalence", *Population Health Metrics 2012*.

StatLink http://dx.doi.org/10.1787/888933316184

And education?

- Should schools ban sugary drinks and fast food items from their cafeterias or impose daily physical education classes in order to lower overweight rates among their students? What should the role of schools and teachers be in inspiring healthy behaviours?
- How can education systems improve physical health among children and youth without fat-shaming or encouraging bullying?
- Many older people are physically and mentally active for much longer. What role should the education system (formal and informal) play in promoting well-being among the elderly? What is the best way to increase health literacy among seniors?

INFOGRAPHIC: THE FUTURE OF THE NATION AND EDUCATION

What are some of the ways the national trends presented in this chapter interact with education? And how can education affect these trends? Some answers are obvious and immediate, for example the impact of increasing obesity on the health and well-being of students and teachers, and conversely, the potential of education to raise awareness of healthy lifestyles. Others are less obvious, or more long-term, for example the possible impact of reduced defence spending on a nation's R&D (research and development) capacity.

This section is an invitation for readers to consider how the trends interact with education, both in terms of the effect they might have on education, and also the effect education might have on the trends. While the trends presented are robust, the links with education are illustrative and suggestive. They are also not intended as conclusive answers to policy questions. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning.

Governance and spending

- Cross-government co-operation for efficient use of limited resources
- Providing accessible and high-quality education for all
- Investing in early childhood development and prevention to help support disadvantaged children and youth

Security

- Highly-skilled and flexible graduates with capabilities needed to tackle new security challenges
- Tertiary sector as motor for innovation and technological advances
- Fostering trust and integration through civic education
- A focus on identifying and managing new risks, including hacking and cybercrime

Labour market

- 21st century skills, including multiple languages and digital skills
- Attracting and retaining the best researchers in tertiary institutions
- Closing the gender gap in the workforce, encouraging female entrepreneurship
- Reskilling an ageing workforce through lifelong learning

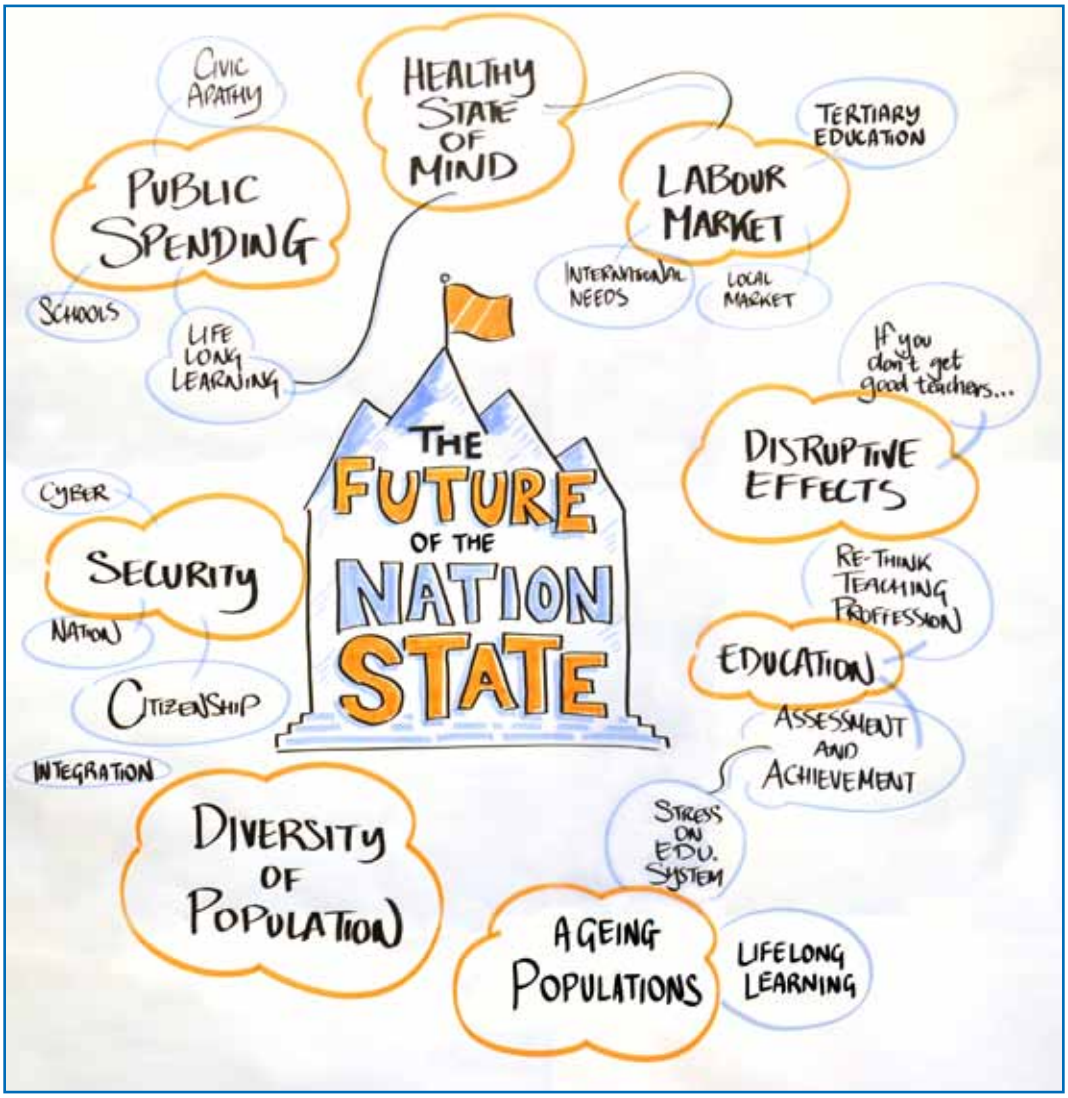
Health

- Supporting physical and emotional well-being starting at the youngest ages
- Addressing obesity, smoking and other national health concerns
- Supporting excellence in medical research and science
- Increasing focus on lifelong learning for the ageing population, including health literacy

Brainstorming the links between global trends and education

Readers are encouraged to use this visual as a point of departure for the question: "What do these trends mean for my education system and my work?"

Figure 2.13. **Infographic: The future of the nation-state**



NOTES

1. Military expenditure data are derived from the NATO definition and include all current and capital expenditures on the armed forces including: peacekeeping forces; defence ministries and other government agencies engaged in defence projects; paramilitary forces, if these are judged to be trained and equipped for military operations; and military space activities. Such expenditures include: retirement pensions of military personnel and social services for personnel; operation and maintenance; procurement; military research and development; and military aid (in the military expenditures of the donor country). Excluded are civil defence and current expenditures for previous military activities, such as veterans' benefits, demobilisation, conversion and destruction of weapons.
2. OECD (2010), *Obesity and the Economics of Prevention*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264084865-en.

FIND OUT MORE

Relevant sources

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Definitions and measurement

- **Alzheimer's disease**: Alzheimer's disease is a progressive, degenerative disorder that attacks the brain's nerve cells, or neurons, resulting in loss of memory, thinking and language skills and behavioural changes. It is the most common form of dementia, representing about 60% to 80% of cases.
- **BRIICS**: The BRIICS grouping of countries includes Brazil, the Russian Federation, India, Indonesia, China and South Africa.
- **Cardiovascular disease (CVD)**: Cardiovascular disease refers to two common types of stroke: ischemic stroke and haemorrhagic stroke. Both types of stroke can cause brain cells to die, leading to a potential loss in functions such as walking or talking. CVD also refers to a range of other diseases related to the circulatory system, including heart failure, vascular diseases of the brain and kidney and peripheral arterial disease.
- **Dementia**: Dementia is a syndrome – usually of a chronic or progressive nature – in which there is deterioration in cognitive function (i.e. the ability to process thought) beyond what might be expected from normal ageing. It affects memory, thinking, orientation, comprehension, calculation, learning capacity, language and judgement.
- **Diabetes**: Diabetes is a chronic disease characterised by high levels of glucose in the blood. It occurs either because the pancreas stops producing the hormone insulin (type 1 diabetes), or through a reduced ability to produce insulin (type 2 diabetes).
- **Effective retirement age**: The actual age at which people retire and leave the labour market.
- **Gross domestic product (GDP)**: GDP is a standard measure of the value of the goods and services produced by a country during a period. Gross means that no deduction has been made for the depreciation of machinery, buildings and other capital products used in production. Domestic means that it is production by the residents of the country. As

many products in a country are used to produce other products, GDP is calculated by summing the value added for each product.

- **Overweight and obese**: Abnormal or excessive fat accumulation that may impair health. Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. An individual with a BMI between 25 and 30 is classified as overweight, and an individual with a BMI above 30 is classified as obese.
- **Patent**: A right granted by a government to an inventor in exchange for the publication of the invention; it entitles the inventor to prevent any third party from using the invention in any way, for an agreed period.
- **Research and development (R&D)**: Research and creative work conducted by either the private and/or the public sector to develop new goods, techniques and services, and to increase the stock of knowledge and the use of this knowledge to devise new applications.
- **Social expenditure**: Social expenditure is the provision by public (and private) institutions of benefits to households and individuals in order to provide support during difficult circumstances. Such benefits can take the form of cash transfers or can be the direct ("in-kind") provision of goods and services.

Chapter 3

Are cities the new countries?

Are cities the new countries trends: A visual overview *– a display of the trends in this chapter and the connections between them.*

Urban life *– illustrates the continuing growth in urbanisation and the importance of cities to national economic and productivity growth.*

Thriving communities, engaged citizens *– looks at the co-operation between citizens and local government and proactive citizen involvement.*

Innovation spaces *– observes the growing role of cities as centres of innovation, productivity and exchange.*

A tale of many cities: Urban transport and safety *– questions what makes cities more liveable through the lenses of efficient transport systems and security.*

Urban challenges *– takes a look at dangers associated with city living, such as pollution and epidemics.*

Infographic: Cities and education *– a visual exploration of the links between the trends in this chapter and education.*

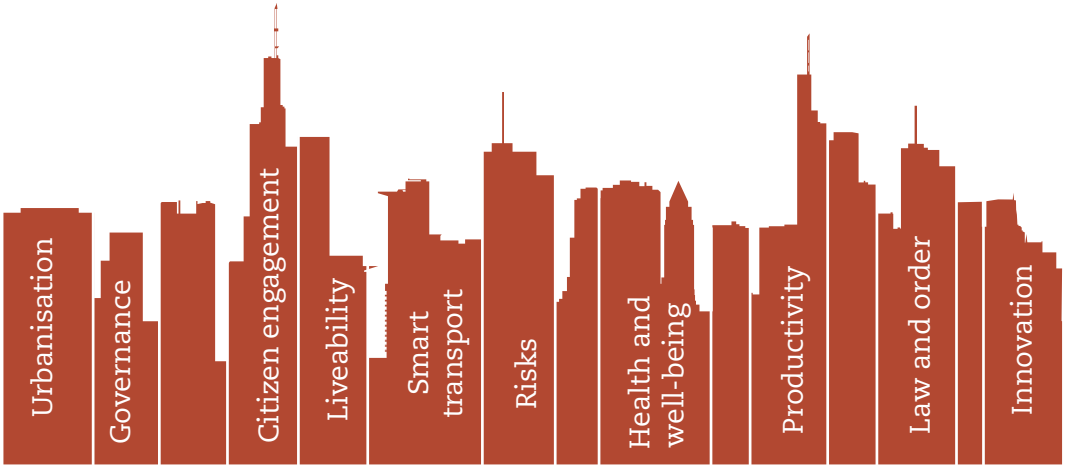
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

ARE CITIES THE NEW COUNTRIES? TRENDS: A VISUAL OVERVIEW

Major urban areas like Mexico City have seen their populations grow to over 20 million, larger than many small countries. Some have argued that cities are now the most relevant level of governance, small enough to react swiftly and responsively to issues and large enough to hold economic and political power. Today, more than half of the world's population lives in cities and this ratio is projected to increase to seven out of ten people by 2050.

This chapter examines a set of key trends affecting cities. While they are all relevant to education, not all pertinent trends are included – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence.

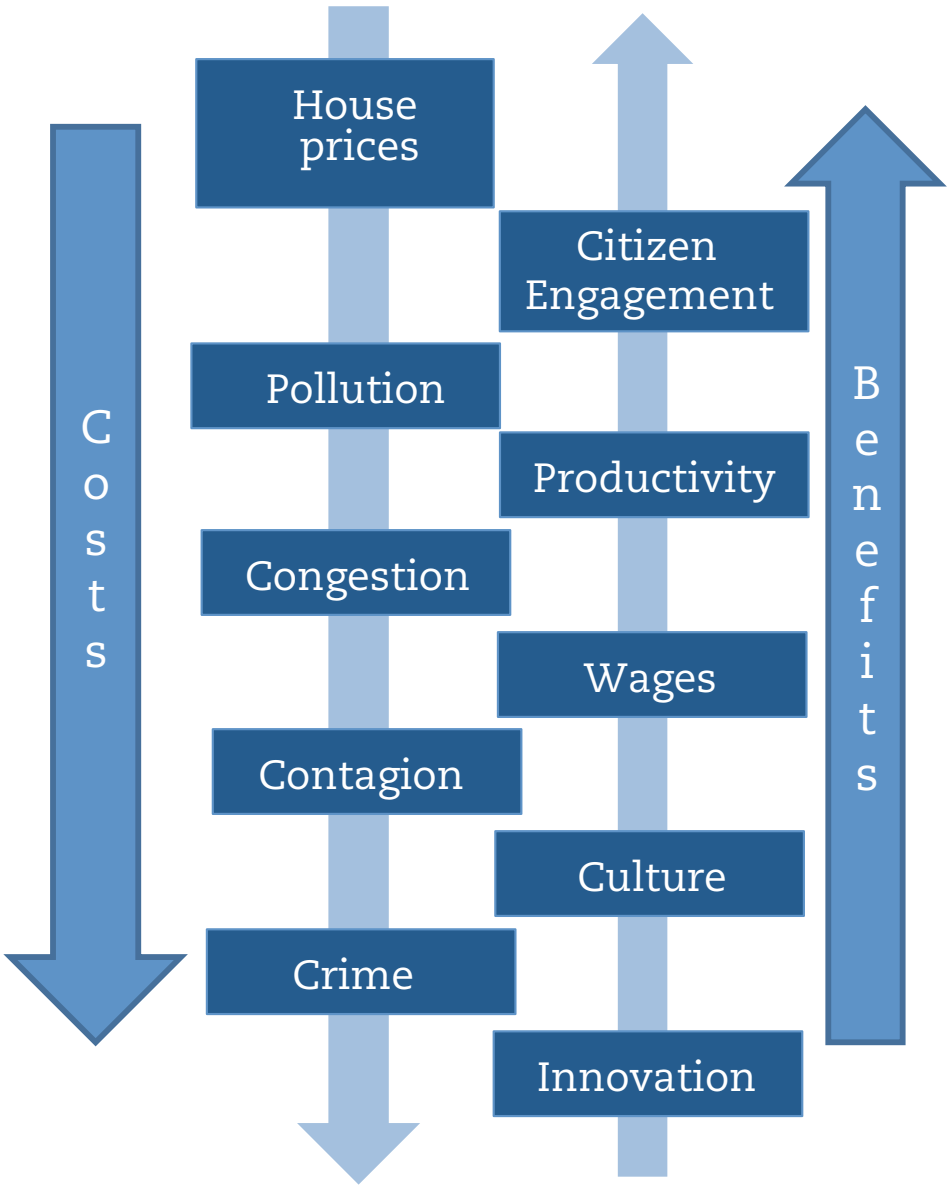
Figure 3.1. **Are cities the new countries trends: A visual overview**



Interactions between the trends

These trends do not exist in isolation. Urban areas are confronted with a paradox: they concentrate productivity and employment opportunities, but they can also host high levels of poverty and labour-market exclusion. The trends themselves are interrelated and influence each other, sometimes in unpredictable ways. Some of the costs and benefits that emerge from cities are illustrated below.

Figure 3.2. **Interactions between cities trends**



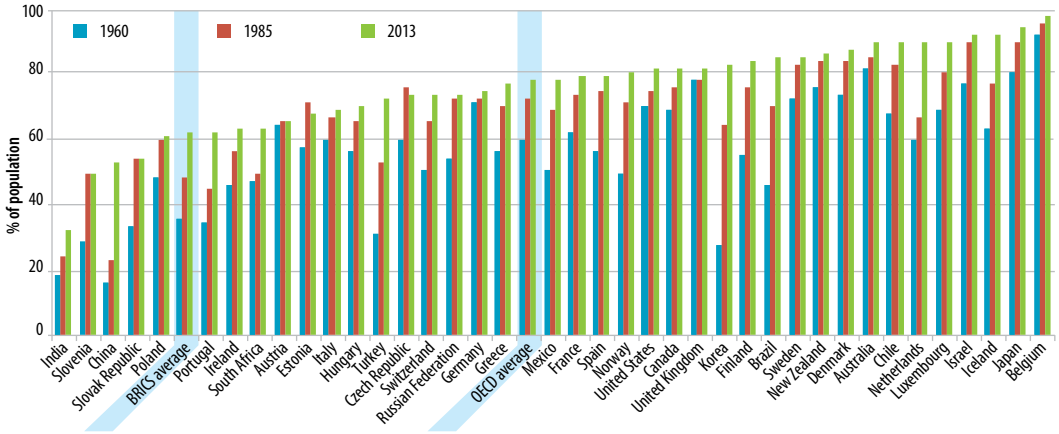
Source: Adapted from OECD (2014), *OECD Regional Outlook 2014: Regions and Cities: Where Policies and People Meet* http://dx.doi.org/10.1787/9789264201415-en.

URBAN LIFE

Today, more than half of the world's population lives in cities and this ratio is projected to increase to seven out of ten people by 2050. Urban environments attract people from rural areas and foreign countries searching for better economic prospects and easier access to public services such as education and healthcare, as well as a wider variety of cultural institutions. However, urban areas are confronted with a paradox: they concentrate wealth and employment opportunities, but they can also host high levels of poverty and labour-market exclusion. These difficult conditions can contribute to more tenuous social networks and disconnection from family and community, which can engender social alienation and violence. This can have consequences for families and children, and, by extension, our education systems.

Figure 3.3. **Concrete jungles**

Urban population as a percent of the total population in 1960, 1985 and 2013



Note: Urban population is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects.

Source: World Bank (2015), "Urban population (% of total)", *World Development Indicators*.

StatLink http://dx.doi.org/10.1787/888933316191

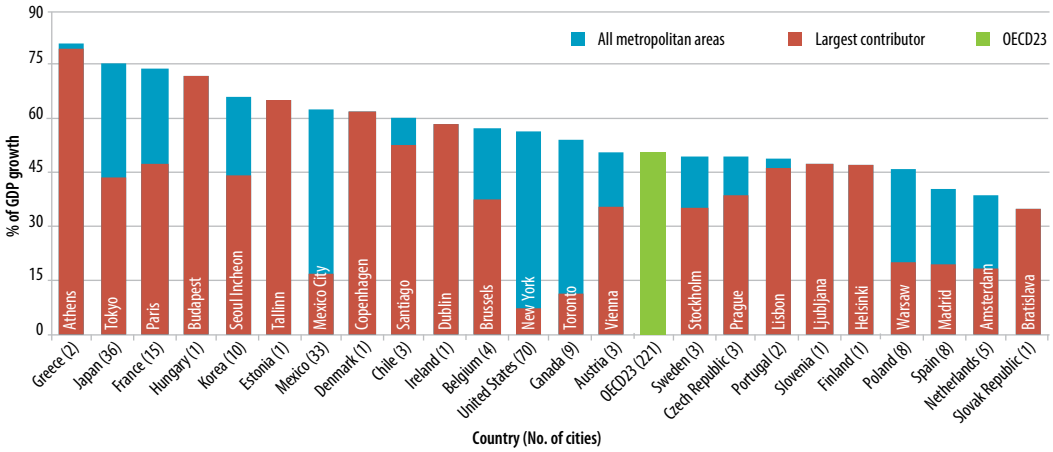
The shift from rural to urban areas has been ongoing among OECD and BRIICS countries (and indeed the rest of the world) for over 50 years. Between 1960 and 2013, all countries have seen an increase in the percentage of their population living in urban areas. In addition to being a universal trend, it is also a swift one: between 1960 and 1985, urbanisation grew by 20% on average for OECD countries and 32% for the BRIICS. However, in the last 30 years the speed of change has slowed somewhat, to 8.5% and 29% for OECD and BRIICS countries, respectively. The most dramatic transformation was seen in China, where urbanisation grew by over 228% between 1960 and 2013. Currently, Belgium has the highest percentage of the population living in urbanised areas at 90%.

Increasing urbanisation can be accompanied by an increase in productivity and economic growth. In fact metropolitan areas produce a disproportionately higher percentage of the country's GDP when compared to the percentage of the population living

in metropolitan areas in most countries. For example, 80% of the national GDP growth was contributed by cities between 2000 and 2010 in Greece. France, Hungary and Japan also saw cities contribute to over 70% of national GDP growth. In general, smaller countries tend to have fewer cities and therefore each one is responsible for a larger percentage of total metropolitan area GDP growth. In larger countries such as Canada, Mexico and the United States, the largest contributing metropolitan area provides only 21%, 27% and 12% of metropolitan area GDP growth, respectively.

Figure 3.4. **Productivity: from the City of Love to the Big Apple**

Percent of national GDP growth contributed by the metropolitan areas 2000-2010



Note: GDP values in metropolitan areas are estimates based on GDP data at TL3 level, meaning smaller territorial regions at the lower level. Data can be found in StatLink file.

Source: OECD (2013), *Regions at a Glance 2013*, http://dx.doi.org/10.1787/reg_glance-2013-en.

StatLink http://dx.doi.org/10.1787/888933316207

And education?

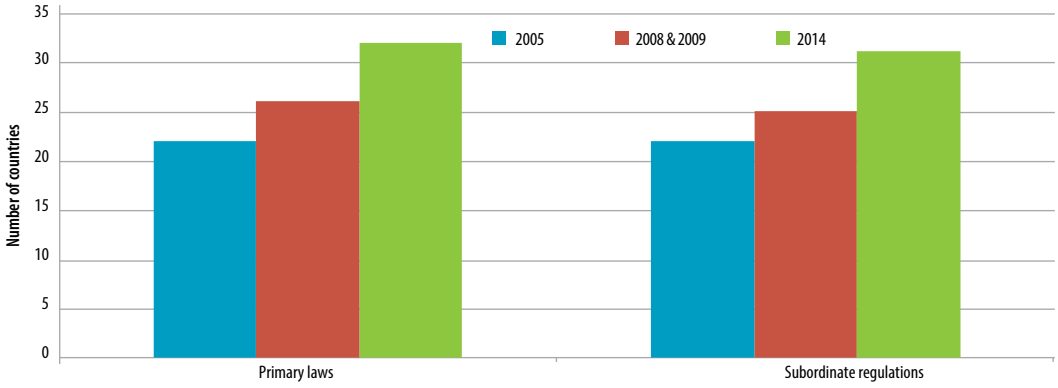
- How can education planners address infrastructure and supply issues that arise from quickly growing urban areas, and in parallel the potential shrinkage in rural zones?
- Some of the most disadvantaged schools are found in inner cities. How can schools in low-income neighbourhoods attract and retain highly qualified teachers?
- Higher productivity of cities creates more job opportunities. How can school systems ensure that they are equipping their graduates with the skills needed to successfully transition to the labour force?

THRIVING COMMUNITIES, ENGAGED CITIZENS

Some have argued that cities are now the most relevant level of governance, small enough to react swiftly and responsively to issues, large enough to hold economic and political power. Indeed, major urban areas like Mexico City have populations over 20 million, larger than many small countries. Citizen involvement is an increasingly important element of governance on all levels, helping to shape and change our communities and societies. Protests such as Occupy Wall Street, initiated in New York City, eventually spread across more than 1 500 cities worldwide. Social media and the Internet help to spur citizen engagement by facilitating co-ordination and action within communities. New and innovative applications allow residents to report problems in their community and governments to respond quickly and efficiently to their concerns. Citizen involvement is thus an important element of local accountability and community building.

Figure 3.5. **Citizens with a say**

Number of OECD countries in which mandatory consultation with parties affected by regulations is part of developing new draft regulations, 2005, 2008-2009, and 2014



Note: Based on preliminary data from 34 countries and the European Commission. Chile, Estonia, Israel and Slovenia were not members of the OECD in 2005 and so not included in that year's survey.

Source: OECD (2015), *Government at a Glance 2015*, http://dx.doi.org/10.1787/gov_glance-2015-en.

StatLink http://dx.doi.org/10.1787/888933316218

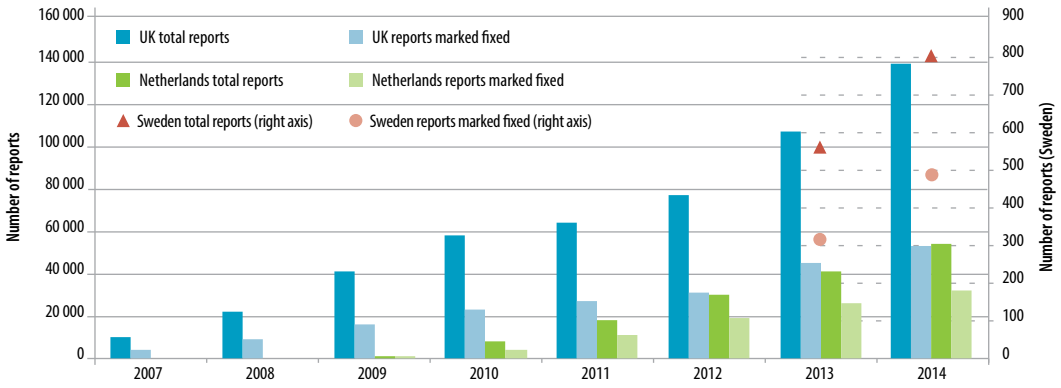
Citizens are becoming increasingly involved in the governance of their communities and countries. In 2014, 32 of 34 OECD countries reported that they required mandatory consultation of relevant stakeholders during the development of laws, and 31 OECD countries reported the same for subordinate regulations, or regulations that can be approved by an authority other than the parliament or congress. This is a large increase from 2005, where only 22 OECD countries reported consulting all relevant stakeholders for both categories. This consultation process strengthens the voice of citizens in the governance of their community and country while also providing more legitimacy to the law makers, helping them smooth implementation or overcome resistance to change in certain circumstances.

New technologies are facilitating this process, allowing citizens to interact more easily and immediately with their local governments. For example, Fix My Street is an

application which allows residents to use an online map to report street problems and needed repairs. Initiated in the United Kingdom, this application and others like it have now spread to 15 more countries around the world. Since its inception both reports and responses in the United Kingdom increased dramatically, from around 10 000 reports and 4 000 responses in 2007 to 138 000 reports and 53 000 responses in 2014. While more limited, FixaMinGata and Verbeterdebuurt – the Swedish and Dutch versions of Fix My Street – have also seen an important increase in the number of reports. This is just one example of how governments at all levels are engaging citizens and improving responsiveness to the concerns of their residents.

Figure 3.6. **Word on the street**

Total reports and reports marked fixed from Fix My Street (United Kingdom), FixaMinGata (Sweden) and Verbeterdebuurt (The Netherlands) applications, 2007-2014



Note: Last data for Verbeterdebuurt end in 24 July 2014. Verbeterdebuurt allows citizens to delete their reports, regardless of the state. Fix My Street users mark reports fixed when they believe that the problem has been solved.

Source: FixaMinGata (2015), Fix My Street (2015) and Verbeterdebuurt (2015).

StatLink http://dx.doi.org/10.1787/888933316229

And education?

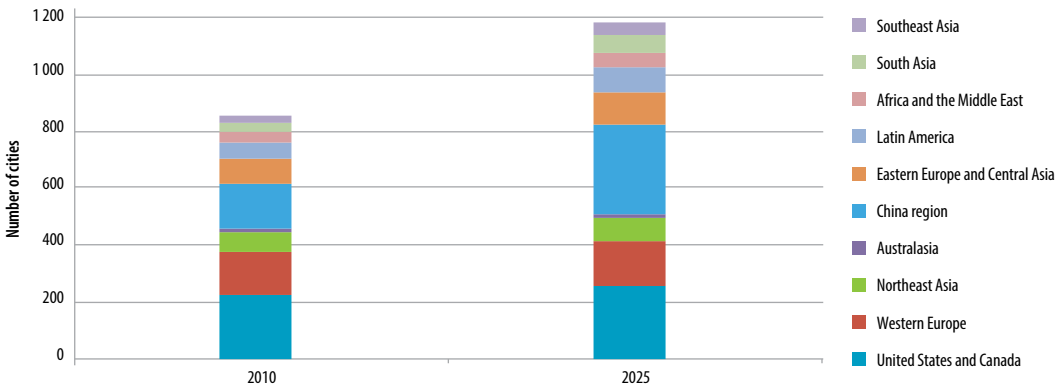
- Developing responsible, active citizenship is fundamental to any system of education. What should be the specific role of schools and universities in fostering civic literacy?
- Should schools help build the attitudes necessary for student and youth empowerment by giving pupils more opportunities to be heard, participate and collaborate in school decision making?
- What is the best manner of involving more actors (such as parents and community members) in education governance? Is it possible to have too much parental/community involvement?

INNOVATION SPACES

Cities attract talented innovators, researchers, inventors and educators. This concentration of human capital stimulates research and development, making cities a regional nucleus for growth and innovation. In fact, metropolitan areas produce more patents per capita than the rest of the country for all 16 OECD countries in which data are available. The concentration of resources found in cities makes it easier to conduct business through provisions such as ample office space, proximity to inputs, accessibility of clientele and customers, and an abundant labour force. For businesses and innovation, location matters, and that location is increasingly in a city. Education can and does contribute to this by ensuring that students have the skills and competences needed to succeed in an innovative world. It also underlines the role of the university and other tertiary institutions as centres of R&D and innovation.

Figure 3.7. **Location of company headquarters**

Total number of cities holding head offices of companies by region, in 2010 and 2025



Note: Projections for 2025 are based on city GDP forecasts.

Source: MGI Company Scope – McKinsey Global Institute (2013), *Urban World: The Shifting Global Business*.

StatLink http://dx.doi.org/10.1787/888933316234

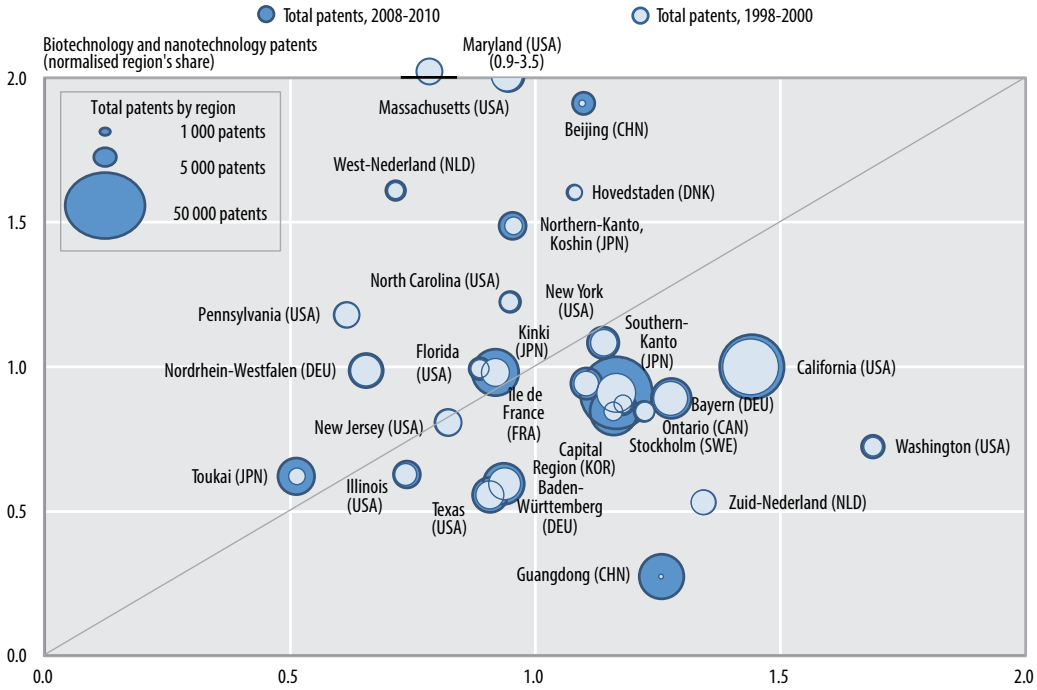
Cities are increasingly contributing to innovation by bringing people together, fostering ideas, and acting as networks and physical places to conduct business. In 2010, over 800 cities around the world hosted head offices. That number is expected to grow by almost 40% in 15 years, reaching over 1 100 cities worldwide. And while cities in Western Europe and the United States and Canada will still be home to a large percentage of head offices, many new head offices are being established in regions such as Latin America, Africa and the Middle East. South Asia is expected to have the highest growth rate in the number of cities holding head offices by 2025, at over 100%. The China region which includes China, Hong Kong, Macau and Taiwan, is a close second, forecasted to experience a growth rate of 99% and be home to the most number of cities that hold head offices by 2025.

Certain metropolitan areas are hotspots for innovation, bringing together the human talent, economic resources and incentives and physical infrastructure needed. For example, New York, Stockholm and the Paris region have all generated a large number

of patents since 1998. The fastest growing innovation hubs, measured by patents, are in the Asian region: Toukai, Japan, and Guangdong, China, have seen rapid growth in the number of patents generated between 1998 and 2010. Education plays a key role in making this possible: according to the OECD Regional Growth Model, the development of human capital is more important to an economy's long-term competiveness than its infrastructure. Policies that promote infrastructure will thus only be successful if human capital and innovation are also developed.

Figure 3.8. **Innovation hotspots**

Patents by city or region, 1998-2010



Note: Data relate to patent applications filed under the Patent Co-operation Treaty (PCT) in ICT, biotechnology and nanotechnology. Patent counts are based on the priority date, the inventor's region of residence and fractional counts. The region's share in the country's patents in the selected technology fields is normalised to the region's share in the country's patents for all technologies.

Source: OECD (2013), *Science, Technology and Industry Scoreboard 2013: Innovation for Growth* http://dx.doi.org/10.1787/sti_scoreboard-2013-en.

StatLink http://dx.doi.org/10.1787/888933316242

And education?

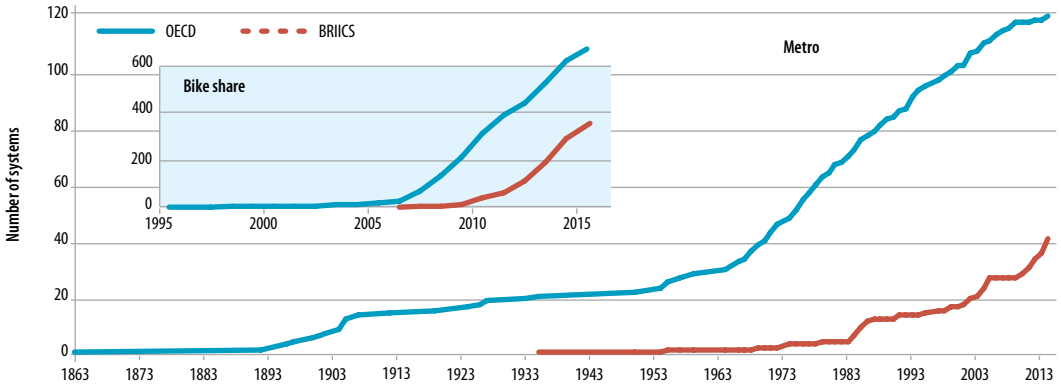
- Do city governments have a role in providing technical incentives and funding to tertiary institutions to help produce the graduates required by the knowledge-intensive economies of the future?
- How well does the education system develop and nurture the talents required by major corporations to stay on the forefront of innovation?
- What is the best way for our education and training systems to adequately develop 21st century skills such as creativity, critical thinking, collaboration and leadership?

A TALE OF MANY CITIES: URBAN TRANSPORT AND SAFETY

The liveability of a city often influences where people choose to settle down. Liveability can be enhanced through safer streets, better infrastructure, and reductions in commuting time. Improving public transportation systems, for example, whether by adding new modes or refining old systems, can decrease time spent commuting as well as reduce urban pollution and noise. Safety is another major concern when choosing a city and neighbourhood in which to live. Crimes and threats to safety come in many forms and a quality police force and trust between residents and local police can help establish peace of mind. This is especially important for families who may be concerned about the safety of their children. Schools can not only teach children about citizenship but also stimulate trust and engagement in their communities, creating more liveable cities.

Figure 3.9. **The urban commute**

Metro and bike-sharing systems in OECD and BRIICS countries, 1863-2015



Source: Meddin, R. (2015), *The Bike-Sharing World Map;*[1] Metrobits (2015), *World Metro Database.*

StatLink http://dx.doi.org/10.1787/888933316253

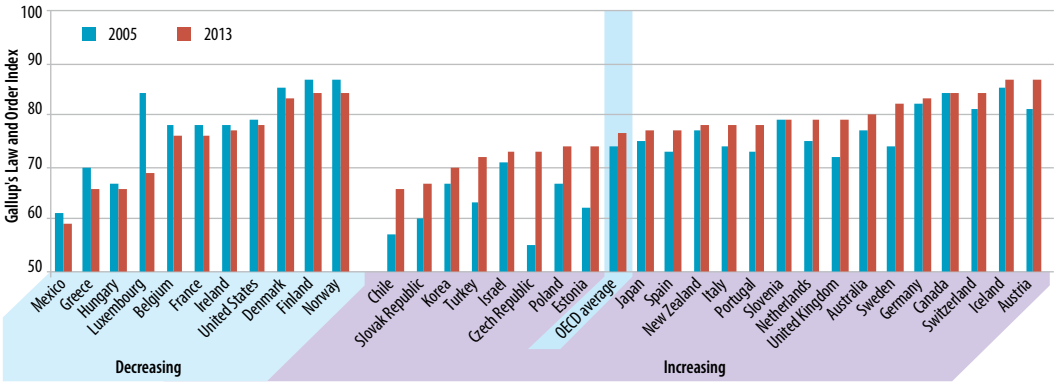
Currently in OECD countries, full time workers spend 38 minutes a day on average commuting to work. In 1863, London opened the first metro system, and there has been a (slow but) steady increase in the number of metro systems ever since. There are now a total of 119 metro systems running in 27 OECD countries. Germany and the United States each have 19 metro systems, the highest number among the OECD countries. Metro systems are also increasingly more common in the BRIICS countries, with 41 metro systems operating in 4 of the 6 BRIICS countries.

Recently, public transportation has expanded from motorised means to other modes, such as bike-sharing. Launched in Copenhagen in 1995, bike-sharing has since spread to 676 cities worldwide, and there are now more bike-sharing systems than metro systems. In 2006, São Paulo became the first city in the BRIICS to adopt a bike-sharing programme. They are now present in all BRIICS countries except South Africa. Currently, China hosts the largest bike-sharing programme in Hangzhou, Zhejiang, which supplies over 80 000 bikes. Studies reveal that cycling and walking projects bring a return of USD 20 in economic benefit for every USD 1.50 invested,[2] due to reduced traffic congestion levels, reduced pollution and overall improvements to public health.

Cities must also ensure the safety of their residents. Between 2005 and 2013, scores on the Law and Order Index, which measures perceptions of safety, increased across 23 of the 34 OECD countries. In 2013, Austria recorded the highest Index score, indicating it is perceived to be the safest country by its residents, while Mexico had the lowest. The Czech Republic had the largest change in their Law and Order Index score in that time with an increase of 32%. However not all countries saw an increase on the Index. Of the eleven countries that reported a decrease in perception of safety, Luxembourg had the greatest reduction, decreasing by 17%. The next largest fall was reported in Greece, at 5.7%.

Figure 3.10. **Law and order**

Gallup's Law and Order Index, 2005 and 2013



Note: Data from 2006 for Austria, Chile, Estonia, Finland, Ireland, Israel, Korea, New Zealand, Norway, Portugal, the Slovak Republic, Slovenia, Switzerland, and the United States instead of 2005 data. 2008 and 2009 data used for Iceland and Luxembourg, respectively, instead of 2005. 2012 used for Norway and Switzerland instead of 2013 data.

Source: Gallup (2015), *Gallup World Poll*.

StatLink http://dx.doi.org/10.1787/888933316263

And education?

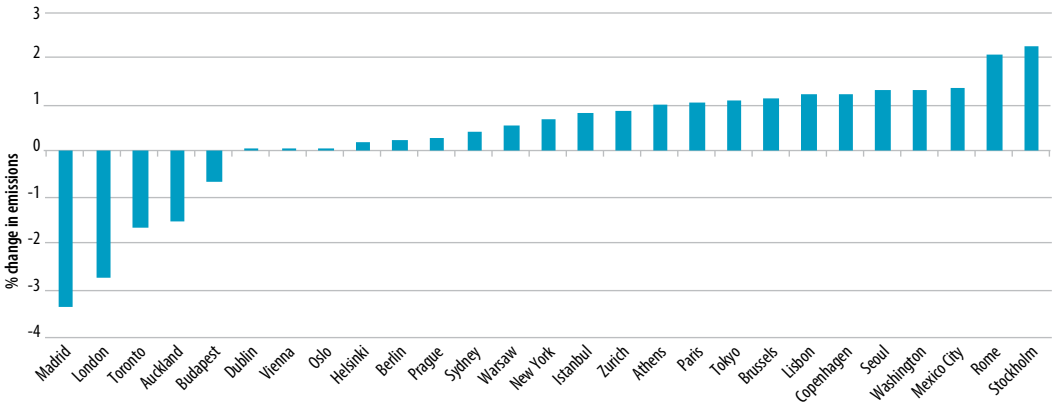
- Education is often expected to solve social problems. What is education's role in preventing crime and promoting safety, for example through keeping at-risk youth engaged in the system or providing self-defence training for students?
- It is often said that it takes a village to raise a child. What is the broader community's role in creating safe environments for students? Can communities play a greater role in reducing peer-to-peer bullying?
- Can innovations in urban transport systems open up new possibilities for education, for example by increasing access to more distant school zones and offering opportunities for eco-friendly school transport?

URBAN CHALLENGES

A lack of green space and a greater intensity of people, traffic and industry are linked to physical and mental health challenges. Higher air pollution creates risks for respiratory health and cardiovascular disease. Higher noise levels, for example near major roads or on the flight approach to airports, have been associated with sleeping problems as well as difficulty concentrating at work or school. In addition, the close proximity of city-dwellers, including densely packed public transport, facilitates rapid passing of viruses and disease. The herd immunity threshold (HIT) is the percentage of people that need to be vaccinated in order to prevent outbreaks of an infectious disease across a community. Since many vaccinations are not 100% effective, people who are vaccinated can still benefit from others who get vaccinated. And with no cure for viruses such as the common cold, staying healthy benefits everyone!

Figure 3.11. **Pollution and large cities**

Projected annual average growth rate of greenhouse gas emissions from manufacturing production from 2000-2030 (%)



Note: Calculations are based on the IMACLIM-R model and the OECD Metropolitan Database. Local pollution emissions are understood as greenhouse gas emissions arising from manufacturing production.

Source: OECD (2010), *Cities and Climate Change*, http://dx.doi.org/10.1787/9789264091375-en.

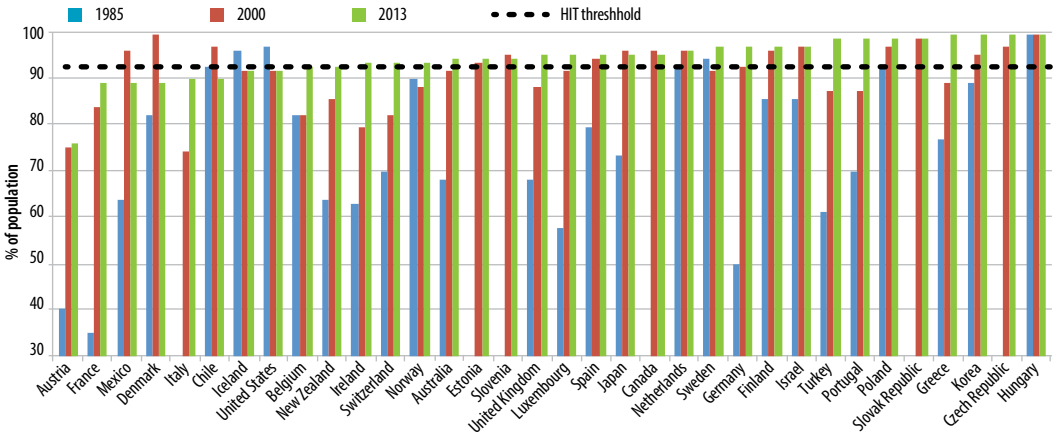
StatLink http://dx.doi.org/10.1787/888933316276

Living in cities is accompanied by certain risks. While measures of pollution have been decreasing on average across countries, pollution is expected to increase in the largest cities of 22 out of the 27 OECD countries in the figure above. OECD studies show that an increase in pollution levels is associated with a decrease in a city's attractiveness. While some of the increases are small, in Stockholm the projected increase in pollution emissions is over 2.2%. On the opposite end of the spectrum, Madrid is expected to curb its emissions by almost 3.4%. Auckland, London and Toronto are other examples of large cities where air pollution is expected to decrease in the next 15 years, thereby boosting these cities' attractiveness levels. This is not an accident: many OECD countries are directly addressing urban air and noise pollution in their largest cities, taking measures such as reducing vehicle and industrial emissions and increasing green spaces in order to reach these goals.

Another health risk in cities is communicable disease, which can spread quickly through densely packed populations. Although the average percentage of the population vaccinated has been increasing since 1985, there is still room for improvement. In Austria, Denmark, France and Mexico, for example, the percent of the population vaccinated against measles is below the threshold required to protect the community. This means that the most vulnerable individuals (the old, the young and the ill) would be at risk if there were an outbreak of measles in their city. Worryingly, there has been a decrease in vaccination rates since 2000 in a number of countries including Chile, Denmark and Mexico. New outbreaks of measles, long thought eradicated in many OECD countries, have contributed to public health concerns and an increased emphasis on educating the public on the importance of vaccinations. Education has a part to play in this, not only through improving public awareness, but also in ensuring that schools and early childhood centres remain safe spaces for all children, including those most vulnerable.

Figure 3.12. **What the doctor ordered?**

Measles vaccinations by percentage of the population, 1985, 2000 and 2013, and the HIT threshold



Note: HIT (herd immunity threshold) for measles ranges from 90-95% of the population, set here at 92%. 1985 data replaced by 1986 data for Switzerland and 1987 for Denmark.

Source: OECD (2015), *Health Care Utilisation, Immunisation: Measles*, OECD Stat, http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT.

StatLink http://dx.doi.org/10.1787/888933316281

And education?

- How well do young people develop an awareness of the connections between their daily decisions and possible long-term consequences, not just for themselves as individuals but for society as a whole? How can education systems support this awareness?
- A potential drawback of urbanisation is a loss of community and connection to the local neighbourhood. How might schools foster a greater sense of community in their students and families in urban environments?
- Greater urbanisation means that fewer children have experienced rural or farm life. Does education have a role to play in raising awareness of different types of communities? Is there a place for educational exchange between urban and rural schools?

INFOGRAPHIC: CITIES AND EDUCATION

What are some of the ways the city-level trends presented in this chapter interact with education? And how can education affect these trends? Some answers are obvious and immediate, for example the impact of improved physical and emotional safety on students. Others are less obvious, or more long-term, for example the impact of innovation on school curriculum.

This section is an invitation for readers to consider how the trends interact with education, both in terms of the effect they might have on education and also the effect education might have on the trends. While the trends presented are robust, the links with education are illustrative and suggestive. They are not intended as conclusive answers to policy questions. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning.

Citizen engagement
• Involving more actors in educational governance, such as family, community and academics • Encouraging student empowerment through student associations, class representatives • Teaching civic literacy
Innovation
• Prizes and contests to reward young scientists and innovators • Encouraging the establishment of science parks and start-ups working with tertiary institutions • Attracting and retaining the best researchers and entrepreneurs
Liveability
• Teaching civic responsibility and environmental awareness • Creating and maintaining green spaces for healthy lifestyles • Parking for bicycles and incentives for other methods of eco-friendly transport
Health and safety
• Ensuring schools are safe places emotionally and physically • Zero tolerance for bullying (face to face or online) • School-based vaccinations and other public health drives such as blood donations

Brainstorming the links between global trends and education

Readers are encouraged to use this visual as a point of departure for the question: "What do these trends mean for my education system and my work?"

Figure 3.13. **Infographic: Are cities the new countries?**

NOTES

1. All numerical data on metro count are by Jordi Serradell. The bike-share count is a list of automated, advance automated and mixed automated/manned public use bike-sharing services that offer location "A" to location "B" capabilities (pick up at one station and drop off at another without penalty). This list does not include programmes that are only manned (not automated) and programmes that are not open to the general public. For more information, see World Metro Database: http://mic-ro.com/metro/table.html.
2. Living Streets (n.d), *The Pedestrian Pound: The Business Case for Better Streets and Places*.

FIND OUT MORE

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Definitions and measurement

- **Bike-sharing**: A short-term bicycle rental available at a network of unattended locations. Individuals can use and share bikes for a given amount of time and for a specific price.
- **BRIICS countries**: The BRIICS grouping of countries includes Brazil, the Russian Federation, India, Indonesia, China and South Africa.
- **Communicable diseases**: An infectious disease transmissible by direct contact with an infected individual or the individual's discharges or by indirect means. Communicable diseases include measles, chicken pox and hepatitis B.
- **Gross domestic product (GDP)**: The GDP is a standard measure of the value of the goods and services produced by a country during a period. Gross means that no deduction has been made for the depreciation of machinery, buildings and other capital products used in production. Domestic means that it is production by the residents of the country. As many products in a country are used to produce other products, GDP is calculated by summing the value added for each product.
- **Herd immunity threshold (HIT)**: The percentage of people that need to be vaccinated in order to prevent outbreaks of an infectious disease across a community.
- **Human capital**: The knowledge, skills, competencies embodied in individuals that are relevant to economic activity including the production of goods, services or ideas that have a market value.
- **Law and Order Index**: Gallup's Law and Order Index incorporates three "Yes/No" questions to gauge respondents' sense of personal security and the incidence of crime: 1) In the city or area where you live, do you have confidence in the local police force? 2) Do you feel safe walking alone at night in the city or area where you live? and 3) Within the last 12 months, have you had money or property stolen from you or another household member?
- **Liveability**: Measure of the quality of life for a city's residents.
- **Measles**: Measles is a highly infectious disease of the respiratory system caused by a virus. Symptoms include fever, cough, runny nose, red eyes and a characteristic rash. It can lead to severe health complications, including pneumonia, encephalitis, diarrhoea, blindness and death.
- **Occupy Wall Street**: A movement protesting against economic and social inequality that began on 17 September 2011 in New York City's financial district. It spread to over 100 cities in the United States and over 1 500 cities globally. Inspired by popular

uprisings in Egypt and Tunisia during the "Arab Spring", the movement aims to challenge the influence of major banks, multinational corporations and the richest 1% of people on democracies and to draw attention to the role of Wall Street in the financial crisis of 2007-2008.

- **Subordinate regulations**: Subordinate regulations are regulations that can be approved by the head of government, by an individual Minister or by the Cabinet - that is, by an authority other than the parliament/congress. Subordinate regulations are also referred to as "secondary legislation" or "subordinate legislation".

Chapter 4

Family matters

Family matters trends: A visual overview *– a display of the trends in this chapter and the connections between them.*

The marriage of the century? *– looks at changing marriage structures such as the rise in the age at first marriage and the growing legal recognition of same-sex marriage.*

A helping hand for families *– observes government policy interventions to support families such as increasing public expenditure on childcare and pre-primary education and maternity leave.*

Improving health and well-being *– focuses on the decline in tobacco consumption and suicide rates.*

Keeping children safe and sound *– considers improvements in certain aspects of child well-being, such as deaths due to accidental injury and time spent on homework.*

Balancing the books *– examines trends that show that households across the OECD have experienced an increase in debt and young people are now the most vulnerable group to income poverty.*

Infographic: Families and education *– a visual exploration of the links between the trends in this chapter and education.*

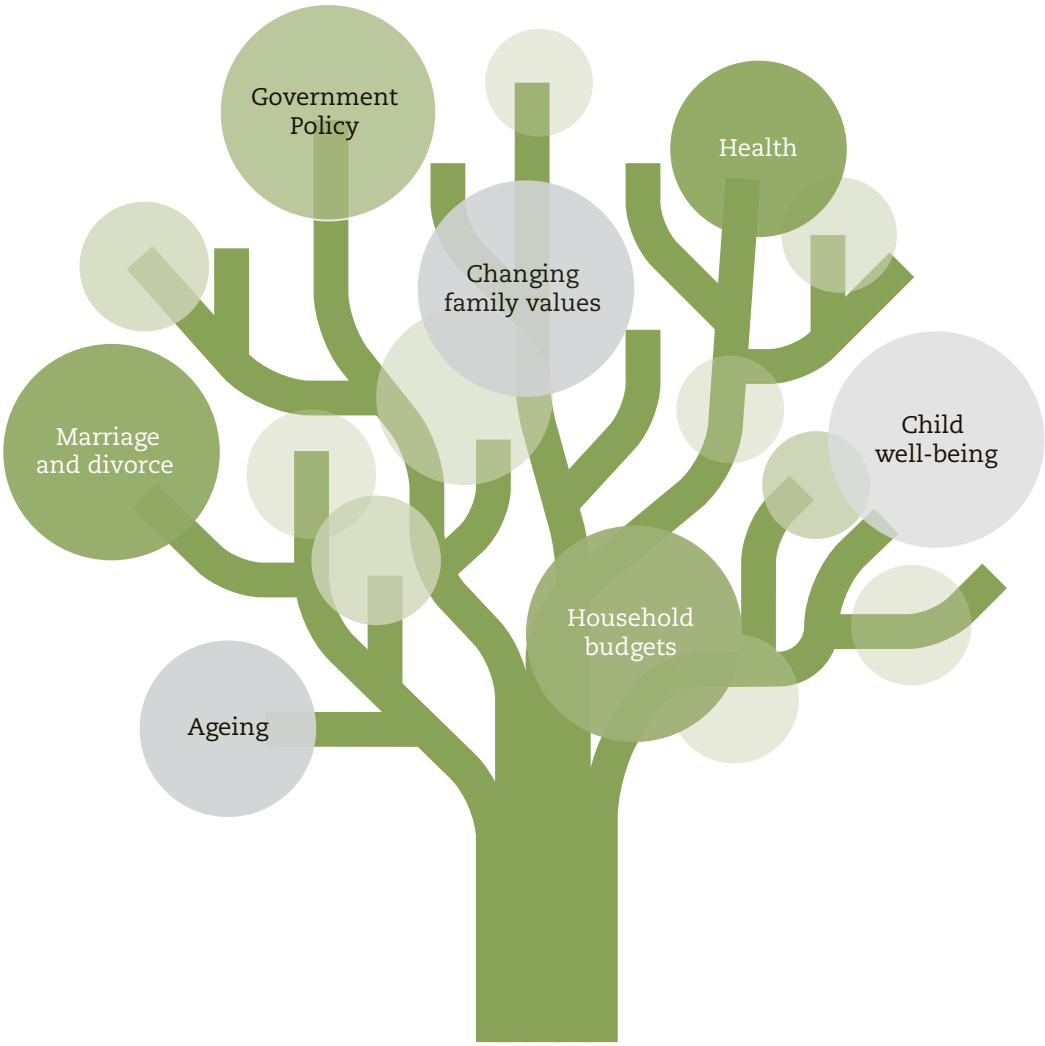
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

FAMILY MATTERS TRENDS: A VISUAL OVERVIEW

The dominant family model in the twentieth century – characterised by a breadwinning father and a mother taking care of the household and a number of children – has changed. Over the past 50 years the number of reconstituted families and single parent households has risen, families have become smaller and individuals are deciding to have children later in life, or not at all. Numbers of divorces are rising even as marriage rates are declining. As our concept of the institution of marriage transforms, so too does our thinking about families and family structures.

This chapter examines a set of key trends affecting our families. While they are all relevant to education, not all pertinent trends are included – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence.

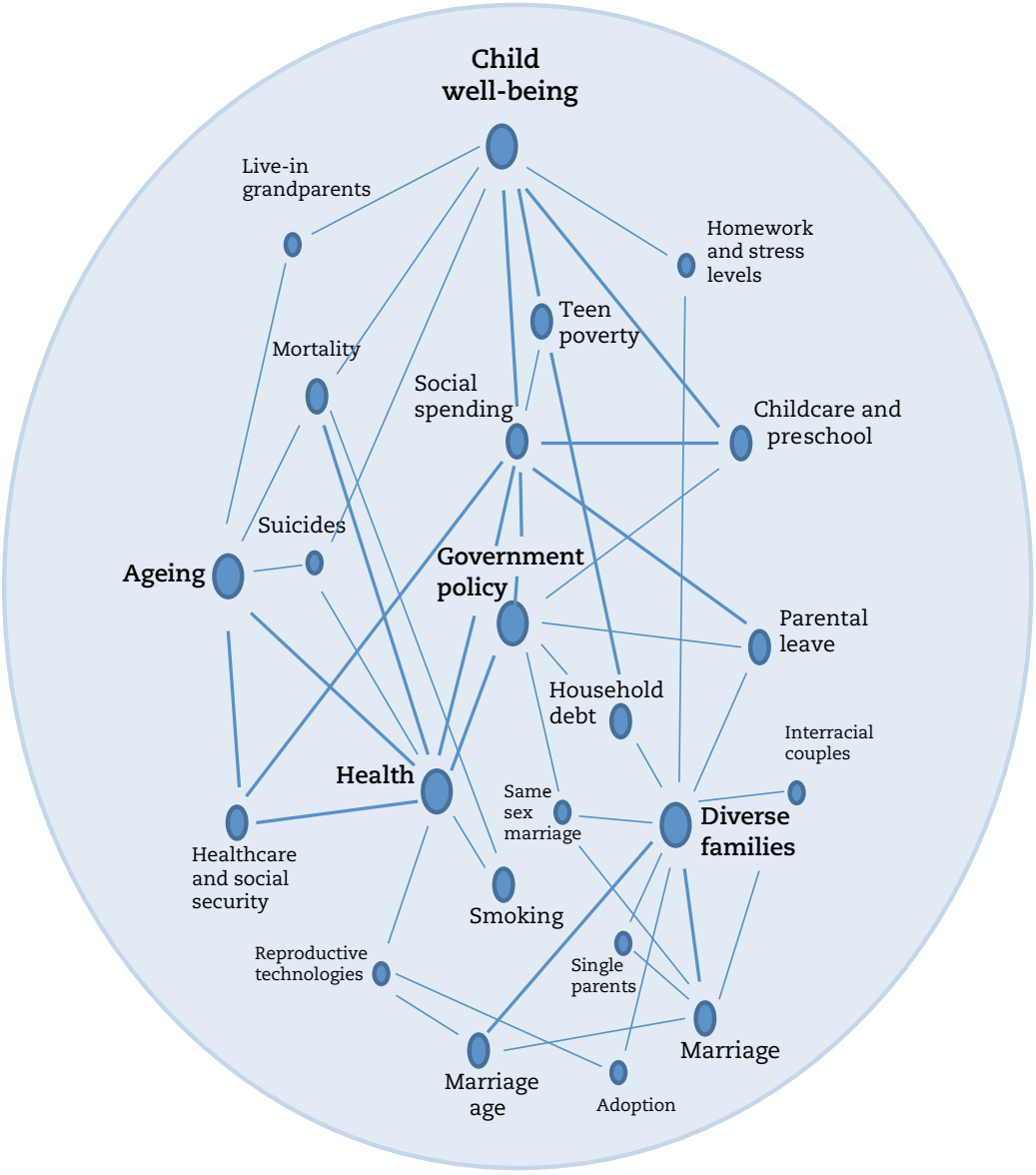
Figure 4.1. **Family matters trends: A visual overview**



Interactions between the trends

These trends do not exist in isolation. As our concept of family transforms, so too have the opportunities and challenges that families face. The trends themselves are interrelated and influence each other, sometimes in unpredictable ways. Some of the connections between the trends in this chapter are illustrated below.

Figure 4.2. **Interactions between family trends**



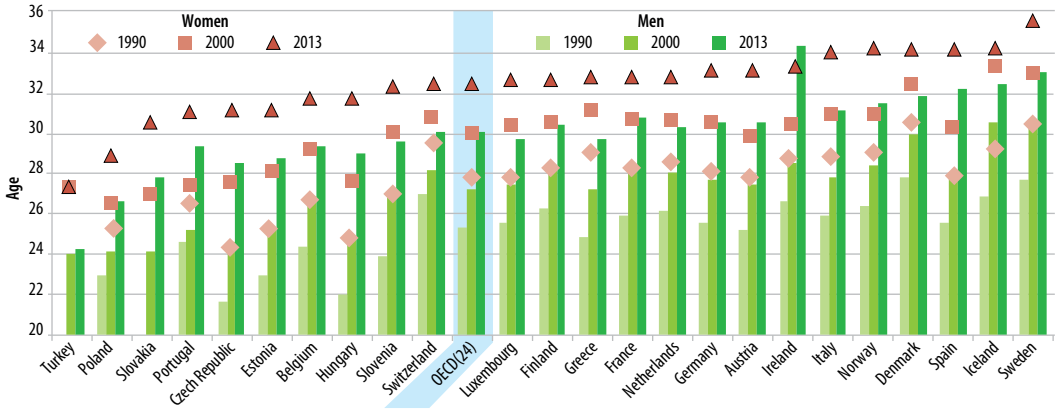
A corrigendum has been issued for this page. See
http://www.oecd.org/about/publishing/Corrigendum-TrendsShapingEducation2016.pdf

THE MARRIAGE OF THE CENTURY?

The institution of marriage is changing. Marriage rates are declining even as numbers of divorces are rising. On average couples are waiting longer to get married, or choose not to marry at all. In addition, governments across the OECD are in the process of legalising same-sex marriages. As our concept of the institution of marriage transforms, so too does our thinking about families and family structures. Schools will need to take these changes into account in their administrative procedures and in classroom learning in order not only to help students feel comfortable about themselves, their preferences and their families, but also to accommodate the increasing diversity of family structures.

Figure 4.3. **Marriage age is rising**

Mean age at first marriage for men and women, 1990, 2000 and 2013



Note: Due to data availability, 1992 figures used for Estonia and 1993 for Poland instead of 1990 data. 1996 figures used for Ireland and 2003 for Turkey instead of 2000 data. 2010 data used for Belgium, 2011 for Germany, Ireland, France, and Iceland, and 2012 for Austria instead of 2013 data.

Source: Eurostat (2015), *Marriage and Divorces Data*.

StatLink http://dx.doi.org/10.1787/888933316294

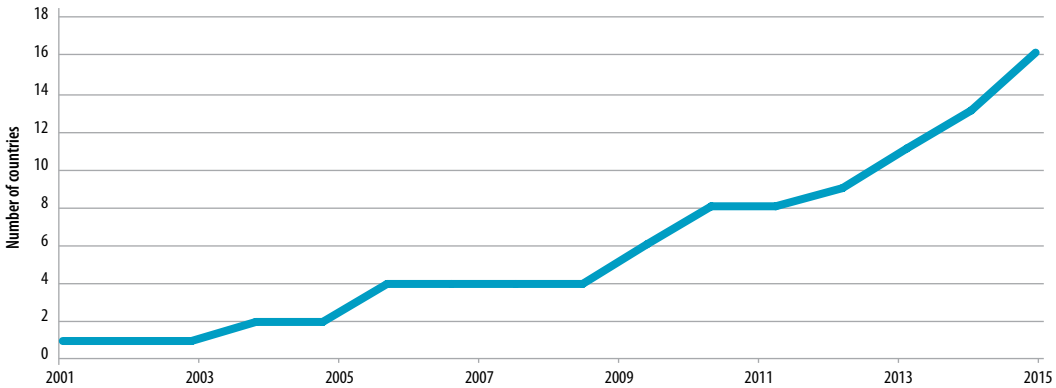
Across OECD countries, men and women are now waiting on average 4.7 and 4.8 years longer for their first marriage compared to 1990 levels. Hungarian men have experienced the greatest change in this time period. In 1990, Hungarian men first married at 24.5 years old, while in 2013 they married at just under 32 years old on average, an increase of over seven years. For women, mean age of first marriage increased the most in Ireland, from just under 27 years of age in 1990 to just over 34 years of age in 2013. This makes Ireland the only country in which the mean age at first marriage for women exceeds the age of men (although the difference is only six months on average). On average across all countries the difference in the age of first marriage between men and women has remained fairly steady at 2.5 years.

Marriage has changed in other ways too. Same-sex marriage is now legal in almost half of the OECD countries. Legalisation of same-sex marriage began in the Netherlands in 2001 and has steadily spread since then. In 2015 alone, three OECD countries legalised

same-sex marriage. Interestingly, of these three, Finland's bill started as a "citizens' initiative" garnering over 150 000 signatures, Ireland legalised it through a popular referendum in which 62% voted in favour and the United States passed it through their Supreme Court on a close vote, 11 years after the state of Massachusetts first deemed it legal. Some countries have only legalised same-sex marriage in various regional jurisdictions, for example Mexico City, which legalised it in 2009. However, there is still a long way to go before same-sex marriage is universally accepted. The challenge continues beyond legalisation to ending discrimination against the LGBTQ community across OECD member countries. Education and schools can and should play an important role in fighting prejudice and promoting acceptance.

Figure 4.4. **Marriage for all**

Number of OECD countries in which same-sex marriage is legal, 2000-2015



Note: United Kingdom approval in 2014 includes England, Wales and Scotland. However, Northern Ireland has not legalised same-sex unions. Sub-national jurisdictions (e.g. Mexico City or certain states) are not included in the count.

Source: Pew Research (2015), *Gay Marriage Around the World, Religion and Public Life*.

StatLink http://dx.doi.org/10.1787/888933316305

And education?

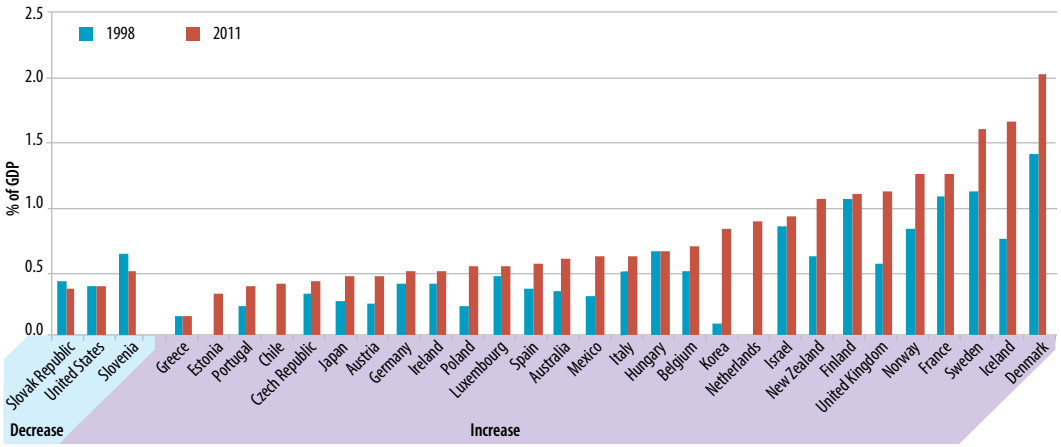
- Effective education at the school level relies on good home-school relations. Does the growing diversity of family structures affect the nature of these relationships? If so, how?
- Are schools taking full advantage of the professional experience that older parents might bring to the classrooms? Conversely, are older, better educated parents more likely to demand more say in their children's education, potentially a challenge for teachers and schools?
- Children will be increasingly more likely to come from non-traditional families (for example, mixed-race or same-sex couples). What role do educators have in encouraging open discussion of and shaping attitudes towards these issues?

A HELPING HAND FOR FAMILIES

Governments are increasingly working to assist families and support children. Public spending on family benefits has increased across most OECD countries for the past three decades. In particular, there has been a special emphasis on public spending on children between 0 and 5 years old, the most vulnerable age group. By increasing expenditure on young children and strengthening other programmes such parental leave (for both mothers and fathers), governments are trying to ease the burden on families with children. This trend might also reflect governments' attempts to increase birth rates across OECD countries, amidst worries of our ageing populations. These kinds of government programmes and support help individual families and children, and also help equalise the playing field for children from differing socio-economic backgrounds and for men and women in the workplace.

Figure 4.5. **Childcare and preschool spending rising**

Public expenditure on childcare and preschool as a percentage of GDP, 1998 and 2011



Note: Data for Greece are taken from 2010.

Source: OECD (2013), *Social Expenditure Database* www.oecd.org/els/soc/expenditure.htm.

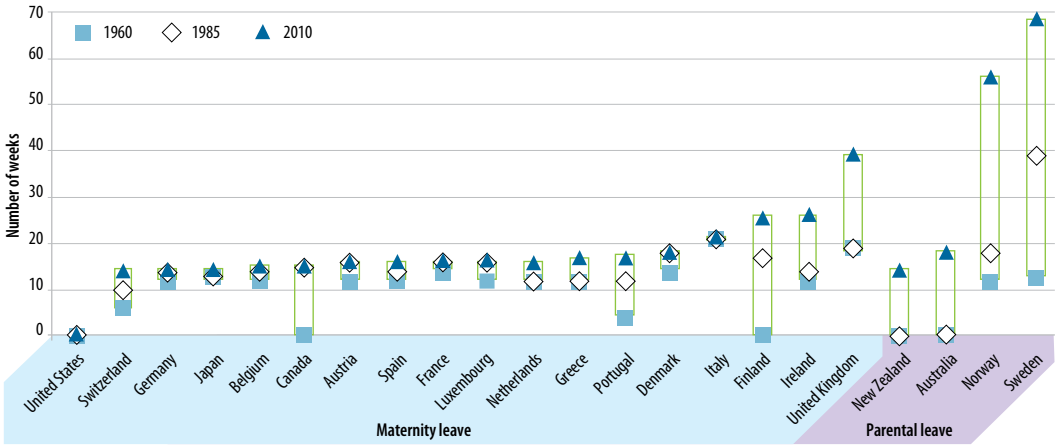
StatLink http://dx.doi.org/10.1787/888933316316

Between 1998 and 2011, public expenditure on young children in the form of childcare and preschool increased 55% on average across OECD countries. On the country level, this ranged from USD 57 billion in the United States to USD 100 million in Estonia in 2011. Denmark spent the largest percentage of their GDP on childcare and preschool of any OECD country, at over two percent, while Estonia and Greece spent the smallest percentage of their GDP on childcare and preschool. The increase in spending was quite pronounced in a number of countries, for example in Iceland, which doubled its expenditure in that time period. The most dramatic increase was observed in Korea, which increased its spending tenfold, from 0.08% in 1998 to 0.83% in 2001. In contrast, public expenditure on childcare and preschool as a percentage of GDP remained steady in the United States, while the Slovak Republic and Slovenia are the only countries where spending decreased in this time period.

Family friendly policies also include paid parental leave. On average, mothers in the 22 OECD countries for which data are available are permitted to take 17 weeks of maternity leave. The figures, however, vary considerably across countries. In 2015, the United Kingdom had the longest maternity leave of any OECD country, while the United States is the only OECD country which has not introduced maternity leave legislation at the national level. Just as families are changing, so too are government policies: Austria was the first country to pass parental leave legislation in 1956, offering varying amounts for lone mothers and couples. In 2010, 20 countries had implemented parental leave legislation, up from 10 in 1985. By 2014, the majority of OECD countries had some parental leave provision. Governments are increasingly recognising the interchanging roles of parents in caring for and raising children by allowing both parents to take leave from work.

Figure 4.6. **Maternity leave**

Total number of weeks of maternity leave (and parental leave), 1960, 1985 and 2010



Note: Data from 2011 used for Australia. Maternity leave was included under parental leave legislation in Australia (2011), New Zealand (2002), Norway (1977) and Sweden (1974).

Source: Gauthier, A.H. (2011), *Comparative Family Policy Database Version 3*, Netherlands Interdisciplinary Demographic Institute and Max Planck Institute for Demographic Research.

StatLink http://dx.doi.org/10.1787/888933316324

And education?

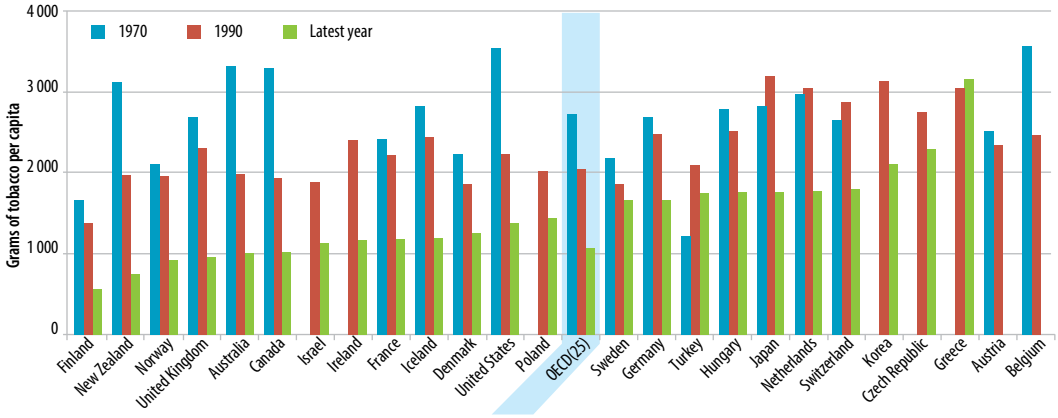
- Early access to quality childcare and early childhood education is associated with higher school achievement and life outcomes. How can governments ensure that it is accessible to all, especially the most disadvantaged?
- The numbers of children in early childhood education and care are expected to continue to rise. What does this mean for the capacity of the system? How can governments ensure high quality service delivery and standards?
- Fathers are increasingly encouraged to play a greater role in caring for their children, both through paternity leave when they are infants and throughout their years in school. Are educational institutions able to move with this trend, welcoming fathers into classrooms?

IMPROVING HEALTH AND WELL-BEING

In the last decades personal health has improved due to better medicine, awareness and individual choices. Citizens are increasingly searching for healthier options, time and space for physical activity, and more information on what we consume. Businesses and governments are responding by offering gyms in offices and launching a variety of initiatives to help people make healthier choices, for example by including more information on nutrition fact labels and providing more smoke-free areas. These public health measures have been successful to some extent: tobacco consumption is decreasing, as are rates of suicide. However, more can be done to prevent unhealthy life choices and support individual physical and mental health. Schools can play a role by teaching healthy lifestyles, recognising harmful tendencies and providing resources to combat unhealthy behaviour early on.

Figure 4.7. **Going smoke-free**

Annual tobacco consumption, grams per capita, 1970, 1990 and latest year



Note: Tobacco consumption of those 15 years of age and older. Due to data availability, 1991 data were used for Germany and 1996 for Poland instead of 1990 data. See StatLink for full information on latest year per country.

Source: OECD (2015), *Non-Medical Determinants of Health*, OECD Stat, http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_LVNG.

StatLink http://dx.doi.org/10.1787/888933316333

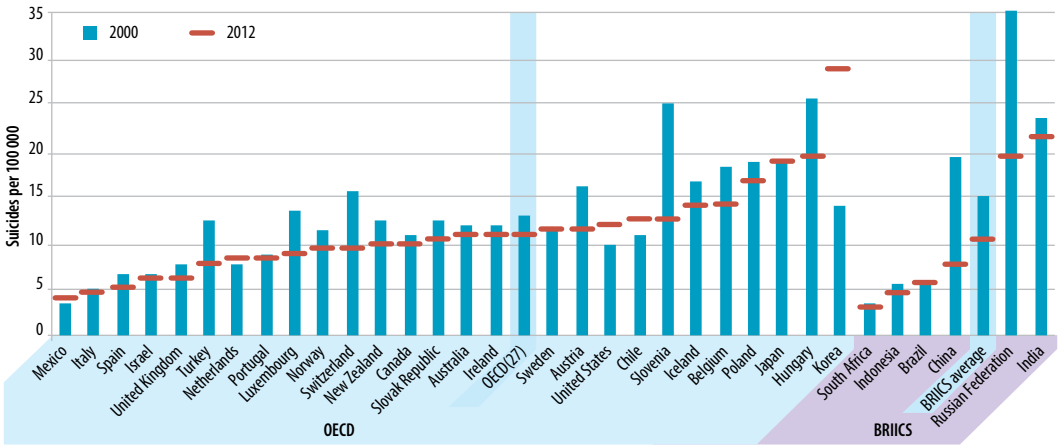
Tobacco consumption has been decreasing across most OECD countries for the past four decades. Since 1970, New Zealand experienced the greatest change in tobacco consumption, with a drop of 76%. However, not every country has shown a steady decrease across time. Greece in fact has experienced a slight increase in tobacco consumption since 1990, and Turkey is the only country in which current consumption exceeds that of 1970 levels; however, there has been a decline in Turkey since 1990. This general trend of decreased consumption is the result of a better understanding of the harmful effects of smoking as well as public policies aimed at deterring smoking, including increased taxes on cigarettes, banned smoking in public areas and warning

labels on cigarette packages. Specific campaigns aimed at preventing children from smoking in the first place have also been put in place in many OECD nations.

Suicide rates have also been decreasing in the vast majority of OECD and BRIICS countries in the last decade. Between 2000 and 2012, China and Slovenia experienced the largest drop in their suicide rates, of 60% and 51%, respectively. Suicide rates fell by 13% on average across the OECD. Only five OECD countries (Chile, the Netherlands, Mexico, Korea and the United States) have experienced an increase in their suicide rates. Korea currently has the highest suicide rate of 29 per 100 000 inhabitants, a growth rate of over 100% since 2000. Although one of the leading causes of death, suicide often fails to be prioritised as a public health issue due to continuing taboos and stigmas that prevent individuals from reaching for help and others from responding effectively.

Figure 4.8. **Suicide rates decreasing overall**

Suicide rates per 100 000 inhabitants, 2000 and 2012



Note: These estimates represent the best estimates of the WHO, computed using standard categories, definitions and methods to ensure cross-country comparability, and may not be the same as official national estimates.

Source: World Health Organization (2014), *Preventing Suicide: A Global Imperative*.

StatLink http://dx.doi.org/10.1787/888933316349

And education?

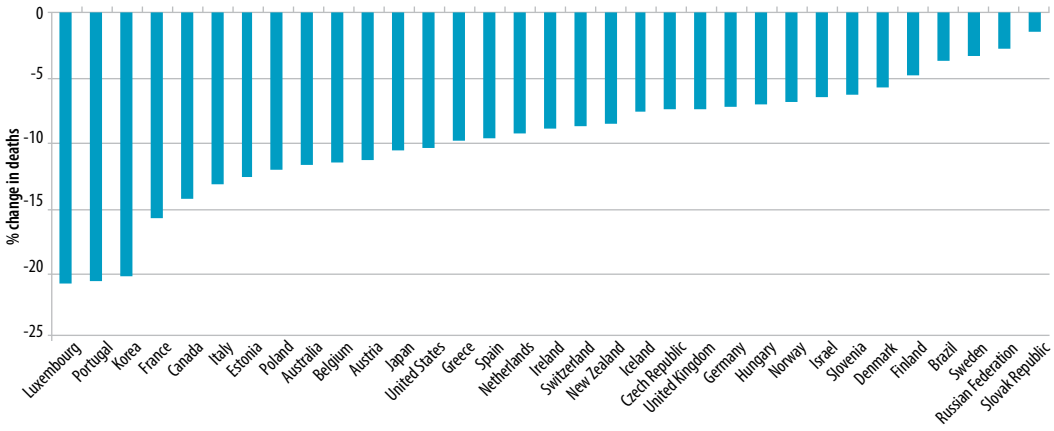
- Improving individual well-being throughout the lifespan is a key public policy goal throughout the OECD. Does education have a responsibility to teach physical and mental health to students in addition to its traditional focus on cognitive outcomes?
- Although smoking rates are decreasing, young people remain particularly vulnerable to advertising and peer suggestion. Should school systems be teaching our children about advertising techniques and the critical skills needed to decode the meaning behind the message?
- The loss of a peer or a family member can be one of the most difficult things for a young person to handle. How can schools and teachers be better equipped to help them through such crises?

KEEPING CHILDREN SAFE AND SOUND

Child well-being is increasing across OECD countries and indeed in much of the world, due to advances in medicine, better nutrition and healthier lifestyles. Safer environments and better healthcare have allowed child mortality rates from accidental and intentional injury to steadily decrease across most OECD countries. Physical and mental health is being more carefully nurtured. Still, there is a worry that the modern world has created new stresses for our children. Child obesity, cyber-risks (such as online bullying) and reported levels of stress have all increased in the last decade. While there are a number of concerns, there is some good news: the amount of time students spend on homework is declining in most OECD countries, easing stress. Schools have a responsibility to be safe places for learning, and teachers are on the front line of monitoring and ensuring their students' well-being.

Figure 4.9. **Accidents not waiting to happen**

Change in child deaths due to accidental injury, early 1980s to latest figures, average deaths per 100 000 children aged 0-14



Note: Figures are averages based on combined years such that the cumulative population of 0-14 year-olds exceeds 10 million.

Source: OECD (2011), *Doing Better for Families*, http://dx.doi.org/10.1787/9789264098732-en.

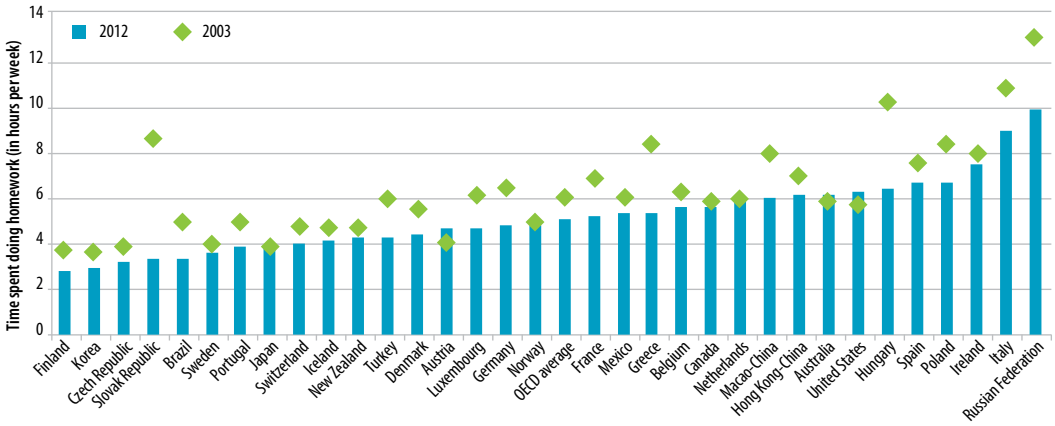
StatLink http://dx.doi.org/10.1787/888933316356

Deaths due to accidental injuries for children aged 14 and below have been decreasing across all OECD countries since the early 1980s. Accidental death, including death from traffic accidents, drowning, falls and fires is a partial indicator of safety levels and child maltreatment, although many accidental deaths are beyond the control of caregivers. Rates of death from accidental injury range from 2.3 in Luxembourg to 17.5 in Estonia per 100 000 children. The rate of death from accidental injury declined by 20% in Korea, Luxembourg and Portugal. Germany, Italy, Luxembourg and the Netherlands all had fewer than three deaths per 100 000 children from accidental injury in the late 2000s. In general, environments are becoming safer for children across all OECD countries, Brazil and the Russian Federation.

Child well-being is also affected by how children spend their time. Between 2003 and 2012, 15 year old students in the majority of OECD countries decreased the time they reported spending doing homework, from almost six hours to almost five hours per week on average. The Slovak Republic had the largest decrease in that time period, from just over eight hours down to just over three hours per week on average. Of the five countries that had an increase in homework load in that time, the increase was only significant for Austria and Australia. Interestingly, results from PISA 2009 suggested that the achievement benefits from spending more than four hours a week on homework were negligible. This general trend might thus be a good way to lower stress levels in our students without having an impact on their educational attainment.

Figure 4.10. **Less homework, less stress?**

Average time spent doing homework, 2003 - 2012



Note: Only countries and economies with comparable data from PISA 2003 and PISA 2012 are shown. Only statistically significant differences are shown.

Source: OECD (2013), *PISA 2012 Results: What Makes a School Successful? (Volume IV): Resources, Policies and Practices*, http://dx.doi.org/10.1787/9789264201156-en.

StatLink http://dx.doi.org/10.1787/888933316362

And education?

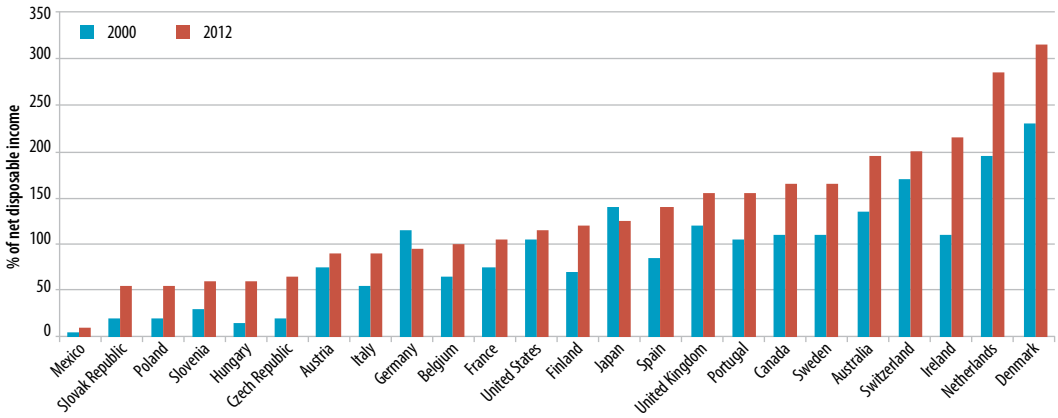
- There is a difficult debate about the rights and responsibilities of parents and schools. Who is responsible for keeping children healthy, for example by receiving immunisations and providing nutritious meals? Should schools be permitted to contradict the wishes of parents, for example if they do not wish to vaccinate their children?
- Accidents, by definition, cannot be entirely prevented. How can we protect children while at the same time allowing them the space and freedom to grow and play? Is some level of physical risk acceptable in playgrounds, for example?
- Children and young people increasingly report higher levels of stress and fewer hours of sleep. Reducing the hours of homework a week is one way teachers and school leaders can help decrease stress – what might some other ways be?

BALANCING THE BOOKS

Household poverty and debt have a large impact on families. Children living in low-income households perform more poorly in school on average due to a lack of resources including books, access to computers and sometimes even proper meals. Not only has household debt been rising across most OECD countries, but youth are now at a greater risk of living in poverty than their older counterparts. This has serious implications, not just for educational performance but also for success and well-being later in life. The importance of social background in shaping attainment and achievement across the lifespan remains one of the best-charted relationships in educational and social research. Good quality education can be an important tool to reduce inequality and narrow the gap between low- and high-income students, but it cannot act alone.

Figure 4.11. **Household debt increasing**

Total household debt as a percent of net disposable income, 2000 and 2012



Note: Due to data availability, 2001 data are used for Ireland and Slovenia and 2003 for Mexico and Poland instead of 2000 data. 2009 data are used instead of 2012 data for Mexico.

Source: OECD (2015), *Household Debt Indicator*, https://data.oecd.org/hha/household-debt.htm.

StatLink http://dx.doi.org/10.1787/888933316376

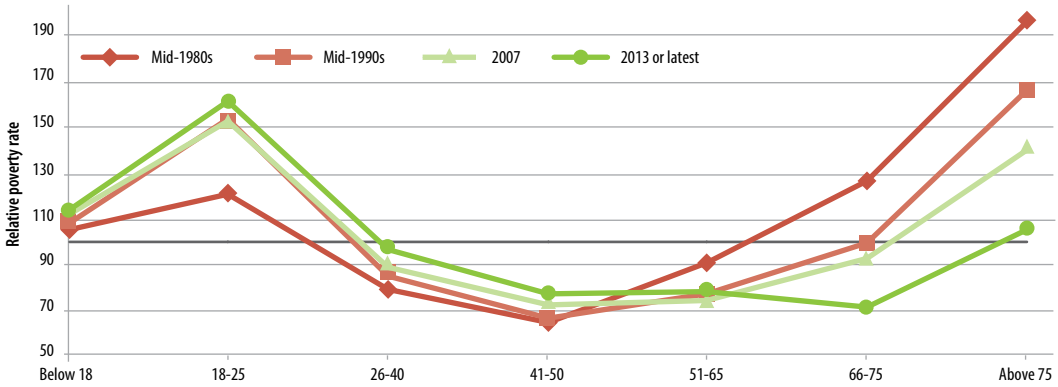
Households across the OECD have experienced an increase in debt relative to net disposable income over the last decade. The average household debt across the OECD has increased from 40% to 131% of net disposable income. Household debt in Hungary almost tripled between 2000 and 2012, while debt in the Czech Republic and Poland doubled in that time period. Denmark, which had the highest household debt levels in 2000, still has the highest ratio of debt to net disposable income at over 300%. Germany and Japan are the only OECD countries for which there are data that have seen a decline in household debt relative to disposable income between 2000 and 2012.

The risk of income poverty has shifted over the last four decades from the elderly to the young. In the mid-1980s, men and women over 75 years of age were on average almost twice as likely as the entire population to be poor. In contrast, young adults between the ages of 18 and 25 were only 20% more likely than the entire population to be in poverty. By 2013, the pattern had shifted, and the likelihood that young adults would be in poverty

increased to 60% while the prospect for the elderly dropped to 5%. Part of the explanation for this might be improved social security and pensions for the old. For the youth, this pattern might be driven by increased attendance in tertiary education, which effectively delays their entry into the labour market and thus their income. However, the rising numbers of youth who are neither in employment nor education are a real policy concern, particularly since the financial crisis of 2007-2008. These trends indicate that emphasis should continue to be placed on assisting children and youth living in precarious circumstances, without backtracking on the progress made to support the elderly. Good quality education throughout the lifespan can help reduce inequality at all ages.

Figure 4.12. **Poverty and youth**

Relative poverty rate of the entire population in each year = 100, mid-1980s to 2013 or latest available year



Note: OECD un-weighted average for 18 OECD countries for which data are available from the mid-1980s: Canada, Denmark, Finland, France, Germany, Greece, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Sweden, Turkey, the United Kingdom, the United States.

Source: OECD (2015), *In It Together: Why Less Inequality Benefits All*, http://dx.doi.org/10.1787/9789264235120-en.

StatLink http://dx.doi.org/10.1787/888933316389

And education?

- What is the role of educational institutions in addressing the need for greater financial education? What should this look like in terms of curriculum planning and design?
- The rise in household expenditure and student debt is partially due to higher costs of education, including tuition fees and computer and Internet access. What is the role of governments in supporting families that have difficulty in covering those costs?
- Troubled labour markets have contributed to the increase of young people choosing to study rather than work. How might post-secondary providers meet this demand? And how can the quality of new offerings, including online provision, be ensured?

INFOGRAPHIC: FAMILIES AND EDUCATION

What are some of the ways the family trends presented in this chapter interact with education? And how can education affect these trends? Some answers are obvious and immediate, for example the rise in the numbers of working women and the importance of early childhood education and care. Others are less obvious, or more long-term, for example the impact of trust between parents and teachers on the learning environment and, potentially, even teacher retention.

This section is an invitation for readers to consider how the trends interact with education, both in terms of the effect they might have on education, and also the effect education might have on the trends. While the trends presented are robust, the links with education are illustrative and suggestive. They are not intended as conclusive answers to policy questions. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning.

Diversity of families

- Promoting acceptance of non-traditional families in schools
- Acknowledging multi-cultural backgrounds in the classroom and providing teachers with the tools to teach diverse classrooms
- Creating strategies and providing resources for teaching students with special needs

New working patterns

- Offering high quality universal childcare
- Increasing relevance of lifelong learning for ageing populations and an older workforce
- Using professional skills of parents in classroom and school governance

Household poverty

- Providing opportunities for disadvantaged students throughout their academic career
- Avoiding early tracking and developing links between tracks to allow for better student mobility
- Reinforcing financial education for responsible budgeting

Health and well-being

- Encouraging and teaching healthy habits for emotional and physical well-being
- Paying attention to signs of abuse and neglect
- Providing accessible counselling, especially after a traumatic event (e.g. death or suicide)

Values

- Addressing differences in social values within schools and promoting respect among students
- Promoting trust between parents, teachers and administrators
- Teaching tolerance and critical thinking and preventing radicalisation

Brainstorming the links between global trends and education

Readers are encouraged to use this visual as a point of departure for the question: "What do these trends mean for my education system and my work?"

Figure 4.13. **Infographic: Family matters**

FIND OUT MORE

Relevant sources

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Definitions and measurement

- **Accidental injury**: Injury caused by an accident, such as traffic accident, drowning, falls and fire. It may or may not be fatal. If the accident was caused intentionally by someone it is known as intentional injury.
- **Cyberbullying**: Cyber or online bullying occurs when a person is threatened, harassed, or embarrassed by another person or a group of people using the Internet. It has led to a number of high profile tragedies, for example teens committing suicide as a result of cyberbullying. Although cyberbullying is increasingly popular, bullying offline is still reported to be more common.
- **Disadvantaged students**: Students who are socio-economically disadvantaged in comparison to their peers. On average, there is an academic performance gap between disadvantaged and advantaged students. Disadvantaged students can lack resources, such as books, computers, easy access to the Internet and help from parents, among others.
- **Family benefits**: Broadly speaking there are three types of public spending on family benefits: child-related cash transfers (cash benefits) to families, public spending on services for families (benefits in kind), including direct financing and subsidising of providers of childcare, and financial support for families provided through the tax system, including tax exemptions; child tax allowances, and child tax credits, amounts that are deducted from the tax liability.
- **Homophobia**: Discrimination against homosexuals and/or homosexuality.
- **Household debt**: All liabilities that require payment or payments of interest or principal by household to the creditor at a date or dates in the future.
- **"LGBTQ"**: LGBTQ is an acronym for the Lesbian Gay Bisexual Transgendered and Queer community.
- **Maternal educational level**: The level of education attained by the mother. Low maternal education is defined as educational attainment up to lower secondary education.
- **Maternal leave**: A job-protected leave of absence for employed women prior to and after childbirth or, in some countries, adoption. Most countries allow beneficiaries to combine pre- and post-birth leave, while some mandate a short period of pre-birth leave and six to ten weeks after childbirth. Almost all OECD countries provide specific public income support payments that are tied to the length of maternity leave.
- **Paternity leave**: Employment- or job-protected leave of absence for employed fathers after childbirth. Paternity leave is on average much shorter than maternity leave – no more than two weeks. Because it is short, workers on paternity leave often continue to receive their full wages.
- **Parental leave**: Employment-protected leave of absence for employed parents that supplements maternity and paternity leave. In most, though not all countries, it follows maternity leave. Unlike eligibility for public income support that is often family-based, entitlement to parental leave is individual so that only one parent can claim support at any one time.
- **Relative poverty rate**: Defined as the share of people living in households with less than 50% of the median disposable income (adjusted for family size and after taxes and transfers) of the entire population.

- **Same-sex marriage**: Legalised union between same-sex partners.
- **Warning labels**: Health warning label on cigarette packets, which can be pictorial or text-only warning. The labels warn consumers of the dangers of smoking cigarettes.
- **Well-being**: Although there is no single definition of well-being, most experts agree that it requires meeting various human needs, some of which are essential (e.g. being in good health), as well as the ability to pursue one's goals, to thrive and feel satisfied with one's life.
- **Youth**: Young people aged 15-24.

Chapter 5

A brave new world

A brave new world trends: A visual overview *– a display of the trends in this chapter and the connections between them.*

At the touch of a button *– brings together changing technological uses such as an increase in online purchases and online searches for health-related information.*

E-society and the iSelf *– discusses the exponential rise in the number of Internet users and the variety of activities performed simultaneously by online users.*

Virtual reality *– questions to what extent virtual reality influences the physical world, as world leaders, firms and individuals create their digital personas.*

Dial "C" for cybercrime *– takes a look at emerging cyber-risks and the growing concern for protection from these threats.*

The future is now: The rise of the biotechnology *– focuses on the growing biotechnology sector.*

Infographic: Technologies and education *– a visual exploration of the links between the trends in this chapter and education.*

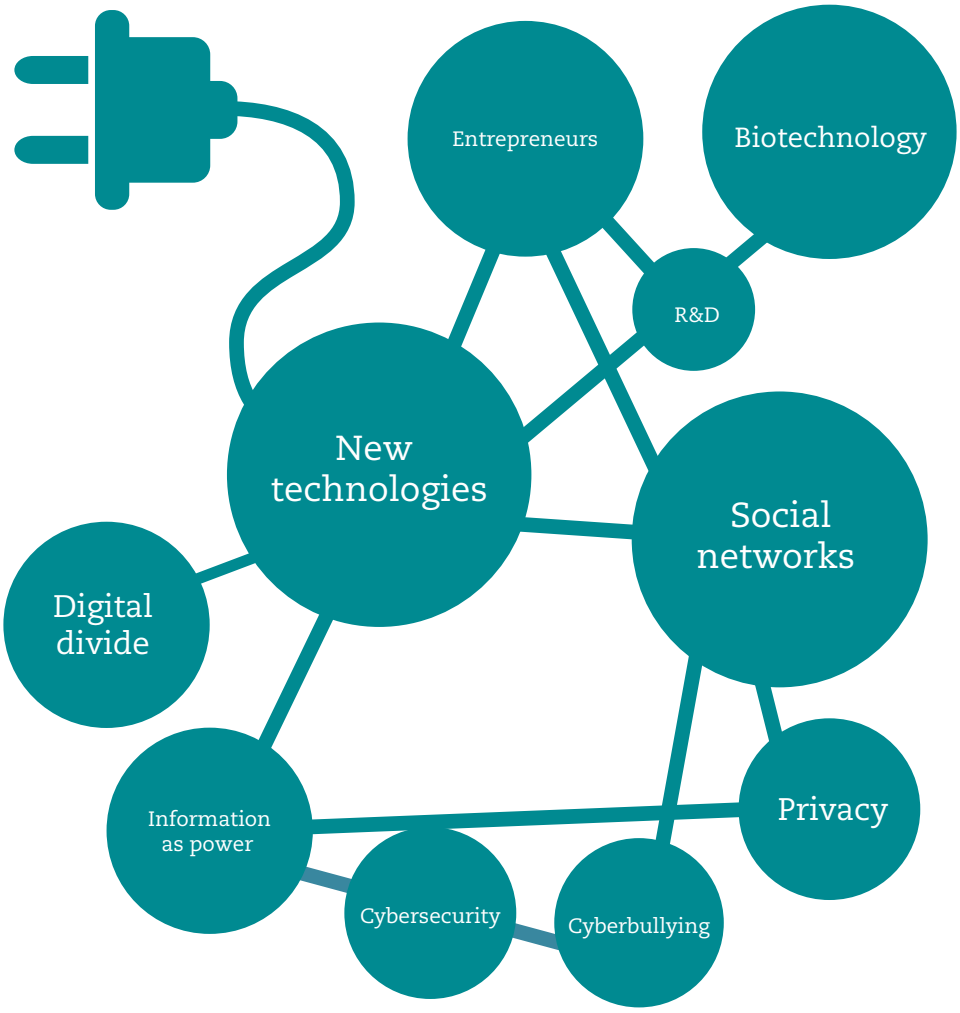
The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

A BRAVE NEW WORLD TRENDS: A VISUAL OVERVIEW

In contrast to many of the trends in this book that are gradual and often linear, the pace of technological development is exponential and its impact often unpredictable. New technologies have changed the way we communicate, work and even socialise. And they have the potential to do more: innovations in biotechnology, for example in genome sequencing, have the potential to revolutionise our lives.

This chapter examines a set of key trends in new technologies. While they are all relevant to education, not all pertinent trends are included – it is necessarily highly selective. As well as relevance for education, the criterion for selecting trends was the availability of internationally comparable, long-term evidence.

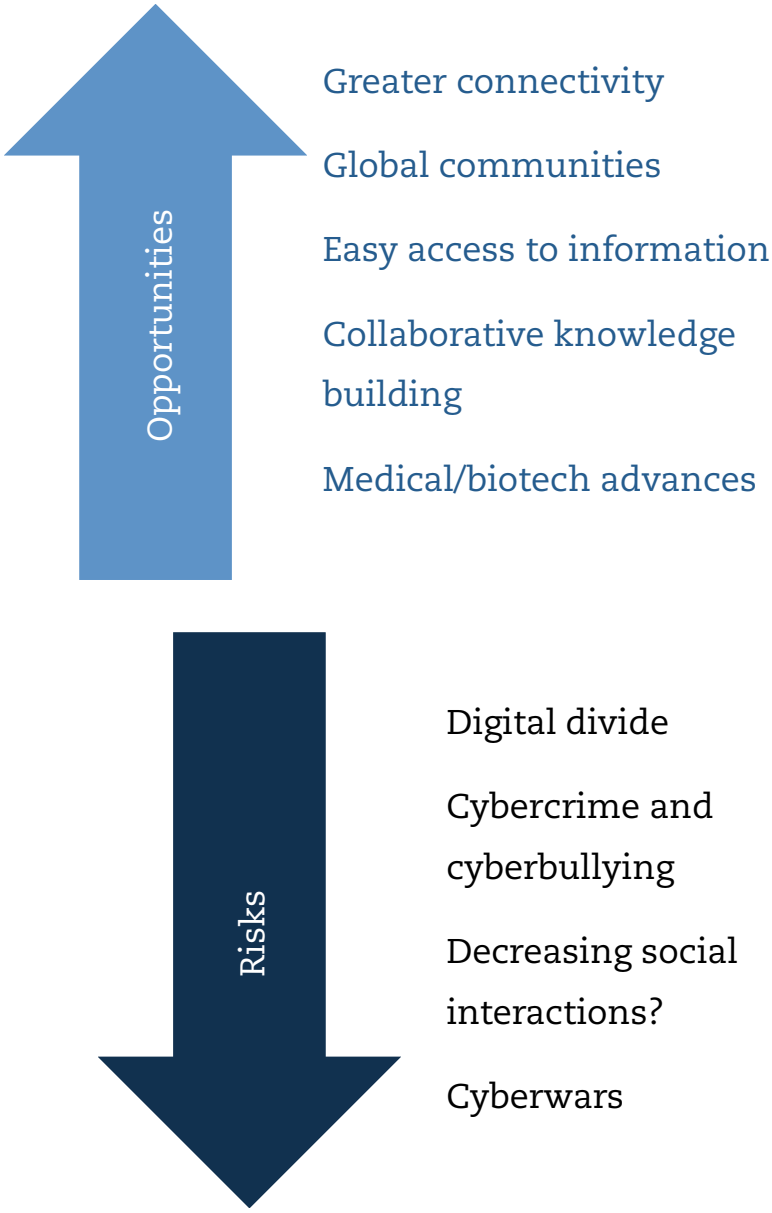
Figure 5.1. **A brave new world trends: A visual overview**



Interactions between the trends

These trends do not exist in isolation. New technologies bring new opportunities as well as new risks. The trends themselves are interrelated and influence each other, sometimes in unpredictable ways. Some of the opportunities and risks that stem from new technologies are illustrated below. As adolescents and children are the most frequent users of online services and social networks, schools and teachers are increasingly faced with the challenges of educating and guiding students through the realities of the virtual world.

Figure 5.2. **Interactions between technologies trends**

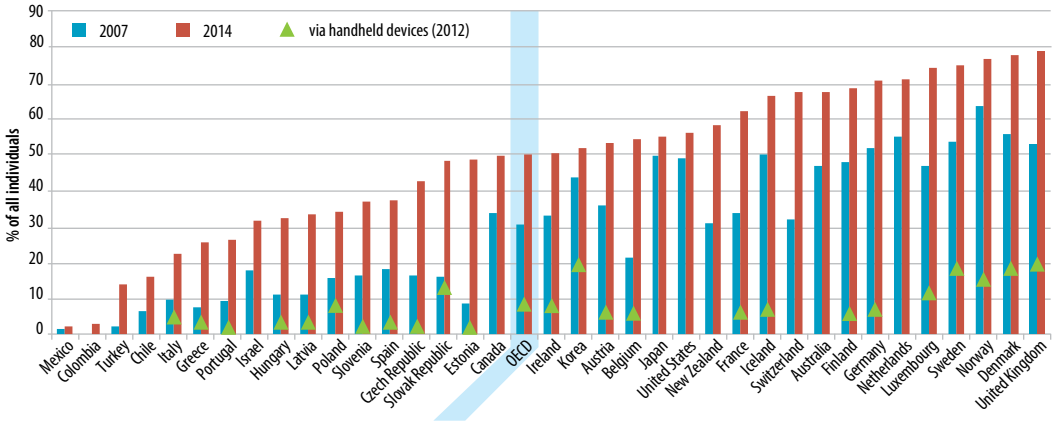


AT THE TOUCH OF A BUTTON

The continuing evolution of the Internet has had an enormous impact on our daily lives. We can now buy our groceries, pay our bills, watch films and attend meetings without ever leaving our homes. We tend to trust the information presented online, using virtual searches to better understand a plethora of complex information, including health and legal issues. Our language reflects this change: words like "google", "tweet" and "skype" have become verbs that are incorporated seamlessly into conversation. These technological developments have opened up new markets for the education sector, including online courses and distance learning. They have also transformed our understanding of teaching and learning; for example, virtual learning platforms allow for professors and students to interact yet be in different physical environments.

Figure 5.3. **Online shopping from the comfort of your home**

Individuals who have ordered goods or services online, including via handheld devices, 2007 and 2014



Note: Due to data availability, the actual year may vary by country. See StatLink for more information.

Source: OECD (2014), *Measuring the Digital Economy: A New Perspective*, http://dx.doi.org/10.1787/9789264221796-en.

StatLink http://dx.doi.org/10.1787/888933316398

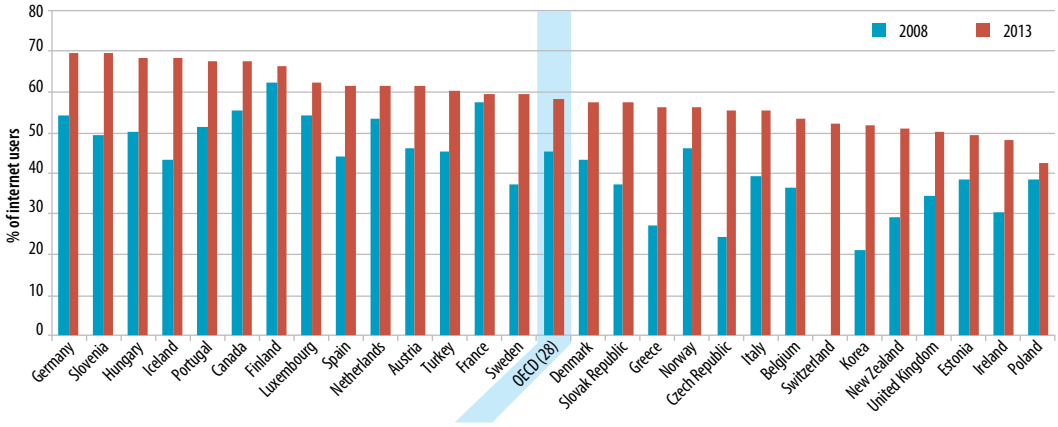
Since 2007, the percentage of individuals who have ordered goods or services on line has increased substantially across OECD countries, from an average of just over 30% in 2007 to 50% in 2014. In this time period Turkey experienced the highest growth rate in online purchases, of 504%. On average, the United Kingdom has the highest percentage of individuals ordering goods or services on line – over 78%. Although most online purchases still take place on computers, a significant percentage is being done via handheld devices such as mobile phones. In Korea, for example, almost 20% of online purchases were made through handheld devices in 2012, and this number is expected to grow. Although all countries in the figure above have seen an increase in online purchases since 2007, countries such as Mexico and Colombia lag behind, with rates of less than five percent of online purchases in 2014.

The Internet is also being used as a tool to search for expert information, for example on health issues. Between 2008 and 2013, there has been an increase in individuals

searching for health-related information on line in the OECD member countries for which there are data. The change is more pronounced in certain countries: in Germany, nearly 70% of internet users searched for health-related information, whereas in Poland only 42% of users did. Greece experienced the most dramatic increase during this time period, from 27% in 2008 to 56% in 2013. It is likely that these patterns will continue, especially given our ageing population, resulting health concerns and availability of information on line. This is part of a general pattern of consumers becoming more informed in fields that were once exclusively the domain of experts. This also suggests that doctors and nurses will continue to be more likely to treat better informed patients who may challenge their suggestions or recommended course of action.

Figure 5.4. **Who's the expert? Online searches for health information**

Individuals who searched for health-related information online as a percentage of individuals who used the Internet in the last three months, 2008 and 2013



Note: For Canada, data refer to 2007 and 2012 and to all individuals aged 16 and over in 2007. For New Zealand, data refer to 2006 and 2012. For Switzerland, data refer to 2010. For Canada and New Zealand, data refer to individuals who used the Internet in the last 12 months.

Source: OECD (2014), *Measuring the Digital Economy: A New Perspective*, http://dx.doi.org/10.1787/9789264221796-en.

StatLink http://dx.doi.org/10.1787/888933316407

And education?

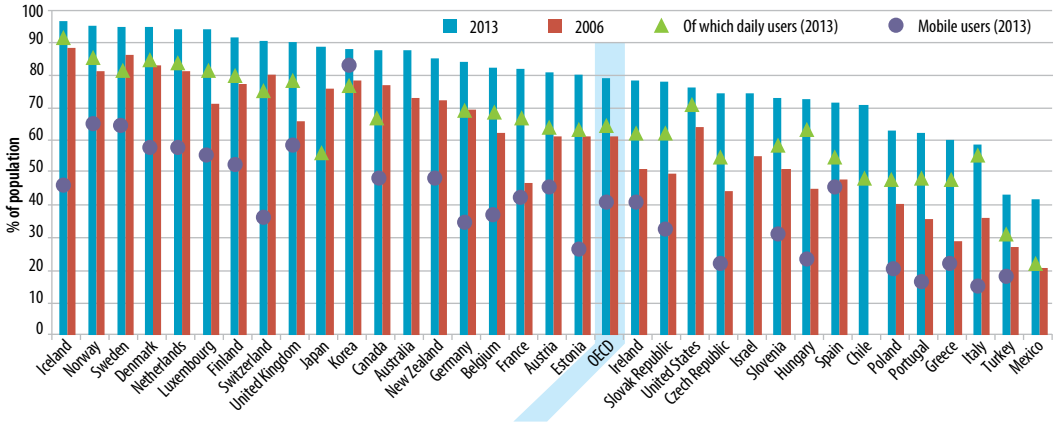
- ICT has the potential to allow more self-paced, interactive and personalised learning. How much more should this potential be exploited, whether in schools, vocational or higher education or non-formal learning for adults? Can it be over-done?
- There has been a dramatic growth in the amount of information available and the ease with which anyone can upload materials. How can educators develop their students' critical capacity to use and contribute to this wealth of information?
- Teachers' use of ICTs often lags behind the technical skills required by students by the time they enter the workplace. How can education ensure that students develop these skills? And how might teachers be better prepared for teaching and using technology?

E-SOCIETY AND THE iSELF

The Internet has become an integral part of our lives, especially with the development of mobile handheld devices such as smartphones and tablets. Internet users are more and more likely to be on line every day, and they are also becoming increasingly sophisticated in their habits and online behaviours, performing more activities simultaneously, for example. The extent of these changes has given rise to concerns about decreasing attention spans, digital withdrawal and even a new syndrome: the "fear of missing out", or fomo. These fundamental changes in our social and work lives challenge the education system to take advantage of the tools and strengths of new technologies, while at the same time addressing concerns regarding the use of information and privacy.

Figure 5.5. **Internet is an integral part of our lives**

Average number of Internet users, daily users and mobile users, 2006 and 2013



Note: For information on the exact dates of specific countries, see StatLink.

Source: OECD (2014), *Measuring the Digital Economy: A New Perspective*, http://dx.doi.org/10.1787/9789264221796-en.

StatLink http://dx.doi.org/10.1787/888933316412

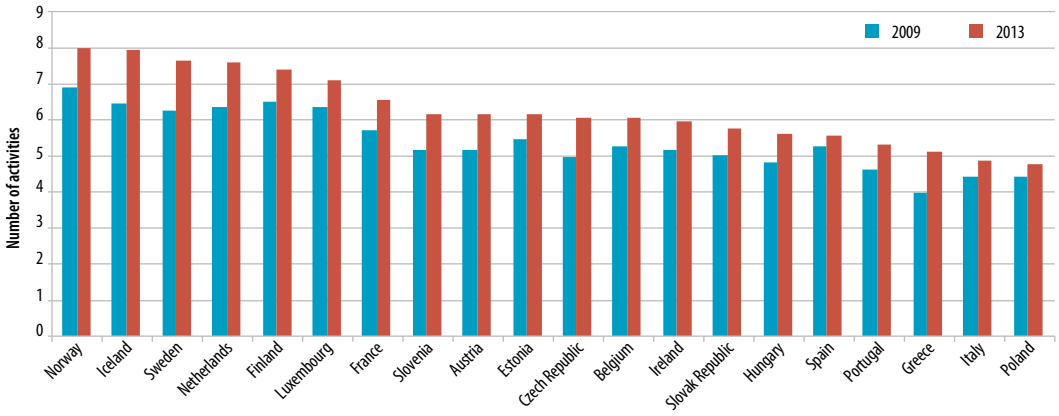
Across all OECD countries, the average percentage of Internet users as a share of national populations increased from 61% in 2006 to 79% in 2013. This overall average ranges from a high of 95% in the Nordic countries to a low of less than 50% in Mexico and Turkey. These numbers are expected to rise as broadband capacity and access improves across all regions of all countries. Whereas in previous decades the Internet was generally accessed from offices, homes or libraries, the explosion of handheld devices has allowed today's users to bring the Internet with them wherever they go. On average, 64% of Internet users across the OECD use it daily. And in Korea for example, 83% of Internet users report being mobile users.

Technologies not only connect people but also shape individual behaviours and abilities. Since 2009, the average number of activities performed on line at the same time (for example, sending emails, checking social networks, reading news) has increased by 16% across OECD countries. At the lowest end of the spectrum, Poland's Internet users perform on average nearly five activities at the same time, while Norwegians report

performing eight activities simultaneously. This means that Internet users could be checking their emails, reading about the latest corruption scandal, downloading music and talking to their friends via messaging services all at once. This may suggest an increasing ability to multi-task, but also gives rise to worries about decreasing attention spans among today's youth.

Figure 5.6. **Online multi-tasking: More efficient or more distracted?**

Average number of activities being performed online at the same time per Internet user, 2009 and 2013



Note: Due to lack of full correspondence with the list of activities provided in the Community Survey on ICT Usage in Households and by Individuals (Eurostat), the number of activities performed might be underestimated.

Source: OECD (2014), *Measuring the Digital Economy: A New Perspective*, http://dx.doi.org/10.1787/9789264221796-en.

StatLink http://dx.doi.org/10.1787/888933316429

And education?

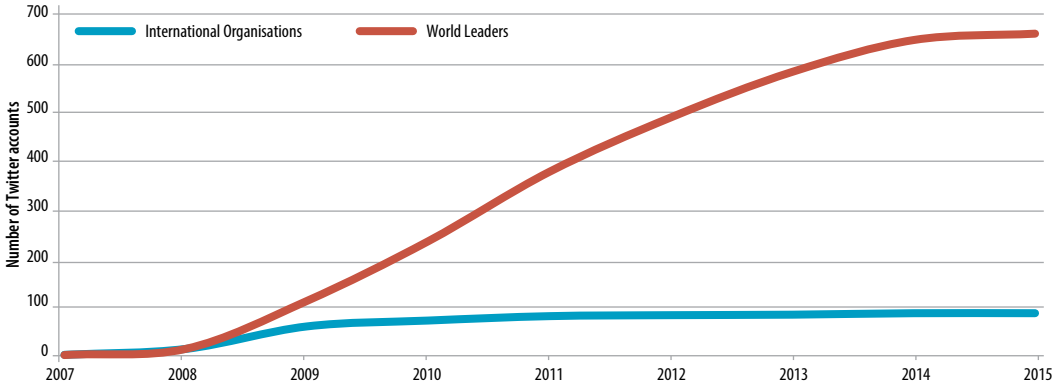
- We now have the means to get an immediate answer, in fact potentially several immediate answers all at once, to any online question. Does this search and find mentality alter cognition, including the way we store and retrieve information?
- Are we adequately preparing students with the techniques and skills needed to take advantages of the opportunities that ICTs offer?
- The ubiquitous nature of technologies in our lives means that advanced computer skills are increasingly relevant. Should students learn programming skills in addition to basic computer literacy as part of the general curriculum?

VIRTUAL REALITY

In 2014, Finnish Prime Minister Alexander Stubb tweeted: "Most people who criticise Twitter are often not on it. I love this place. Best source of info. Great way to stay tuned and communicate." Once used only by the tech-savvy, social media has pervaded all aspects of modern life in just a few short years. World leaders and international organisations have increasingly taken advantage of social media as a channel of diplomacy, communication and engagement. Businesses have created their own websites and social media profiles as a form of interacting with customers. Schools and universities are stepping up their game, creating institutional Facebook, Twitter and Instagram pages. Education systems need to prepare their students to process the mass of information available on line and judge fact from fiction.

Figure 5.7. **#Worldimpact in 140 characters or less**

Aggregate number of international organisations and world leaders that have Twitter accounts, 2007-2015



Note: World Leaders include heads of state and government and a list of foreign ministers and their institutional accounts as well as a list of all diplomatic missions and head of missions worldwide.

Source: Twiplomacy (2015), *Twiplomacy Study 2015*.

StatLink http://dx.doi.org/10.1787/888933316430

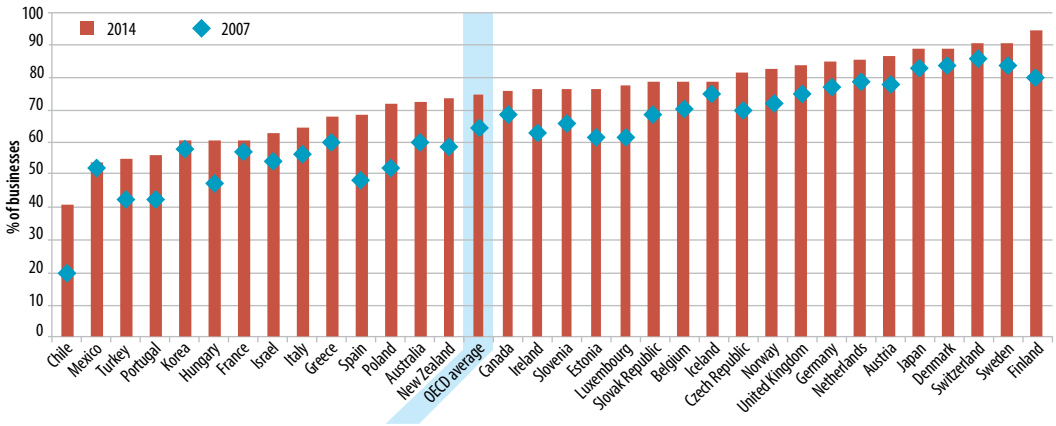
Twitter is a popular social network that allows users to post short 140-character texts called tweets. Like most social media, it has experienced an explosion of users in a very short time. Between 2007 and 2015, the number of Twitter accounts skyrocketed, and even the most famous and influential individuals and organisations have had to adapt. In 2015, 660 world leaders and 89 international organisations had Twitter accounts, up from 4 international organisations and 5 world leaders in 2007. Currently, United States president Barack Obama has the most followers of the world leaders, at 56 million, followed by Pope Francis with over 19 million followers. The impact of social networks can extend far beyond national boundaries and time zones: YouTube and Facebook each have over a billion followers alone, with Facebook having recorded over 1 billion users in a single day.

Businesses have also had to adapt to new times. Across the OECD, the share of firms with websites rose from 64% in 2007 to 75% in 2014. However, there is wide variation across countries: only 41% of Chilean firms have their own website, whereas 95% of

Finnish firms do. In general, having an online presence is increasingly seen as a necessity for individuals as well as companies. Staying relevant and in the public eye is the bread and butter of the digital landscape. The trick, of course, is that with so much constant change, getting the attention and visibility you are looking for (whether or not you are the President of the United States) requires increasingly more effort, exposure and time spent on line.

Figure 5.8. **Businesses in a dot.com world**

Percentage of businesses with 10 or more employees that own a website, 2007 and 2014



Note: Specific years per country vary slightly; see Statlink for full details.

Source: OECD (2012) OECD *Internet Economy Outlook 2012*, http://dx.doi.org/10.1787/9789264086463-en; OECD (2015) *OECD Digital Economy Outlook 2015*, http://dx.doi.org/10.1787/9789264232440-en.

StatLink http://dx.doi.org/10.1787/888933316449

And education?

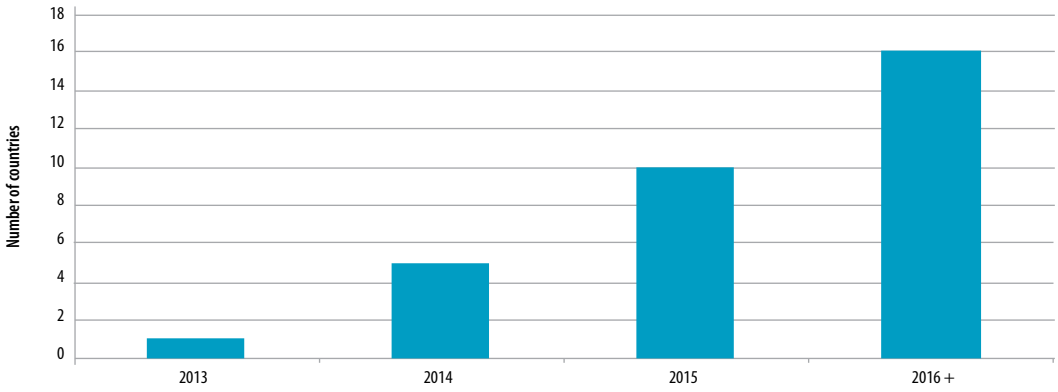
- With technological development continuing at a rapid pace, how well has education kept pace and, indeed, should it? What are the benefits and costs of students learning through technology?
- Social networking and user-generated content Internet sites are often perceived as taking time away from the core business of learning. What can their participatory and collaborative models bring to formal learning systems?
- Online educational materials and software are an increasingly important market. Who should be responsible for determining content and monitoring the quality of these products?

DIAL "C" FOR CYBERCRIME

New technology can be a double-edged sword: despite its positive impacts, it can also lead to previously unknown dangers. Cyberfraud, hacking, cyberbullying and identity theft are only some examples of new risks that have emerged. One of the most difficult challenges for governments will be staying abreast of the evolution of technology and human behaviour: for example, with an increase in the ease of uploading information and a large online audience, more and more countries are enacting specific laws against revenge porn in an effort to close loopholes in current legislation. There has also been an increase in the number of cybersecurity certificates and courses offered. As adolescents and children are the most frequent users of online services and social networks, schools and teachers are increasingly faced with the challenges of educating and guiding students through the advantages and disadvantages of the virtual world.

Figure 5.9. **Revenge porn legislation**

Aggregate number of OECD and BRIICS countries that have national laws on revenge porn, 2013-2016



Note: Data for 2016+ include countries that have bills under discussion in Parliament or consultations being launched. For the United Kingdom, England and Wales criminalised revenge porn in 2015. Scotland has no law but a consultation has been launched. For more information on each country see the StatLink.

Source: Data compiled from national and international legislation and news sources. See StatLink for full breakdown by country.

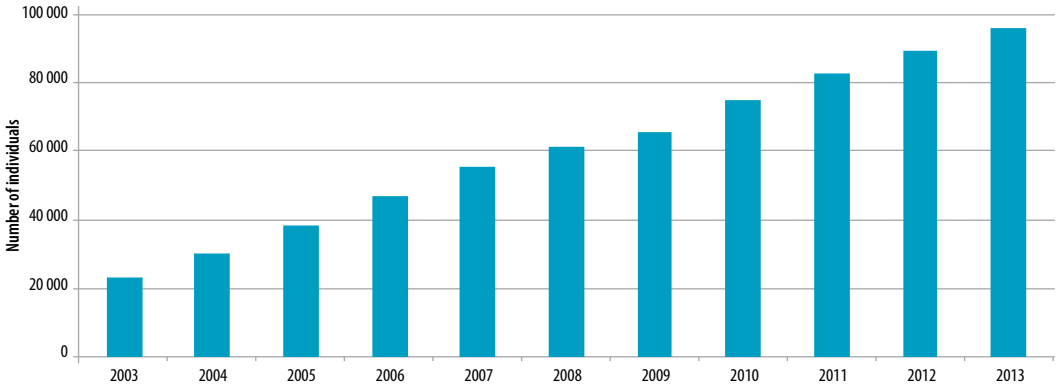
StatLink http://dx.doi.org/10.1787/888933316455

Revenge porn, or posting explicit images of former partners online without the consent of the individual pictured, has become an increasingly common phenomenon. Due to its immediate and devastating effects on the victim and his/her family, revenge porn is of growing concern for individuals and governments alike. As a result, an increasing number of countries have created specific laws to address this issue, and many others have included it under a general penal code regarding harassment or offensive behaviour. The Philippines was the first country to adopt a specific law on revenge porn in 2009. It has since been followed by nine other countries, including the Czech Republic, Israel and Japan. In the United States, 24 states have implemented laws to combat revenge porn, but there is still no federal law – although a bill is currently being discussed in Congress.

As cyber-risks emerge, we have also seen a parallel concern with cybersecurity. The International Information Systems Security Certification Consortium, otherwise known as (ISC)2, issues a range of cybersecurity certifications. It experienced an increase in worldwide membership from around 23 000 in 2000 to nearly 96 000 in 2013. Similar associations, (for example the International Association of Privacy Professionals [IAPP]), have also experienced a similar trajectory.[1] These trends underline the importance of ensuring cybersecurity through government legislation, certification and raising awareness of individual risky behaviour. Schools and teachers, along with communities and parents, can play an important role in preparing children and teenagers to face these challenges.

Figure 5.10. **Cybersecurity certification increasing**

Number of (ISC)2 certified individuals worldwide, 2003-2013



Note: The International Information Systems Security Certification Consortium, otherwise known as (ISC)2, issues a range of cybersecurity certifications.

Source: OECD (2015) *OECD Digital Economy Outlook 2015*, http://dx.doi.org/10.1787/9789264232440-en.

StatLink http://dx.doi.org/10.1787/888933316469

And education?

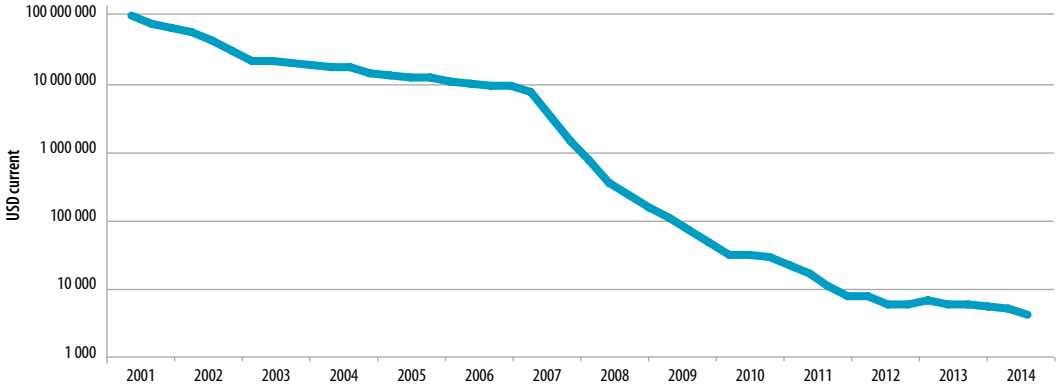
- What responsibilities do educators have in monitoring student's time online, and how can different parental standards of safety be accommodated? Is there a need for system-wide policies to establish consistent standards in online security for all schools and educational institutions?
- Anonymous posting and commenting online has been the subject of intense debate, with those in favour citing freedom of speech issues, and those against arguing that it can encourage hate speech and a lack of accountability. Should education take a pro-active stance in encouraging respectful online behaviour?
- Are teachers being given the appropriate training to recognise cyber-risks for students? Are students being appropriately taught how to manage and avoid these risks? Should all students be taught the technical skills needed to protect themselves from cyberthreats, in addition to ICT specialists?

THE FUTURE IS NOW: THE RISE OF BIOTECHNOLOGY

Technological advances are not exclusive to the Internet. Although it might still seem like science fiction, major developments in biotechnology have already changed our lives in dramatic ways. Biotechnology is used in medicine to combat disease, in agriculture to produce higher yields and more resistant crops, and in the environment to develop cleaner energy. One example of how biotechnology is becoming more integrated in our lives comes from genome sequencing, where prices have been dropping exponentially in the last decade. This increasingly allows individuals to map their genes and identify whether they carry potentially life threatening mutations. The sector is booming, as evidenced by the rise in the numbers of patent applications, for example. No longer just science fiction, biotechnology is an increasingly important field of study both scientifically and economically.

Figure 5.11. **Technological advancement and genome sequencing**

Cost of genome sequencing in logarithmic scale, 2001-2014



Source: OECD (2014), *Measuring the Digital Economy: A New Perspective*, http://dx.doi.org/10.1787/9789264221796-en.

StatLink http://dx.doi.org/10.1787/888933316473

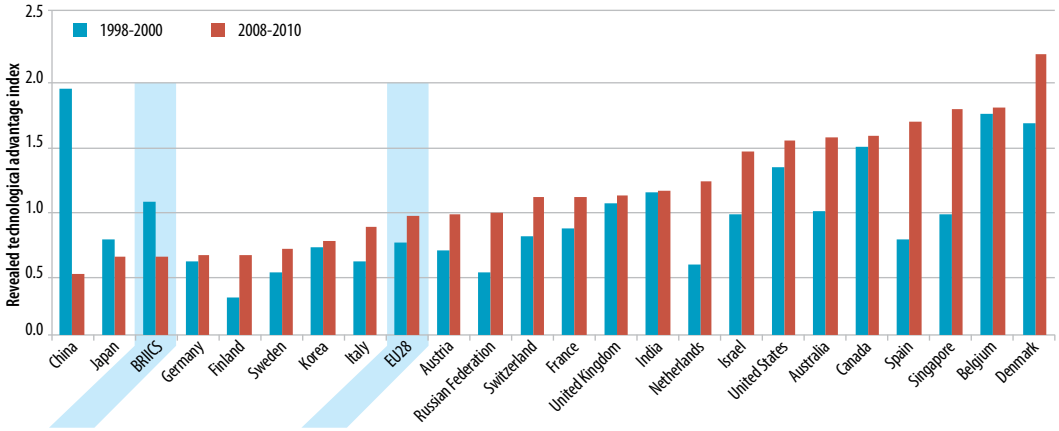
Genome sequencing, or the ability to map out the genetic code, was a big breakthrough for biotechnology and medicine when it was developed in 2001. Although originally only specific genes could be mapped at once, technological developments have now made it possible to map a person's entire genetic code by sequencing all of their genes simultaneously. Over the 13 years since its development, the cost of genome sequencing plummeted from over USD 100 million to USD 4 000 per genome. At the time of printing, online searches revealed websites offering the service for less than USD 1 000. This decline in price will enable more and more people to discover if they carry genetic markers that could lead to cancer or other diseases before they experience any physical symptoms. It will also stimulate new academic research and could help prevent a series of diseases or genetic mutations.

As biotechnology booms around the world, most countries have observed an increase in their biotechnology index (roughly, the numbers of biotechnology patents being filed relative to the total number of patent applications filed in the country). All OECD countries in the figure below have seen an increase in share of biotechnological patents relative to the total number of patents, with the exception of Japan. Denmark had the highest

biotechnology index in 2008-10, followed by Belgium. In terms of growth rates, Finland, the Netherlands, Singapore and Spain have seen the fastest growth in their biotechnology index in the decade between 1998 and 2008. The decrease in China, Japan and the average of the BRIICS may be explained by rapid growth in patents outside biotechnology.

Figure 5.12. **Biotechnology patents on the rise**

Share of biotechnological patents relative to the total number of patents, 1998-2000 and 2008-10



Note: The revealed technological advantage index is calculated as the share of biotechnology patents of an economy relative to the share of total patents belonging to the economy, based on patent applications filed under the Patent Co-operation Treaty (PCT). Only the top 20 economies in biotechnology patents, with more than 500 patents in 2008-10, are included.

Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013* http://dx.doi.org/10.1787/sti_scoreboard-2013-en.

StatLink http://dx.doi.org/10.1787/888933316486

And education?

- Brain-enhancing drugs aim to improve concentration and memory while also increasing productivity. Should schools and tertiary institutions take a stand on the use of cognitive performance-enhancing drugs? How could this be implemented?
- Are tertiary institutions able to provide students with the skills required to work in the biotechnology sector, such as being able to work in genome sequencing laboratories or developing new uses for nanotechnologies?
- As advances in biotechnology help to support healthy old age, elder learning may become increasingly important. What is the best way for the education sector to provide formal and informal opportunities for learning throughout the lifespan?

INFOGRAPHIC: TECHNOLOGY AND EDUCATION

What are some of the ways the technological trends presented in this chapter interact with education? And how can education affect these trends? Some answers are obvious and immediate, for example the emergence of cyber-risks and the need for teacher preparation on this topic, or conversely, improved literacy allowing for better use of new technologies. Others are less obvious, or more long-term, for example the potential impact of increased multitasking on students' attention spans.

This section is an invitation for readers to consider how the trends interact with education, both in terms of the effect they might have on education, and also the effect education might have on the trends. While the trends presented are robust, the links with education are illustrative and suggestive. They are also not intended as conclusive answers to policy questions. All of education is explored, from early childhood education and care through to tertiary education and lifelong learning.

Information and data

- Teaching students and teachers how to evaluate the validity of online information
- Developing strategies to combat plagiarism
- Providing training on the use of big data

Learning and teaching

- Integrating technology into the classroom
- Utilising collaborative learning platforms to share and expand knowledge
- Teaching programming and advanced computing skills
- Implementing self-paced and personalised e-learning

Digital divide

- Ensuring that all students have the digital skills necessary for the modern world
- Supplying computers and training to students who lack access and resources
- Informal workplace training to up-skill or re-skill

Cyber-risks

- Teaching students and parents how to protect themselves from online risks
- Strategies to combat cyberbullying
- Developing protocols to protect sensitive data from security flaws and hacking

Biotechnology

- Providing skills needed to work in biotechnology sectors
- Addressing cognitive performance-enhancing drug use
- Supporting biotechnology R&D

Brainstorming the links between global trends and education

Readers are encouraged to use this visual as a point of departure for the question: "What do these trends mean for my education system and my work?"

Figure 5.13. **Infographic: A brave new world**

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FIND OUT MORE

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Definitions and measurement

- **Applications ("Apps")**: Apps are software programs developed for a specific task that run on mobile phones, tablets, personal digital assistants (PDAs) or other portable devices.
- **Biotechnology**: The use of biology to create products and solve issues. The most prominent and traditional area of biotechnology is the production of genetically modified crops through genetic engineering.
- **Cyberbullying**: Cyber or online bullying occurs when a person is threatened, harassed, or embarrassed by another person or a group of people using the Internet. It has led to a number of high profile tragedies, for example teens committing suicide as a result of cyberbullying. Although cyberbullying is increasingly common, bullying offline is still reported to be more frequent.
- **Cyberfraud**: Cyberfraud includes a variety of scams, such as identity theft, fraud, hoaxes, spam and identity breaching. As awareness of the most common scams grows, so too does the ingenuity and creativity of the fraudsters.
- **Cybersecurity**: Considering the emergence of cyberthreats, there is an increasing concern with guaranteeing cybersecurity within companies and the public sector.

It is essential that these organisations be able to prevent data breaches and avoid widespread damage.

- **Daily users**: Internet users who access the web on a daily basis. Certain countries, like Chile, Mexico, Korea and Switzerland, consider individuals who use the Internet every day or almost every day to be daily users.
- **Distance learning**: Also known as e-learning or online learning, it is a form of education in which teachers and students are physically separated. Various technologies such as Skype allow for teachers and students to interact and communicate. Traditional distance learning focused on individuals in remote areas and it used to be via mail.
- **Fear of missing out (fomo)**: Anxiety that an interesting event may currently be happening elsewhere, often triggered by posts seen on a social media website.
- **Handheld devices**: Also called mobile devices, these are small electronic devices that can be transported. They can typically be handheld and have touch screens. There are several types of devices, such as smartphones, tablets and personal digital assistants (PDAs).
- **International Information Systems Security Certification Consortium**: Otherwise known as (ISC)2. This organisation issues a range of cybersecurity certifications to members worldwide.
- **International Association of Privacy Professionals (IAPP)**: The largest association in the world to provide training, certification, conferences, publications, professional resources and industry research to a growing membership.
- **Revealed technological-advantage index**: Calculated as the share of biotechnology patents of an economy relative to the share of total patents belonging to the economy.
- **Revenge porn**: Revenge porn is when an ex-partner publishes sexually explicit images without consent and for no legitimate purpose. It is not a new phenomenon, but the Internet has increased its reach and devastating effects. Ex-partners are not always motivated by revenge, but sometimes by notoriety or profit.
- **Whole genome sequencing**: The act of mapping out the complete sequence of the genetic code, or genome, of an organism. The increasing cost-effectiveness of this process has meant that the price of genome sequencing has plummeted. This enables the routine use of whole genome sequencing in laboratories worldwide.

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Trends Shaping Education 2016

Did you ever wonder if education has a role to play in stemming the obesity epidemic sweeping across all OECD countries? Or what the impact of increasing urbanisation might be on our schools, families, and communities? Or whether new technologies really are fundamentally changing the way our children think and learn?

Trends Shaping Education 2016 provides an overview of key economic, social, demographic and technological trends and raises pertinent questions about their potential impact on education. This compilation makes use of a variety of robust international sources of data, including the OECD, the World Bank and the United Nations.

In preparation for this 2016 edition the content was significantly updated and extended to new areas, including a section devoted to cities. The 2016 edition also challenged itself to extend coverage to the interactions between the trends, themes, and links to education. As a result, a great number of completely new indicators have been added, along with new sections on the interactions between trends and a more in-depth exploration of the relationships to education.

This book is designed to give policy makers, researchers, educational leaders, administrators and teachers a robust, non specialist source of international comparative trends shaping education. Its aim is to inform strategic thinking and stimulate reflection on the challenges facing education, whether in schools, universities or in programmes for older adults. It will also be of interest to students and the wider public, including parents.

Contents

Chapter 1. Globalisation

Chapter 2. The future of the nation-state

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Chapter 4. Family matters

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