CHAPTER 3

How can we support teaching strategies for 21st century learners?

Today's teachers need to ensure that their students master a wide variety of knowledge and skills to be prepared for tomorrow's challenges in work and life. This chapter first explores issues around quality teaching and its impact on student learning. The chapter then focuses on recent debates over the competencies and knowledge that teachers need to teach to equip students for success in the 21st century. Lastly, the chapter examines the benefits and challenges of students being actively involved in their learning.

Note regarding data on Israel

The statistical data for Israel are supplied by and are 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.

Introduction

Technological advances have increased our access to factual knowledge, placing more importance on how knowledge is interpreted and applied. For success in the 21st century, students are required to be able to navigate information, think critically, communicate effectively, and apply creativity and innovation to solve complex problems. To help make this possible, experts, policy makers and parents are now increasingly advocating that students should play a more active role in their education through a variety of alternative teaching approaches. Teachers need to adapt their methods to meet these needs, and to ensure that their students can succeed in school, work and life.

Topic 1: A profile of tomorrow's quality teaching

Why is this topic important?

Available research evidence points to teacher quality as the most important school variable in determining the success of an educational system (Hattie, 2003; OECD, 2005a). In other words, an education system is effective when its teachers use teaching practices which improve student performance and develop the full potential of every student, regardless of socio-economic background, native language or migrant status. Good teaching stimulates and guides students' development so that their achievements go beyond even their own expectations.

However, understanding what makes teaching "good" or "effective" has proven a difficult question to answer. While most people can clearly remember the joy of learning from a good teacher, and the occasional frustration brought about by exposure to poor teaching, it would be quite difficult for many to pinpoint the precise differences between what makes good teaching good, and what makes poor teaching less so. What are the indicators of good teaching? How can we further improve teacher quality as we move into the future?

What is the evidence?

Teaching quality is a difficult concept to measure. However, it can be inferred based on observable indicators, such as the demonstration of student learning gains, the implementation of quality processes, and the perception of teacher self-efficacy.

Teaching strategies and practices leading to better student outcomes

A common method of assessing teaching quality and efficient learning practices is the evaluation of student outcomes and their learning gains[1].

The OECD Teaching and Learning International Survey (TALIS) and Programme for International Student Assessment (PISA) findings consistently show that student-oriented teaching strategies which place the student at the centre of the activity and give learners a more active role in lessons than in traditional teacher-directed strategies, have particularly positive effects on student learning and motivation. Active learning practices include, but are not limited to, students working in small groups, encouraging students to evaluate their own

> **First and foremost, a teacher is a group leader.**
> **Ariel Sacks, Teacher, United States of America**

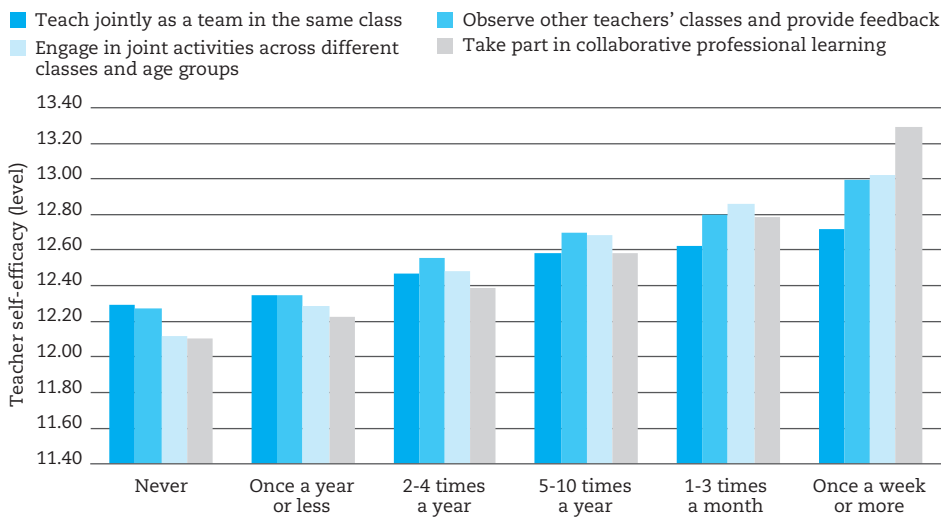
progress, assigning students longer projects (requiring more than one week to complete), and using information and communication technology (ICT) for class work.

Cognitive activation, which aims to teach pupils strategies to solve problems, such as summarising, questioning and predicting, has also been identified as an effective teaching practice. PISA data show that, across OECD countries, students who report that their teachers use cognitive activation strategies in their mathematics classes achieve higher mathematics scores (OECD, 2016a).

Quality processes in teaching

Quality processes are the specific, observable teaching practices that develop and support education quality, and that are validated through improved student performance and well-being. Professional collaboration among teachers in the school is one example of a quality process. According to PISA results (OECD, 2016b), on average across OECD countries, teachers' collaboration has proven to be positively associated with student performance in science, after accounting for the socio-economic profile of both the students and the schools. According to TALIS results (OECD, 2014a), having a collaborative culture within the school is one of the factors that shows the strongest association with teachers' self efficacy and job satisfaction. As Figure 3.1 shows, in general, the more often teachers participate in collaborative activities with their colleagues, the more self-efficacy they report. Other quality processes include teachers' active engagement with students, teachers giving meaningful feedback to students about their school work, and the cultivation of a safe, respectful and supportive environment.

Figure 3.1 **Frequency of collaboration and reported self-efficacy**



Source: OECD (2013), *TALIS 2013 complete database*, *http://stats.oecd.org/index.aspx?datasetcode=talis_2013%20*.

StatLink http://dx.doi.org/10.1787/888933042295

A lot of time we are faced with students and teachers that are bored... So, all learning needs to be incredibly relevant. Students will learn when they are passionate about a problem.
Mareike Hachemer, Teacher, Germany

Drivers of self-efficacy and teaching quality

Bandura's (1986) social cognitive theory defines self-efficacy as an individual's beliefs about their capabilities to successfully accomplish a particular course of action. Thus, in essence, self-efficacy is teaching quality *from the teacher's point of view*. According to TALIS, self-efficacy encompasses three dimensions: quality in classroom management, in instruction, and in student engagement. As it has proven to be positively related to student achievement (Caprara et al., 2006; Muijs and Reynolds, 2002; Woolfolk Hoy and Davis, 2006), self-efficacy is a good proxy measure for teaching quality. TALIS data show, for example, that teachers who are more confident in their own abilities are more likely to engage in active-learning practices, which are known to be effective (OECD, 2014b).

Many valuable practices are found to affect self-efficacy and, therefore, teaching quality. TALIS results suggest that promoting teacher co-operation and a positive school climate, developing teacher leadership and allowing and encouraging teacher participation in on-site decision-making, are all highly beneficial to teaching quality. Participation in high-quality professional development which includes, for example, opportunities for discussion of active learning methods, increased collaboration among colleagues, and the time and resources to plan and innovate with other teachers, also has a significant influence on teaching quality. Additionally, ensuring that there are multiple avenues for teachers to receive feedback on their work, and promoting the use of comprehensive sources of information and data for teacher appraisal, are also key to supporting the continuous improvement of teachers and, ultimately, schools. As we move into the future, these practices should therefore be supported and encouraged to further nurture quality teaching.

Lessons from the field: What are practitioners saying?

At the 2017 Qudwa Global Teachers' Forum, a panel of three experienced teachers discussed what tomorrow's quality teaching could look like. The panellists were Mareike Hachemer, a high school teacher of German, English and Drama in Germany; Ariel Sacks, an author and English Language Arts teacher in the United States; and Emma Russo, a physics teacher from the United Kingdom. The discussion highlighted several lessons.

Lesson 1: Understand the needs of students to keep them motivated

The panellists agreed that first and foremost, the teacher is a group leader. A key component of this leadership is taking the time to know one's students. Understanding their background is crucial to facilitating learning and maintaining student motivation. This means that teachers need to reassess their traditional role as classroom manager

Teachers need to be supported, empowered and trusted.
Emma Russo, Teacher, United Kingdom

or controller. Students can only take ownership of their learning if the teacher provides them the space to do so. Thus, it is important to adopt pedagogical strategies that allow students to share their ideas with others, and provide space for reflection, for both the student and teacher.

Lesson 2: Ensure that lessons are practical and relevant for students

Boredom and lack of engagement are some of the main obstacles to sustaining student interest in classrooms. To capture the interest of 21st century learners, teachers increasingly need to make sure that coursework is practical and engaging. One way to do so is to discuss relevant social problems and equip students with the attributes they need to address them. The concept of *"radical relevance"* refers to the ability of instruction to enable students to identify, discuss and recognise possible solutions to social challenges that the world is facing *right now*. This strategy helps students build a strong sense of self-efficacy, as students start seeing themselves as key players in today's issues. For example, Mareike Hachemer suggested discussing the United Nations' Sustainable Development Goals (SDGs) in classrooms as a way to help engage students with important global issues (See Box 3.1).

Box 3.1 Connecting learning to the Sustainable Development Goals

Mareike Hachemer has created a seven-step plan to connect classroom learning to the SDGs. These are:

1. **Make posters available:** Inform students about what the SDGs are.
2. **Focus on SDG-related topics:** When applicable, connect the curricula with the SDGs.
3. **Encourage problem solving and meaningful actions:** Instead of *telling* students how to achieve the SDGs, *ask* students how they can contribute to their success.
4. **Dedicate a day or a week:** Show documentaries and plan projects around SDGs during that block of time.
5. **Create a climate of appreciation and growth:** Foster discussions and encourage student collaboration.
6. **Encourage student leadership:** Put students in charge of classroom and school-related projects centred around the SDGs. Encourage them to have their own ideas for projects.
7. **Make local and global connections:** Connect with experts, teachers, and students from around the world on social media, to build dialogue and share ideas.

> **We're not going to save the world with a piece of paper and a pencil. Students need to learn to collaborate and be involved in issues that concern them.**
>
> **Mareike Hachemer, Teacher, Germany**

Lesson 3: Collaborate with colleagues and with other schools to share best practices

Collaborating and sharing experiences with colleagues can help with understanding challenges, as well as best practices and solutions. Access to the knowledge of others can give teachers the time to reflect on and adjust their own practices. The panel discussed different types of professional development which strengthen collaboration. All panellists agreed that an approach where teachers and students jointly discuss the future of both their school and the education system as a whole, can be particularly effective to develop a common vision among the major stakeholders.

Collaboration between schools can also be a way to share experiences and work together to tackle important social issues. For example, Emma Russo spoke about the "Girls in Physics" initiative, which includes a network of schools and parents that work to promote girls' interest in science, and to encourage them to pursue higher education in the field by creating connections with female scientists (see Box 3.2).

Box 3.2 Girls in Physics

Emma Russo organises *"Girls in Physics"* events at her school, in which students and parents attend talks given by female scientists. The participating scientists share their experiences and professional journeys with the students. This exposure encourages and inspires girls, by giving them access to successful female role models. Due to the success of these events at her school, Ms Russo was invited by other schools to organise similar events, and she now plans to make them city-wide.

In general, school support has been vital to Ms Russo's success. Her school organises regular seminars and conferences to ensure continuous development of all teachers. The school also helps Ms Russo organise science and mathematics master classes in collaboration with other schools, allowing for the sharing of teacher expertise and resources.

Key action points

At the end of the session, the panellists identified a set of three action points which could help promote effective teaching practices.

1. **Give teachers more autonomy:** Teachers need to be supported, empowered and trusted. Teachers want their students to succeed. But at the same time, they should be trusted with the responsibility of adopting appropriate strategies. Administrators should give teachers the space and time they need for self-improvement by allowing for innovation, reflection and the adjustment of teaching techniques.

Providing students with a sense of belonging will go a long way to creating global citizens.
Ariel Sacks, Teacher, United States of America

2. **Identify best practices and create a network of teachers:** It would be helpful to bring together teachers that have consistently had good results and ask them to share their knowledge and expertise. These teachers could also work as mentors for other teachers and create a network of support for the acquisition of best practices.
3. **Recognise teachers as professionals:** Teaching is a complex and difficult task, but teachers are more than up to the challenge. However, teachers need their efforts to be acknowledged and properly rewarded. The under-payment of teachers is a persistent problem across educational systems. As teachers' tasks are becoming more and more demanding, teachers should be paid in a way that recognises these challenges.

Topic 2: Tomorrow's teaching: Balancing knowledge- and competency-based learning

Why is this topic important?

The body of knowledge being produced is expanding exponentially. Even the speed with which knowledge grows, is increasing. Indeed, each day new knowledge frontiers are discovered and explored. This quantitative expansion of knowledge has made it impossible for any human being to master the entire knowledge universe. Therefore, encyclopaedic mastery of knowledge no longer can or should serve as education's purpose. What students learn in school is merely an exemplary sample of knowledge, which allows them to effectively navigate in a world where most jobs and industries are knowledge-driven. Now, *what* you know is not as important as what you can *do* with your knowledge, and how effectively you can navigate the vast knowledge resources, to find what you need.

Yet, it is difficult to find a more passionate debate in the educational community than the question of whether we should educate future generations with an emphasis on transmitting knowledge, or with a focus on developing competencies. Competencies are understood as more complex models of learning, comprising knowledge, skills, attitudes and values (OECD, 2005b).

Challenges to knowledge-based learning

Education has traditionally relied primarily on the transmission of knowledge, most often disciplinary knowledge in a limited number of subject fields. Teaching and learning methods were thus oriented towards the memorisation of facts, as the elementary building blocks of knowledge.

> **We need to go all the way back to teacher training and revamp how we teach teachers about competency and skills.**
> **Armand Doucet, Teacher, Canada**

This perspective has recently come under attack from several angles. The reduction of knowledge to facts only, is increasingly seen as outdated. The argument is that it's not the facts themselves, but *understanding* them that matters. This has implications for teaching and learning strategies as instead of memorisation, more active engagement which aims for student understanding would be appropriate. The traditional idea of reducing the rich body of knowledge down to a few, established school subjects and disciplines, has also been challenged. While the organisation of knowledge into disciplinary fields and subjects dates to the late 18th century, a lot has happened in scientific research (and other fields) since then, putting this categorisation into question. Furthermore, the belief is that new subjects should enter the curriculum which integrate interdisciplinary fields or introduce new areas, such as computer science or robotics.

But the third attack on knowledge-based education is probably the most serious one, as it questions the very concept of knowledge being the goal of education itself. The argument is that individual learners and societies are not well served by simply accumulating knowledge if they are not able to *apply* that knowledge and transform it into practical skills, relevant in the workplace and society. Some critics go even further and question the future of knowledge itself, in a world characterised by an explosion of data, with unlimited access to it via the internet. They argue that since "Google knows everything", students should no longer seek to acquire knowledge, but to develop the skills to navigate it and to identify and apply search strategies and tools. They insist that schools should do more than simply transmit content knowledge; they should develop relevant skills and attitudes as well. Thus, competency-based education became the mantra. An additional driving force behind this transformation is the desire to develop so-called 21st century skills such as problem solving, communication skills, social and emotional skills, creativity and innovation.

Challenges to competency-based learning

But over the past few years, a counter-movement has increasingly attracted a lot of attention and political support, claiming that the competency-based approach is leading to a generation of culturally-illiterate youth, lacking even the most basic knowledge in essential disciplinary fields. The most vocal representative of this counter-movement is the American scholar E.D. Hirsch (2016), who argues in his book, Why Knowledge Matters, that the overreliance on skills has produced a knowledge deficit and that it is time to reinstate the value of knowledge in education. There are also some less radical approaches that are pushing to revalue the importance of knowledge as well. After all, even with navigation skills, some anchoring knowledge and signposts are still needed to find your way. Contemporary approaches seek to balance the quest for knowledge and the desire for skills in a more intelligent way.

> **Rather than training teachers through 45 minutes presentation, we dive deep into targeted issues with a flipped professional development model.**
> **Justin David Moorman, Head of Faculty, UAE**

What is the evidence?

The debate over knowledge versus competencies is based on both ideological grounds as well as on deeply rooted ideas about what education is supposed to be. So, evidence alone cannot resolve it completely. Decisions by individual teachers, and policy choices by schools and governments, will have to find a balance. Yet, evidence can help shed additional light.

Students' integration of knowledge within broader competencies

PISA results show that knowledge and skills are not opposed to one another, but that they interact in various ways. In general, when PISA tests 'science literacy', they examine the proficiency of 15-year-olds in the skills that are required to engage in reasoned discourse about science-related issues. But PISA defines competency in science as being both knowledge of and about science, and attitudes towards science. The PISA 2015 assessment framework for science thus includes knowledge, but it distinguishes between content knowledge, procedural knowledge, and an understanding of the rationale for that knowledge (referred to as epistemic knowledge). It also identifies attitudes. The interesting thing is that scientific knowledge and attitudes combine to constitute competency. In scientific inquiry, competency is defined as the ability to explain phenomena, evaluate and design questions, and interpret data and evidence. Competencies thus emerge when knowledge and attitudes *work together*.

Countries, including well-performing countries, differ in the relative strengths of their pupils' proficiency in content knowledge, procedural knowledge and epistemic knowledge (OECD, 2016c). Finland, for example, has higher scores on content knowledge than on procedural and epistemic knowledge, but it still has an excellent overall science proficiency score.

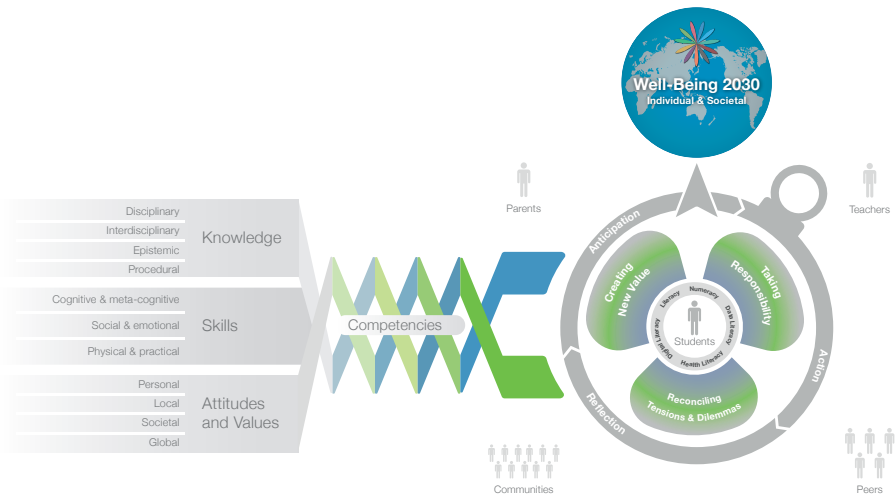
PISA 2015 also asked students about their learning strategies. The data indicate that it would be wrong to equate memorisation (typical for knowledge-oriented learning) with poor learning outcomes, and that it would likewise be incorrect to equate more competency-oriented elaboration strategies (which involve making connections between tasks, prior knowledge and real-life experience) with better learning outcomes. Indeed, results from PISA show that both memorisation and elaboration strategies can lead to better learning outcomes for students, even though the latter seems to be essential for solving more advanced tasks (Schleicher, 2016).

Looking forward, the OECD's Education 2030 project, which is working with countries to explore the competencies needed for success in the world of 2030, and is examining the curriculum changes that will be needed to make this happen, further builds on this idea that competencies are in fact an integration of knowledge, skills, and attitudes and values (see Figure 3.2). For students to demonstrate their competencies through action,

> **There is a difference between management and leadership. We need administrators who are leaders and who understand that teachers need to do innovative things to get through to students.**
>
> **Armand Doucet, Teacher, Canada**

choice, or way of behaving with respect to the demands in a particular context, they will need to be able to mobilise *all dimensions* of "knowledge", "skills", and "attitudes and values".

Figure 3.2 **Competency as the integration of knowledge, skills, and attitudes & values**



Source: OECD (2018), *The Future of Education and Skills: Education 2030*, OECD Publishing, Paris, *http://www.oecd.org/education/2030/oecd-education-2030-position-paper.pdf*.

Note: Please note this figure is a work-in-progress.

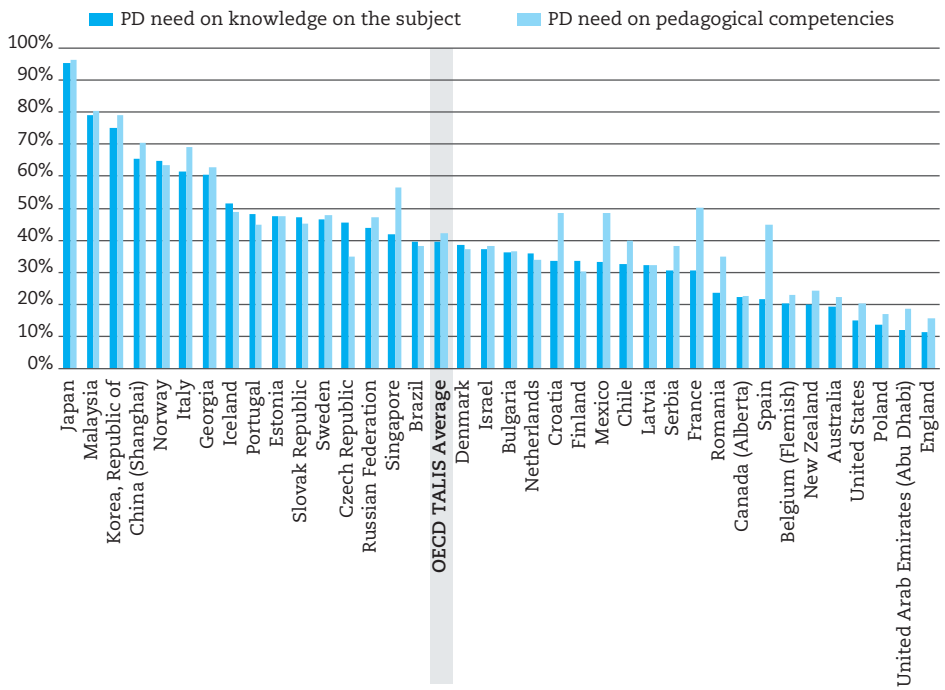
Teachers' integration of knowledge within broader competencies

The tension between knowledge and skills is also present in teachers' professional competencies. Much research has been devoted to exploring the impact of teachers and teaching on student achievement. This research shows that teacher quality is an important factor in determining gains in student achievement, even after accounting for prior student learning and family background characteristics. But research also shows that "professional competence" itself is based on the integration of knowledge (both content knowledge and pedagogical knowledge), skills, attitudes and motivation, and the ability to apply all of the above to highly complex and demanding situations. It follows from this conceptualisation of professional competence that the ability to solve work-related problems requires having not only the cognitive abilities for developing effective solutions (i.e. pedagogical knowledge), but also the right motivation and attitudes.

> **If you give teachers the ability and leeway to be professional, they will do that.**
> **Armand Doucet, Teacher, Canada**

Knowledge and skills often go hand in hand. This is illustrated by TALIS data on the self-reported need of teachers for professional development (see Figure 3.3). Teachers express a need for professional development for both content knowledge and pedagogical competencies in quite similar ways across countries. In most countries, less than 10% of teachers express a need in one but not in the other, while on average, 30% express a need for both at the same time.

Figure 3.3 **Percentage of lower secondary teachers with a moderate or high self-reported need for professional development on subject knowledge or pedagogical competencies**



Note: The data from the United States should be interpreted carefully. This is because the United States did not meet the international standards for participation rates.

Source: OECD (2013), *TALIS 2013 complete database*, *http://stats.oecd.org/index.aspx?datasetcode=talis_2013%20*.

StatLink http://dx.doi.org/10.1787/888933691040

While many education systems seem to be currently swinging in the direction of delivering more competency-based instruction, as we move into the future, the pendulum will most likely swing back and forth between these two approaches. Perhaps education systems would do best by integrating both approaches and benefitting from the best aspects of each.

> **If you can learn to learn then you can apply that knowledge to any content area.**
> **Nik Kafka, CEO Teach a man to fish**

Lessons from the field: What are practitioners saying?

At the 2017 Qudwa Global Teachers' Forum, three panellists from different backgrounds discussed the delicate balance between knowledge- and competency-based learning. The panel included Nik Kafka, CEO and Founder of the educational organisation "Teach a Man to Fish"; Armand Doucet, a high school teacher from Canada; and Justin Moorman, Head of Faculty at a primary school in the United Arab Emirates. A productive and insightful debate yielded three key policy lessons.

Lesson 1: Competency-based learning is crucial in preparing students for today's workforce

The panellists agreed that mastering core content knowledge is crucial, but it is not enough. Skills, such as the ability to adapt to new environments and working flexibly, will be key in determining students' success in the real world. Students also need to learn how to transfer and apply their knowledge from one subject to another. Increasingly, individuals are being judged on what they can do with what they know, instead of on just what they know.

Lesson 2: Context matters in developing student competencies

Learning is a continuum, and in each stage of a student's learning, there needs to be a balance between their knowledge and the competencies that they acquire with that knowledge. Through their instruction, teachers should have the freedom to adapt the curriculum to student needs. Contextualising teaching to meet the needs of students is essential to foster character development and higher order competencies such as, critical thinking and problem solving.

Lesson 3: Teachers need support to effectively adopt and integrate competency-based teaching strategies

Despite the importance of delivering competency-based education, teachers are still not provided with enough guidance or support in how to do so. New and more effective ways of preparing teachers to integrate knowledge- and competency-based approaches will be essential if practice is to evolve. Justin Moorman provided an interesting example of "flipped" professional development initiatives that he promotes in his school (See Box 3.3). It is also important for administrators to support and trust teachers. School leaders should provide teachers with the autonomy they need to innovate in the classroom. They should also provide platforms for teachers to share their experiences with their colleagues.

Box 3.3 Flipped professional development

Applying the principle of flipped classrooms, Justin Moorman introduced the idea of "flipped" professional development (PD) for teachers. This approach allows teachers to personalise learning based on their professional development goals and places them at the centre of their own development.

Flipped PD activities are divided into three phases: Engage, Collaborate and Apply. Each set of activities occurs mostly online and each phase relies on a different platform.

In the *Engage* phase, teachers create presentations related to the content on *Nearpod*, an interactive classroom tool. Teachers can access *Nearpod* on any internet-connected device through a unique code and identifier. After delivering their presentations, teachers are provided with individualised reports and feedback that aid their professional learning. To maximise interactive learning and understanding, each presentation includes a range of tools such as videos, documents, quizzes, and short responses.

In the *Collaborate* phase, teachers share their learning. They either meet in small groups after school or they use *FlipGrid* to talk about what they learned in the previous phase. *FlipGrid* is a tool that enables the creation of a virtual peer learning communities. This reduces the time constraints, coordination and commitments that would otherwise be required. Teachers can interact with each other via videos of 90 seconds or less and respond to key questions about the PD concept of the week.

In the *Apply* phase, teachers apply their learning. Using *Calendly*, an online scheduling tool, teachers sign up for a "Show off" session, which alerts the administrative team to drop in for a demonstration lesson, an observation, or a one-on-one chat, to see the impact of the teacher's learning first-hand.

Key action points

At the conclusion of the session, the panellists were asked to select and prioritise key action points to adopt an approach that blends knowledge and competency-based teaching and learning. These are:

1. **Align the educational system around the mission and vision of balancing knowledge-based and competency-based learning frameworks:** It is crucial to link curriculum design, professional development opportunities for teachers, and classroom practices, to create an education system that balances both knowledge- and competence-based learning and teaching. Knowledge-based learning frameworks have largely determined teaching and learning practices in the classrooms. And high-level policy discussions about the design of competency-based learning frameworks do not always trickle down to the classroom. Instead of following a top-down approach, where policy makers in isolation determine the approach that fits the learning framework, governments and education systems should follow a bottom-up approach that involves teachers and schools, and builds on their insights in policy making.

2. **Re-evaluate how student and teacher performance is measured:** The measurement of the performance of both teachers and students is still used as a key indicator of the quality and progress of educational systems. However, even though the curriculum is increasingly shifting to a competency-based framework, educational systems still rely mainly on indicators that measure the acquisition of knowledge and do not test competencies. If teachers continue to be judged solely on their students' mastery of content knowledge, they won't have any incentive to modify practices or to adopt a competency-based framework.

3. **Re-examine the role of school leaders:** School leaders or principals play a vital role in guiding and supporting teachers in their acquisition of competency-based frameworks. They should give teachers the freedom and autonomy to experiment and try new initiatives in the classroom. Principals should also provide opportunities for teachers to share their experiences, voice their concerns, and take ownership of their teaching. In other words, principals should move away from their traditional roles as managers and instead become true school leaders.

Topic 3: Active learning: The way forward?

Why is this topic important?

Active learning is defined as any teaching method that "involves students in doing things and thinking about the things they are doing" (Bonwell and Eison, 1991). In active learning, students are not just passively listening to the instructions of the teacher. Instead, they are actively or experientially involved in the learning process. Active learning is a purposeful and reflective activity that encourages students to fully understand the relevance of the learning material while simultaneously reflecting on its meaning. It is an interactive and engaging activity, in which there is constant communication between teachers and students, and real-life examples related to the content are used to construct learning tasks.

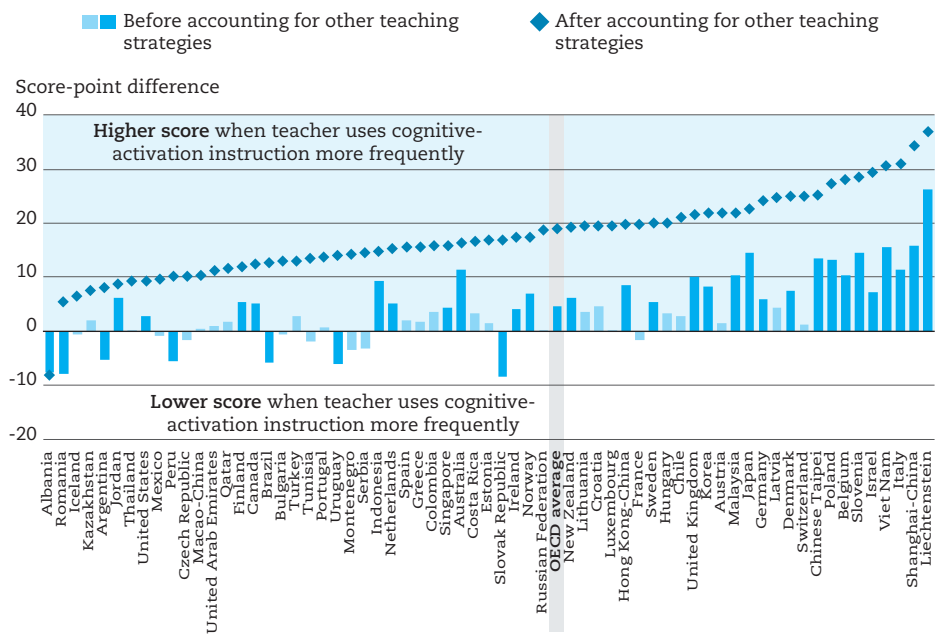
Active learning has gained popularity as a teaching method, with increasing numbers of educators and academics realising that to truly learn, students must do more than just listen; they must read, write, question, discuss, explain, brainstorm, and actively participate in the learning process (Freeman et al., 2014; Meyer and Jones, 1993). Teachers use a variety of teaching strategies when engaging students in active learning activities. Some examples of active learning techniques include whole class or small group discussions, debates, writing lesson summaries or short papers, answering questions or describing topics, roundtable discussions, problem-based learning activities and group presentations. Indeed, a range of names are used for "active learning" activities, but common to them all is that they each require more from students than just listening: the *active* participation of students is a necessary component. What are some ways to incorporate active learning into tomorrow's classrooms? How can active learning strategies propel student achievement even higher in the future?

What is the evidence?

A growing body of empirical evidence indicates that active learning practices are associated with higher academic achievement (Freeman et al., 2014; Meyer and Jones, 1993; Prince, 2004). Students who actively use higher-order thinking skills (such as analysis, synthesis, evaluation, and planning) during the learning process, consistently outperform those who do not actively do so.

The latest data from PISA shows that cognitive-activation instruction (an active learning technique) is associated with an average increase of 19 points in mathematics scores, across OECD countries, after accounting for other teaching strategies (see Figure 3.4). The index of cognitive-activation instruction measures the extent to which teachers encourage students to acquire deep knowledge through instructional practices such as giving students problems that require them to think for an extended time, presenting problems for which there is no immediately obvious way of arriving at a solution, and helping students to learn from the mistakes they have made.

Figure 3.4 **Improvements in student mathematics scores when teachers use cognitive-activation instruction more often**



Note: Statistically significant values before accounting for other teaching strategies are marked in a darker tone. All values after accounting for other teaching strategies are statistically significant. Other teaching strategies refer to the PISA indices of teacher-directed, student-oriented and formative-assessment instruction.
Source: OECD (2017), *PISA 2015 Database*, *http://www.oecd.org/pisa/data/2015database/*.
StatLink http://dx.doi.org/10.1787/888933414800

Letting students lead and participate in lesson will require you (teachers) to overcome your own fears. If students are active and engaged, if they have responsibility and ownership- they will rise to the occasion and behave.

Lisa Lowenstein, Teacher, USA

The following list of positive aspects and outcomes of active learning has been adapted from the work of Bronwell and Eisen (1991), Hoellwarth and Moelter (2011), and Svinicki (2001):

- Active learning improves the retention of new information, reinforces important insights and skills, and improves levels of understanding so that learned material can be transferred to new situations.
- Active learning creates personal connections to topics, thus increasing students' intrinsic motivation and engagement with lesson content.
- Active learning offers opportunities to practice important interpersonal skills, such as collaboration, communication and teamwork.
- Active learning builds self-esteem and personal agency through activities and interactions.
- Active learning helps develop higher order thinking skills such as analysis, evaluation, reflection and synthesis.
- Active learning accommodates a variety of learning styles and personal preferences.
- Active learning creates a sense of community in classrooms.

What are the possible barriers to success?

There are many possible obstacles that need to be considered when deciding whether to engage in active learning practices (Cherney, 2011; Eison, 2010). Firstly, there are numerous practical considerations. Teachers may lack the necessary materials, equipment and resources, or they may not have enough class time to engage in active learning practices while having to cover the planned and expected content. In some cases, class sizes may be too large for effective implementation of some active learning techniques. Educational tradition or lack of school or administrative responsiveness, may also present barriers for the integration of new pedagogies.

To effectively implement active learning in the classroom, teachers need to be knowledgeable about the requirements of different techniques. Creating a supportive, collaborative atmosphere that is conducive to open and lively, but respectful and constructive interaction is key. But, perhaps the biggest barrier of all may be the fact that introducing these techniques involves a certain degree of risk – risk that teachers will lose control, lack the necessary skills, be criticised for abandoning traditional methods, or that students will not engage or will not learn sufficiently (Bronwell and Eison, 1991). Given these possible barriers, it is important to introduce active learning strategies in a planned and positive way. Box 3.4 illustrates some of the important steps in doing so.

Student engagement and ownership prevents losing control of the classroom. The best lessons are when students are doing more than teachers.

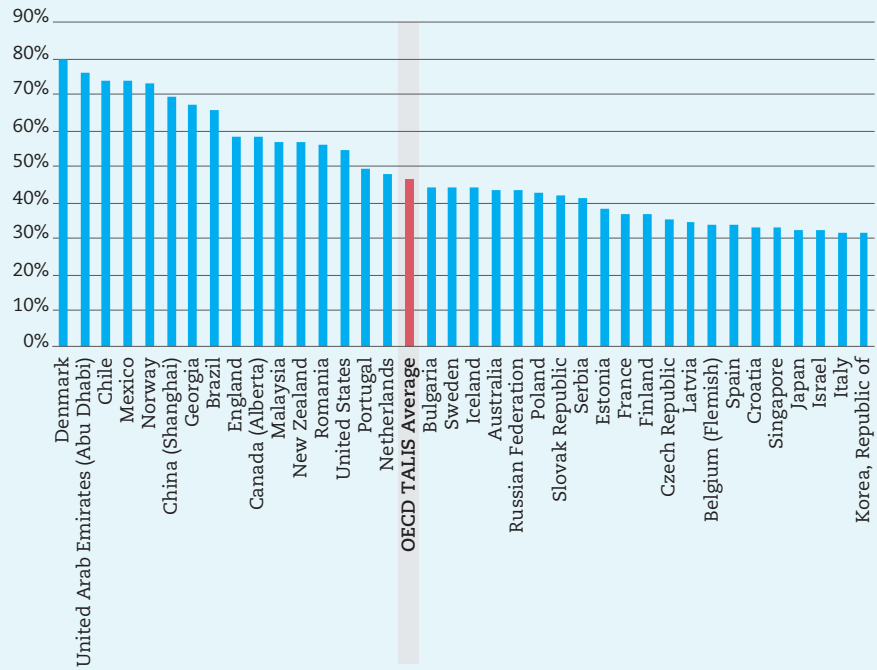
Lisa Lowenstein, Teacher, USA

Instructional variety is essential for student learning.
Richard Spencer, Teacher, UK

Box 3.4 How can active learning techniques be incorporated into the classroom?

As **Figure 3.5** illustrates, one of the most common active learning activities is small-group discussions. These promote long-term retention of the material, an understanding of its application in a wider range of situations, and higher order thinking, communication, collaboration and wider social skills (Bonwell and Eison, 1991). Data presented in **Figure 3.5** show a substantive difference between countries in the frequency of use of this practice by secondary education teachers. Just over 30% of teachers frequently use small groups in Italy and Korea, while almost 80% use this practice frequently or in nearly all lessons in Abu Dhabi and Denmark.

Figure 3.5 Frequency of using small groups discussions as a teaching practice in secondary education, by country



Note: These data were reported by teachers and refer to a randomly chosen course they were teaching at the time. Countries are ranked in descending order, based on the percentage of teachers who used small groups "frequently" or "in all or nearly all lessons".

Source: OECD, *TALIS 2013 Database*, *http://stats.oecd.org/index.aspx?datasetcode=talis_2013%20*.

StatLink http://dx.doi.org/10.1787/888933691059

...

Length of service doesn't make you a great teacher.
Richard Spencer, Teacher, UK

Box 3.4 **How can active learning techniques be incorporated into the classroom? (continued)**

A good way to begin is to select the active learning techniques the teacher has the most knowledge of and experience with (Bronwell and Eison, 1991). These can also be low-risk practices of shorter duration that are more structured and familiar to students, such as writing exercises or class discussions. After becoming comfortable with these, teachers can move towards more involved practices.

Giving clear instructions is critical for active learning. Goals, timeframe, roles and procedures for each task need to be clearly outlined before students engage. Addressing student feedback in a timely and confident manner, and using it as an opportunity to reflect on the learning process (Doyle, 2008) works well.

It is important to remember that just because students are "active" it does not mean that they are necessarily learning (Copeland, Scott and Houska, 2010). When engaging in active learning practices, teachers should monitor students to ensure that they are following planned procedures and that they are working in line with the goals and expected outcomes of the activity. In situations where this is not the case, teachers should be ready to intervene and adjust the activity accordingly.

What is the way forward?

Active learning strategies are not new. Active learning is an established teaching method that brings with it a wide range of important student benefits. It is a pedagogy that promotes skills that are increasingly relevant in the modern world (Cherney, 2011). Even so, the question of what needs to be done to further promote the worldwide integration of active learning techniques requires a multi-layered response.

At the wider, system level, introducing active learning pedagogies into classrooms will not happen by itself. Instead, this will require careful planning, targeted policy action and the investment of necessary resources. At the local or school level, school administrators and managers must recognise the need to provide ongoing support to teachers, especially when new pedagogies are introduced and during the evaluation of new learning outcomes.

But in the end, it is teachers who will be delivering active learning techniques and who therefore bear most of the responsibility for its pedagogical outcomes. Any reform of instructional practices must therefore involve teachers, and must genuinely support their efforts in introducing these practices into the classroom environment (Cherney, 2011). Teachers need to be ready to master new pedagogies, and to put them into practice (Eison, 2010). This may sometimes require that they leave their comfort zone. But, this can ultimately lead to more fulfilling pedagogical experiences, both for their students and for themselves.

Active learning brings down barriers, allows children to engage.
Niall Mcgonigle, Teacher, UAE

Lessons from the field: What are practitioners saying?

At the 2017 Qudwa Global Teachers' Forum, three science teachers discussed the concept of active learning and how it applies to their teaching. The panel included Niall McGonigle, a primary school teacher from Dubai, United Arab Emirates; Lisa Lowenstein, a lower secondary teacher from New York, United States and Richard Spencer, an upper secondary teacher from a rural area outside of York, United Kingdom. While each panellist approaches active learning from a different perspective, they have similar conclusions about active learning's essential role in teaching.

Lesson 1: Active learning is key for developing 21st century skills

For students to become active members of 21st century society, it is increasingly important that their education prepares them to think critically, evaluate various sources of information, make connections between different subjects, and take an active role in the learning process. This does not mean that we should simply abandon teacher-directed lessons. On the contrary, listening is a core component of active learning.

Applied effectively, active learning is a two-step process. First, students learn the content. Then, they apply it while demonstrating skills and competencies. Mr Spencer and Ms Lowenstein shared active learning techniques they use in their classrooms (see Box 3.5). The panellists agreed that instructional variety is *essential* for student learning. But even today, classroom content is still largely delivered in unimaginative ways.

Box 3.5 Making science interactive

To make science lessons more engaging, Richard Spencer introduces classroom activities that require the *application* of knowledge, not just the memorisation of facts. To combat passivity in learning science, Mr Spencer introduces and explains topics and then quickly moves on to activities that actively engage the students. One such activity is making students "act out". To explain protein structure theory, each student makes models of amino acids and works out how to join them as a group. This is followed by another activity where Mr Spencer puts coloured bibs on the students, representing various amino acids, and has students play out the various interactions. For example, when Mr Spencer sprays them with water, students re-enact hydrolysis by breaking apart.

Lisa Lowenstein also uses active learning strategies to facilitate learning in her classroom. To make sure students are engaged with topics of global scientific relevance, and to help them develop their soft skills, she frequently organises debates and field studies. In her *Billion Oyster Project*, Ms Lowenstein's students monitor their own oysters to study ecology and better understand climate change. She also organises debates on topics like genetic engineering, and encourages her students to compete in national competitions such as "Genes in Space", which highlights the use of mini Polymerase Chain Reaction equipment to perform scientific tests in the school environment.

> **As teachers, the best dialogue we have is those amongst ourselves, when we share techniques and strategies.**
> **Richard Spencer, Teacher, UK**

Lesson 2: The best lessons are when students are doing more than teachers

Implementing active learning requires the application of a variety of pedagogical techniques. In doing so, teachers may feel they risk losing control of the classroom situation, compared to more traditional teaching methods. Giving students more responsibility and letting them lead discussions may also require teachers to overcome their own fears. However, the panellists agreed that if students are engaged and have ownership, the chances of losing control of the classroom are low. If students are engaged, active and enjoying their learning, then they are less likely to cause chaos in the classroom.

Lesson 3: Great teachers are great learners

In the 21st century, learning will be a lifelong process. Teachers are also learners, and it is important for students to see that teachers continue to learn and grow professionally. Teachers should introduce new techniques and then tweak them based on feedback. This accrued knowledge should be shared among professionals. Identifying existing expertise within schools and across schools is an important way to provide collegial support. Whether this is done through observations, formal training sessions, or even designating some teachers as "active learning experts", providing a clear avenue for professional development is key.

Key action points

The panellists identified three key action points that could support the implementation of active learning in today's classrooms. They are:

1. **Ensure that learning reflects 21st century skills and competencies:** Provide an evidence-based framework that supports the wider implementation of teaching techniques which foster higher-order thinking, critical thinking, and collaborative skills, across subjects. A closer connection between academic research and policy and practice, could enhance the development of such a framework.
2. **Understand and promote the idea that great teachers are great learners:** To successfully equip students with the knowledge and skills they need today, teachers, too, should keep learning. Wider implementation of active learning methods will require additional types of professional development and peer learning. Only through continued learning can confidence and capacity building take shape.
3. **Allow the time and space needed for innovation:** To implement active learning techniques, teachers need additional time and space. However, the reality for most teachers globally is that time is in short supply. Managing the core tasks of teaching is indeed more than a full-time job. Mr Spencer suggests that perhaps teachers could teach for four days a week and have the fifth day to learn, grade, prepare and innovate. While creative thinking about what students could do on the fifth day would be needed, new and innovative solutions may be warranted.

Still too many students feel that school is about listening and copying.
Richard Spencer, Teacher, UK

Notes

1. Assessing teaching quality and efficient learning practices by evaluating student outcomes and their learning gains does have questionable reliability as students' learning happens both in the classroom and outside of the school. Additionally, student learning and student outcomes are affected by other non-teaching related factors (e.g., student socio-economic background), and are the result of cumulative exposure to a range of teaching approaches over the years. The empirical measurement of teaching quality in such a framework thus requires controlling for as many factors as possible, to measure the net effect of a given teaching strategy.

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