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Challenges for PISA

Desafíos para PISA

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Abstract

The OECD Programme for International Student Assessment (PISA) provides a framework in which over 80 countries collaborate to build advanced global metrics to assess the knowledge, skills and character attributes of the students. The design of assessments poses major conceptual and technical challenges, as successful learning. Beyond a sound conceptual foundation, PISA needed to fulfil a range of sometimes competing demands. The school administrators, policymakers, and teachers need to be able to use this assessment information to determine how to create better opportunities for student learning. Assessments should also provide productive feedback, at appropriate levels of detail, to fuel improvement and accountability decisions at each level of the education systems. In fact, also to assess of reading, mathematics and science as key foundation skills, PISA is now progressively incorporating also some of the broader cognitive, social and emotional competencies.

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Resumen

El Programa para la Evaluación Internacional de Alumnos (PISA) proporciona un marco en el que más de 80 países colaboran para construir métricas globales avanzadas para explorar los conocimientos, habilidades y atributos del estudiantado. El diseño de las evaluaciones plantea importantes desafíos conceptuales y técnicos, como el éxito del aprendizaje. Más allá de una base conceptual sólida, PISA necesita cumplir una serie de exigencias a veces contradictorios. Los/as administradores de escuelas, autoridades normativas y los docentes deben ser capaces de utilizar esta información de la evaluación para determinar cómo crear mejores oportunidades para el aprendizaje de los estudiantes. Las evaluaciones también deben proporcionar retroalimentación productiva, con niveles apropiados de detalle, para potenciar las decisiones de mejora y rendición de cuentas, en todos los niveles educativos. De hecho, además de evaluar la lectura, las matemáticas y la ciencia como competencias clave, PISA va incorporando progresivamente también algunas de las competencias cognitivas más amplias, sociales y emocionales.

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The demands on modern education systems are evolving fast. In the past, education was about teaching people something. Now, it's about making sure that students develop a reliable compass and the navigation skills to find their own way through an increasingly uncertain, volatile and ambiguous world.

These days, we no longer know exactly how things will unfold, often we are surprised and need to learn from the extraordinary, and sometimes we make mistakes along the way. And it will often be the mistakes and failures, when properly understood, that create the context for learning and growth. A generation ago, teachers could expect that what they taught would last for a lifetime of their students. Today, schools need to prepare students for more rapid economic and social

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change than ever before, for jobs that have not yet been created, to use technologies that have not yet been invented, and to solve social problems that we don't yet know will arise.

How do we foster motivated, engaged learners who are prepared to conquer the unforeseen challenges of tomorrow, not to speak of those of today? The dilemma for educators is that routine cognitive skills, the skills that are easiest to teach and easiest to test, are also the skills that are easiest to digitize, automate and outsource. There is no question that state-of-the-art knowledge and skills in a discipline will always remain important. Innovative or creative people generally have specialized skills in a field of knowledge or a practice. And as much as 'learning to learn' skills are important, we always learn by learning something. However, educational success is no longer mainly about reproducing content knowledge, but about extrapolating from what we know and applying that knowledge in novel situations. Put simply, the world no longer rewards people just for what they know – Weibo or Google knows everything – but for what they can do with what they know. Because that is the main differentiator today, education is becoming more about ways of thinking, involving creativity, critical thinking, problem-solving and decision-making; about ways of working, including communication and collaboration; about tools for working, including the capacity to recognize and exploit the potential of new technologies; and, last but not least, about the social and emotional skills that help people live and work together (Schleicher, 2012).

Conventionally our approach to problems was breaking them down into manageable bits and pieces, and then to teach students the techniques to solve them. But today we create value by synthesizing the disparate bits. This is about curiosity, open-mindedness, making connections between ideas that previously seemed unrelated, which requires being familiar with and receptive to knowledge in other fields than our own. If we spend our whole life in a silo of a single discipline, we will not gain the imaginative skills to connect the dots where the next invention will come from.

The world is also no longer divided into specialists and generalist. Specialists generally have deep skills and narrow scope, giving them expertise that is recognized by peers but not valued outside their domain. Generalists have broad scope but shallow skills. What counts increasingly are the versatilists who are able to apply depth of skill to a progressively widening scope of situations and experiences, gaining new competencies, building relationships, and assuming new roles. They are capable not only of constantly adapting but also of constantly learning and growing, of positioning themselves and repositioning themselves in a fast changing world.

Perhaps most importantly, in today's schools, students typically learn individually and at the end of the school year, we certify their individual achievements. But the more interdependent the world becomes, the more we rely on great collaborators and orchestrators who are able to join others in life, work and citizenship. Innovation, too, is now rarely the product of individuals working in isolation but an outcome of how we mobilize, share and link knowledge. Schools need to prepare students for a world in which many people need to collaborate with people of diverse cultural origins, and appreciate different ideas, perspectives and values; a world in which people need to decide how to trust and collaborate across such differences; and a world in which their lives will be affected by issues that transcend national boundaries. Expressed differently, schools need to drive a shift from a world where knowledge that is stacked up somewhere depreciating rapidly in value towards a world in which the enriching power of communication and collaborative flows is increasing (Schleicher, 2015).

In many schools around the world, teachers are trying to help students develop such kinds of knowledge, skills and character attributes. But education systems are often still struggling with reflecting these in the tests and assessments that are used to validate what students know and can do. Indeed, the vast majority of tasks on many conventional tests can now be solved with the help of a smartphone. If we want to know whether students are smarter than a smartphone, we need to build more advanced tests and assessments.

PISA project

The OECD Programme for International Student Assessment (PISA) provides a framework in which over 80 countries collaborate to build advanced global metrics to assess the knowledge, skills and character attributes that matter for student success and that are essential for full participation in modern societies.

The design of assessments poses major conceptual and technical challenges, as successful learning is as much about the process as it is about facts and figures. The design of PISA began with the establishment of a conceptual framework which extended from: the development of a working definition for the assessment areas to be assessed and the description of the assumptions that underlay that definition; an examination of how to organize sets of tasks constructed in order to report to policy-makers and researchers on performance in each assessment area; the identification of a set of key characteristics to be taken into account when assessment tasks are constructed in ways that meaningfully reflect learning progressions; the operationalization of the set of key characteristics to be used in test construction; and the validation of the variables, and assessment of the contribution which each made to the understanding of task difficulty. The framework then provided the foundation for the design of tasks that can be used to generate informative student responses, the coding/valuing of those responses, the delivery of the tasks and the gathering of the responses, and the modelling of the responses with respect to the constructs to be assessed.

Beyond a sound conceptual foundation, PISA needed to fulfil a range of sometimes competing demands. Most obviously, assessments need to be fair, technically sound and valid for purpose. They also need to build on a range of methods to ensure adequate measurement of intended constructs and measures of different grain size to serve decision-making needs at different levels of the education system. Assessments should also provide productive feedback, at appropriate levels of detail, to fuel improvement and accountability decisions at each level of the education systems. Teachers need to be able to understand what the assessment reveals about students' thinking. And school administrators, policymakers, and teachers need to be able to use this assessment information to determine how to create better opportunities for student learning. PISA faces the added challenge of ensuring that the outcomes are valid across the cultural, national and linguistic boundaries over which they extend and that the target populations from which the samples in the participating countries are drawn are comparable (Schleicher, 2014).

PISA began its assessments in 2000 with an in-depth assessment of reading literacy skills, defined as understanding, using, reflecting on and engaging with written texts. This concept deliberately went beyond the traditional notion of decoding information and literal interpretation of what is written, and encompassed a range of situations in which people read, the different ways written texts are presented through different media, and the variety of ways that readers approach and use texts, from the functional and finite, such as finding a particular piece of practical information, to the deep and far-reaching, such as understanding other ways of doing, thinking and being. Since 2000, the PISA reading assessments have evolved considerably, reflecting in large parts the changes in the nature of reading with the advent of digital technologies. In the past, teachers could tell students to look information they were missing up in an encyclopaedia, and to rely on that information generally being accurate and true. Nowadays, digital texts require students to manage non-linear information structures, to build their own mental representation of information as they find their way through hypertext on the internet, and to deal with ambiguity and to interpret and resolve conflicting information which they find somewhere on the web. Indeed, the more content knowledge digital technologies allow student to search and access, the more important becomes the capacity to make sense out of this content, and the capacity of students to question or seek to improve the accepted knowledge and practices of their time (OECD, 1999).

In 2003, the focus of PISA turned to assessing mathematics, defined as students' capacity to formulate, employ and interpret mathematics in a variety of contexts. The assessment was about reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain and predict phenomena. Students were also asked to demonstrate that they could recognise the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective citizens. This approach asserts the importance of mathematics for full participation in society and it stipulates that this importance arises from the way in which mathematics can be used to describe, explain and predict phenomena of many types. PISA has established a set of seven fundamental mathematical capabilities that underpin performance in the PISA mathematics assessments: (1) Communication is both receptive and expressive. Reading, decoding and interpreting statements, questions, tasks or objects enables the individual to form a mental model of the situation. Later, the problem-solver may need to present or explain the solution. (2) Mathematising involves moving between the real world and the mathematical world. It has two parts: formulating and interpreting. Formulating a problem as a mathematical problem can include structuring, conceptualising, making assumptions and/or constructing a model. Interpreting involves determining whether and how the results of mathematical work are related to the original problem and judging their adequacy. (3) Representation entails selecting, interpreting, translating between and using a variety of representations to capture a situation, interact with a problem, or present one's work. (4) Reasoning and argument is required throughout the different stages and activities associated with mathematical literacy. This capability involves thought processes rooted in logic that explore and link problem elements so as to be able to make inferences from them, check a justification that is given, or provide a justification of statements or solutions to problems. (5) Devising strategies for solving problems is characterised as selecting or devising a plan or strategy to use mathematics to solve problems arising from a task or context, and guiding and monitoring its implementation. (6) Using symbolic, formal and technical language and operations involves understanding, interpreting, manipulating and making use of symbolic and arithmetic expressions and operations, using formal constructs based on definitions, rules and formal systems, and using algorithms with these entities. Finally, (7) using mathematical tools involves knowing about and being able to use various tools (physical or digital) that may assist mathematical activity, and knowing about the limitations of such tools (OECD, 2003).

In 2006, the focus of PISA shifted to science, defined as the ability of students to engage with science-related issues, and with the ideas of science, as a reflective citizen. To do well on the PISA science test, students need to be willing to engage in reasoned discourse about science and technology. This requires the competencies to (1) explain phenomena scientifically (which implies the ability to recognise, offer and evaluate explanations for a range of natural and technological phenomena), (2) evaluate and design scientific enquiry (which implies the ability to describe and appraise scientific investigations and propose ways of addressing questions scientifically) and (3) to interpret data and evidence scientifically (which implies the ability to analyse and evaluate data, claims and arguments in a variety of representations and draw appropriate scientific conclusion). Explaining scientific and technological phenomena demands a knowledge of the content of science. The second and third competencies, however, require more than a knowledge of what we know. Rather, they depend on an understanding of how scientific knowledge is established and the degree of confidence with which it is held. Recognising and identifying the features that characterise scientific enquiry requires a knowledge of the procedures that are the foundation of the diverse methods and practices used to establish scientific knowledge – referred to here as procedural knowledge. Finally, the competencies require epistemic knowledge – an understanding of the rationale for the common practices of scientific enquiry, the status of the knowledge claims that are generated, and the meaning of foundational terms such as theory, hypothesis and data (OECD, 2006).

Challenges for PISA project

While continuing with the assessment of reading, mathematics and science as key foundation skills, PISA is now progressively incorporating also some of the broader cognitive, social and emotional competencies discussed above. The assessment of social competencies became a priority in 2015. As noted before, young individuals entering into the workforce and public life need the skills and attitudes to collaborate and effectively solve problems, increasingly in situations where members of the group are geographically dispersed, working in different time zones, and connected through technology. Societies expect them to have the capacity to resolve problems and provide solutions collaboratively through the pooling of knowledge, skills, and effort. As a first step, PISA introduced in 2015 an assessment of collaborative problem solving skills, which assesses students according to three core competencies: (1) establishing and maintaining shared understanding; (2) taking appropriate actions to solve problems; and (3) establishing and maintaining team organisation. To facilitate this, individual students are required to interact and collaborate with computer-generated team member(s) in controlled situations to solve a particular problem. This process necessitates students determining their own role and responsibilities in regards to other agents, monitoring aspects of group organisation, and facilitating adjustments and changes that are needed when communication breaks down, when new obstacles appear, or when opportunities for performance optimisation arise.

Taking this further, countries are currently collaborating to develop an assessment of global competence to be delivered in 2018 and defined as the capability and disposition to act and interact appropriately and effectively, both individually and collaboratively, when participating in an interconnected, interdependent and diverse world. The assessment is built around four key dimensions: (1) Communication and relationship management – which refers to the willingness and capability to adapt one's communication and behaviour in order to interact appropriately and effectively with others holding diverse perspectives and in different contexts. (2) Knowledge of and interest in global developments, challenges and trends – which refers to a learner's interest in and knowledge of cultures, major issues, events and phenomena in the world, as well as the learner's ability to understand their global significance and their implications for adapting appropriately and effectively to learning, working, and living situations with others holding diverse perspectives and in different contexts. (3) Openness and flexibility – which refers to being receptive to and understanding of new ideas, people and situations, as well as to differing perspectives and practices. It also refers to the ability to seek out and understand new and differing perspectives and experiences and appropriately and effectively adapt one's thinking, behaviours and actions to learning, working, and living situations that involve others holding diverse perspectives and in different contexts. (4) Emotional strength and resilience – which refers to the ability, developing the coping mechanisms and resilience, to deal appropriately with the ambiguity, changes, and challenges that these different perspectives and experiences can present.

As our societies evolve further, the countries participating in PISA will continue to collaborate to define and measure the knowledge, skills and character attributes that will help individuals to keep abreast of these changes and to meet rising demands. Every three years, the results from PISA provide a powerful tool that countries can use to develop, review and fine-tune their curricular standards and education policies with the aim to provide the best education possible for all of their students. The OECD stands ready to support countries in this challenging and crucial endeavour.

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