

What's next for IEA's ICILS in 2018?



ICILS is an international assessment of how young people develop computer and information literacy to participate effectively in the digital age. Computer and information literacy combines information literacy, critical thinking, technical skills, and communication skills applied across a range of contexts and purposes

WHY ICILS?

The ability to use information and communication technologies (ICT) is an imperative for effective participation in today's digital age. Schools worldwide are responding to the need to provide young people with such ability. But how effective are they in this regard?

The IEA International Computer and Information Literacy Study 2013 (ICILS 2013) addressed this question by studying the extent to which young people had developed computer and information literacy (CIL), defined as the ability to use computers to investigate, create, and communicate with others at home, school, the workplace and in society. ICILS 2013 gathered data from almost 60,000 Grade 8 (or equivalent) students in more than 3300 schools from 21 countries and benchmarking participants. These student data were augmented by data from almost 35,000 teachers in those schools, and by contextual data collected from school information and communication technology (ICT) coordinators, school principals, and the ICILS national research centers. ICILS 2013 was the first international research to investigate students' acquisition of CIL and its relationship to the school and out-of-school contexts in which it is developed.

FUTURE OF ICT EDUCATION

Computer science and the rapid growth in technology have transformed the world. Today's students need to become technologically literate to navigate the 21st century workplace. ICILS 2013 research indicated that, while students were making widespread and frequent use of digital technologies when outside school, in general, the data challenged the notion of young people as "digital natives" with a self-developed capacity to use digital technology. Large variations in CIL proficiency within and across the ICILS countries suggested it was naive to expect young people to develop CIL in the absence of coherent learning programs. But it is clear that societies and economies will benefit from the discoveries and innovations produced by a workforce that is trained to think computationally.



Governments are including digital literacy and computing in national curricula for students of all ages, and teachers are increasingly tasked to integrate computing concepts, ideas, and processes into teaching practice. This naturally raises many questions about best practice and how to achieve the most effective learning outcomes. But how can these be assessed?

WHAT IS COMPUTATIONAL THINKING?

Computers themselves cannot think: they have to be programmed before they can function. Programming tells a computer what to do and how to do it. However, before a problem can be addressed, the problem itself and the ways in which it could potentially be solved need to be fully understood.

Computational thinking is the process of working out exactly how computers can help us solve problems.

In computational thinking, the students demonstrate the ability to identify a problem, break it down into manageable steps, work out the important details or patterns, shape possible solutions, and present these solutions in a way that a computer, a human, or both, can understand. Computational thinking can also involve structuring and manipulating data sets to support the solution process.

Being able to convert a complicated problem into simple steps is a skill that is extremely useful. In fact, computational thinking is a fundamental skill used by everyone in the world. Increasingly, education and business leaders are advocating that computational thinking should be part of every child's education, as the topic embraces problem solving, design, and relating basic concepts of computer science to human behavior.



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ICILS sheds light on the contexts and outcomes of ICT- related education programs, and the role of schools and teachers in supporting students' computer and information literacy achievement

Developing the skill to think in this way means more than being able to program a computer; it means the ability to abstract concepts and think at multiple levels. It isn't just about problem solving, it's about problem formulation: specifying problem characteristics precisely and systematically.

THINKING COMPUTATIONALLY

For example, if a child is playing a video game, depending on the game, in order to complete a level they might need to decide several things. These might include: (1) what they need to do to progress to the next level, how to undertake the tasks, and the time required, (2) the best route to the exit point to the next level, and (3) the assessment of obstacles preventing the player from achieving the next level, and how to overcome them. From these details the player develops their strategy for completing the level in the most economical way. Equally, the game creator would need to address and answer the same problems before they could begin to program the game. Thus, both player and game designer use essentially the same skill set.

The Australian Council for Educational Research (ACER) serves as the international study center for IEA's ICILS 2018. For all the latest information, please visit <https://icils.acer.edu.au/>

Further reading:

Wing, J. M. (2006). Computational thinking. *Communications of the ACM*, 49(3), 33-35. Retrieved from <http://www.cs.cmu.edu/~151110-s13/Wing06-ct.pdf>

MEETING THE NEED

The IEA plans a second cycle of ICILS for 2018 (ICILS 2018). ICILS 2018 will build upon and extend the work of ICILS 2013. Data collected in ICILS 2018 will enable countries that participated in ICILS 2013 to measure trends in student CIL proficiency and to compare aspects of CIL learning contexts between 2013 and 2018. However, ICILS 2018 will also investigate new areas of student proficiency with the use of ICT, and extend the measurement of the learning contexts in which CIL is developed. For ICILS 2018, the IEA's aim is to restructure and extend the CIL construct to include

a new computational thinking strand. Because this is a burgeoning area of curriculum interest across a broad range of countries and clearly merits serious research, IEA would initially like to offer this as an international option in ICILS 2018. This would comprise some content relating to students' knowledge and understanding of computer use (Aspect 1.1 from ICILS 2013), together with new content relating to students' capacity to think and reason using the type of computational logic that underpins computer coding (across languages), the manipulation of data, and use of computers to solve problems.

OPPORTUNITIES FOR COLLABORATION AND SPONSORSHIP

The assessment framework will be written by assessment experts in consultation with subject matter experts, with comment invited from education professionals from participating countries and interested companies. In addition to contributing to the development of the framework, and the reporting and dissemination of this international research program, companies can become involved by offering financial or technical support toward the implementation of the assessment modules: authentic, interactive tasks are both difficult and expensive to produce, but critical to effective implementation.

The IEA's ICILS is a high profile, respected, international assessment. Companies supporting ICILS 2018 will benefit from the international exposure. They will be invited to attend national meetings, and will be prominently acknowledged in the international reports, but, more importantly, they will have made vital input into ensuring that the skills future workers need are indeed being taught and learned in schools around the world. A modest commitment will help ensure the viability of ICILS 2018, including being able to introduce assessment of computational thinking alongside the existing computer and information literacy construct.

The IEA welcomes contributions from all organizations interested in supporting this critical international research endeavor. Organizations and companies interested in exploring options for partnership are invited to contact the IEA to discuss mutual opportunities for collaboration.

TIMELINE

2015

Framework revision and instrument development

2016

Establishment of testing platform, finalization of framework and instruments

2017

Field trial

2018

Main survey data collection

2019

Reporting