Japan, 25 February 2022

Digitalisation in education: country examples

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BETTER POLICIES FOR BETTER LIVES

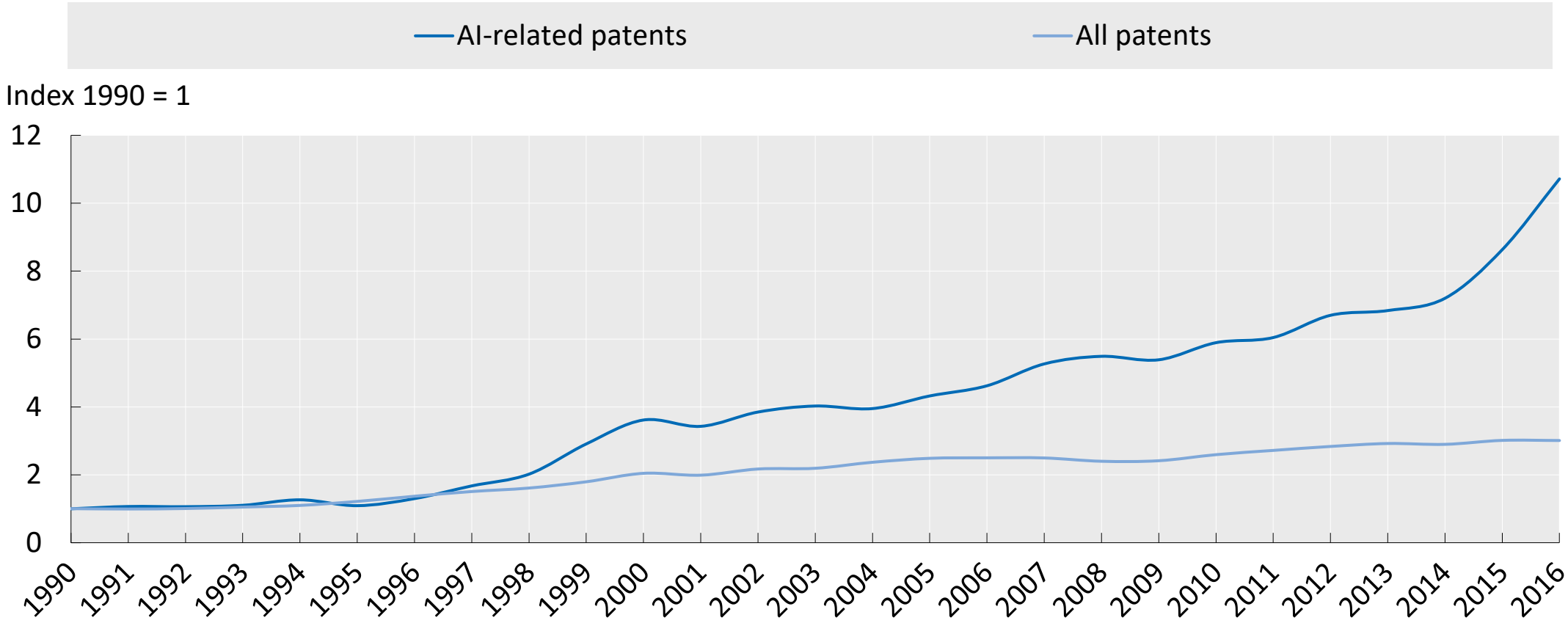
Digital Education Oulook 2021

- What are the current frontiers of AI and other technologies in education?
- What are the upcoming challenges?
- Watch key experts and policy makers talk about it:

  https://oecd-events.org/digital-education

digitalisation: a general ongoing trend

Technology development in artificial intelligence, 1990-2016

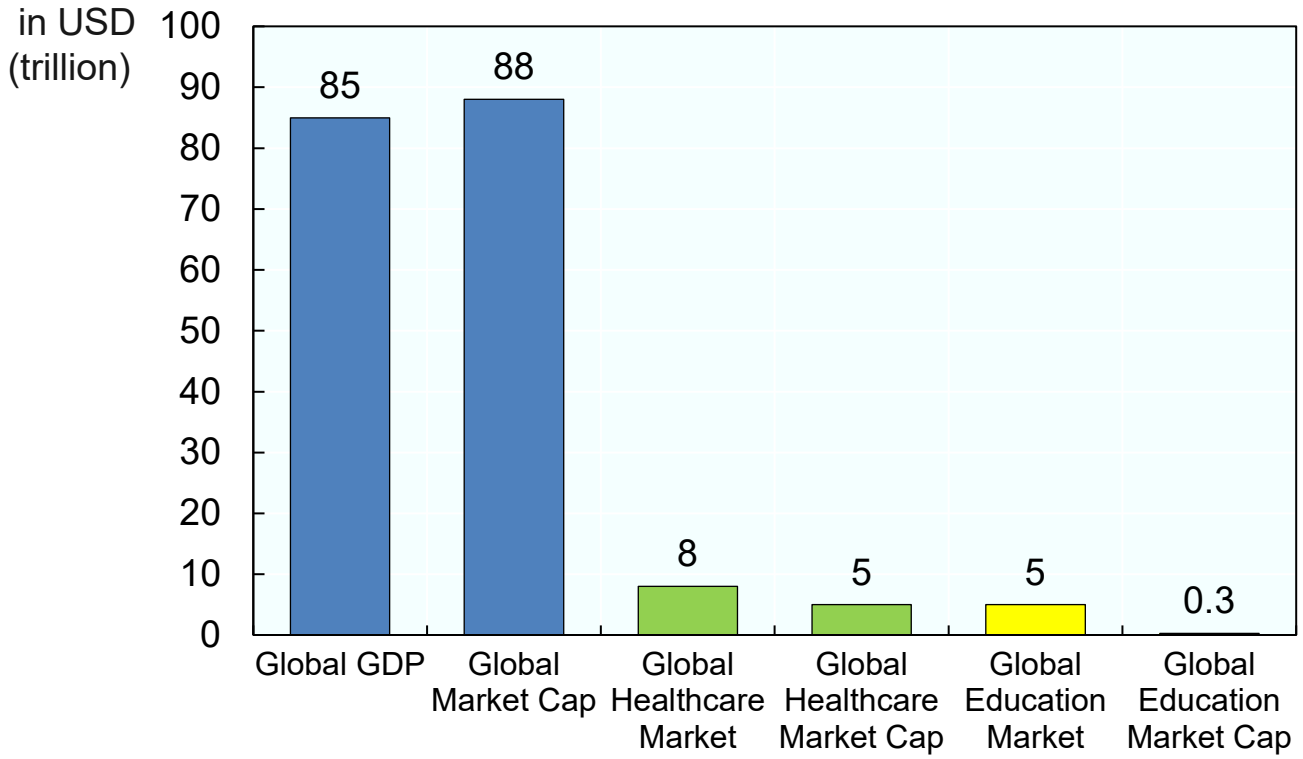


Source; OECD

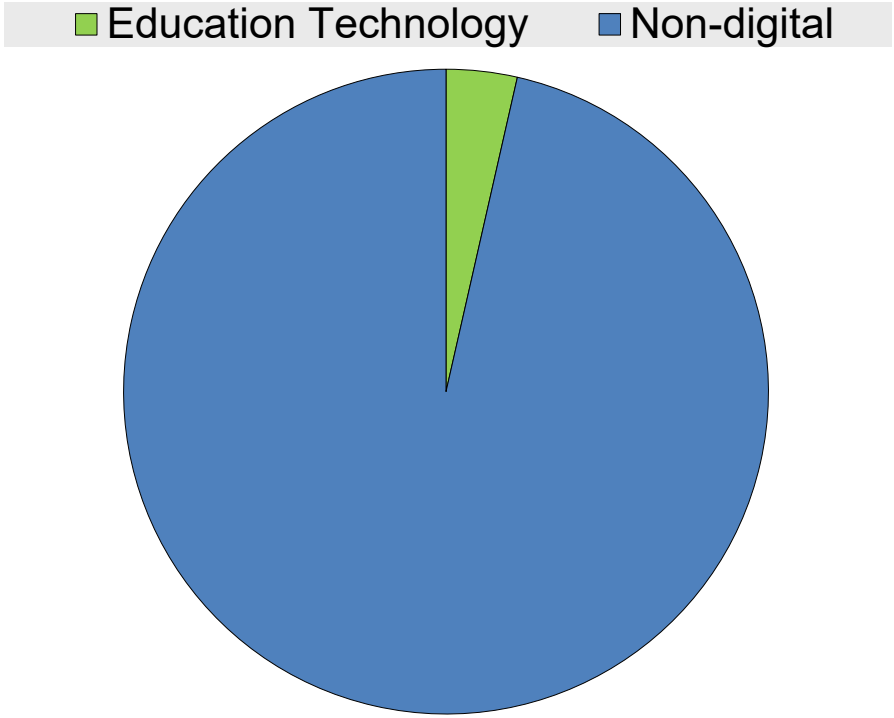
Capital flows for digitalisation of education still limited

The education sector is still at an early technology adoption stage compared to other sectors, with comparatively little market capitalisation

Global vs Education Capital Flows

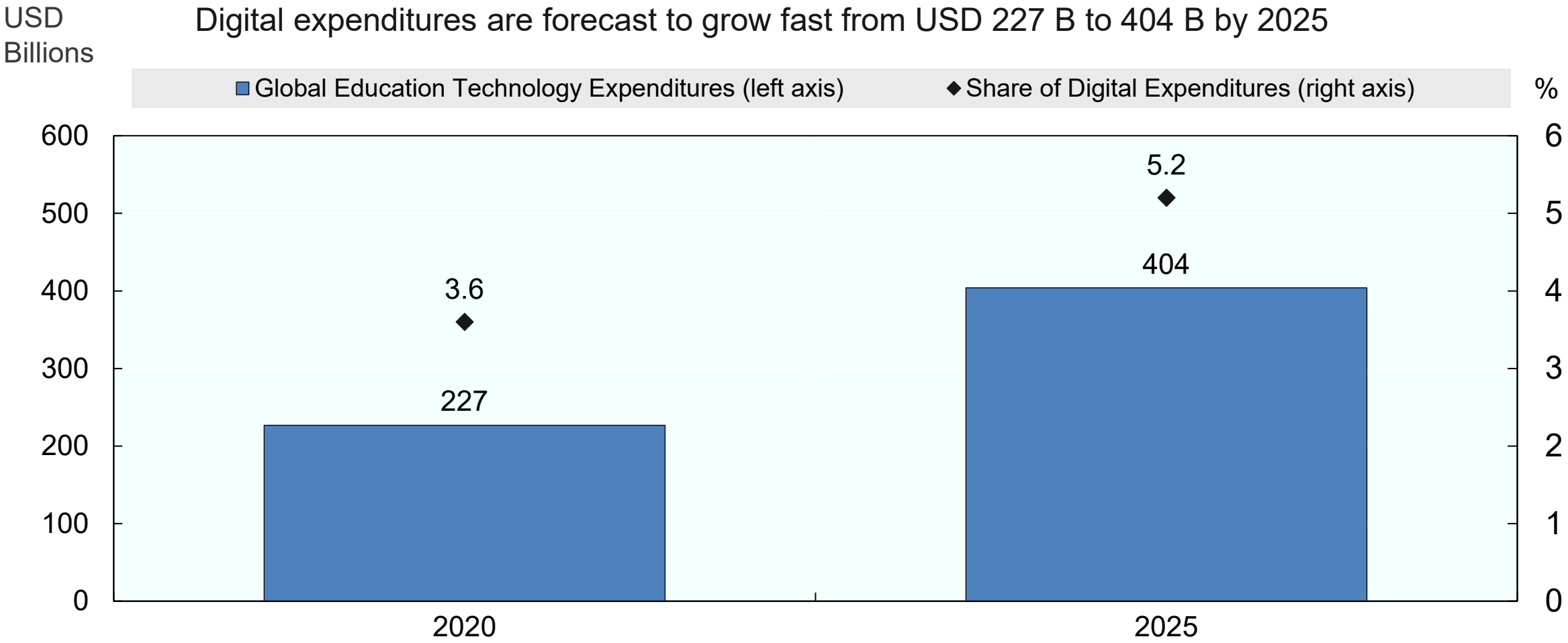


<4% of global education expenditure on technology



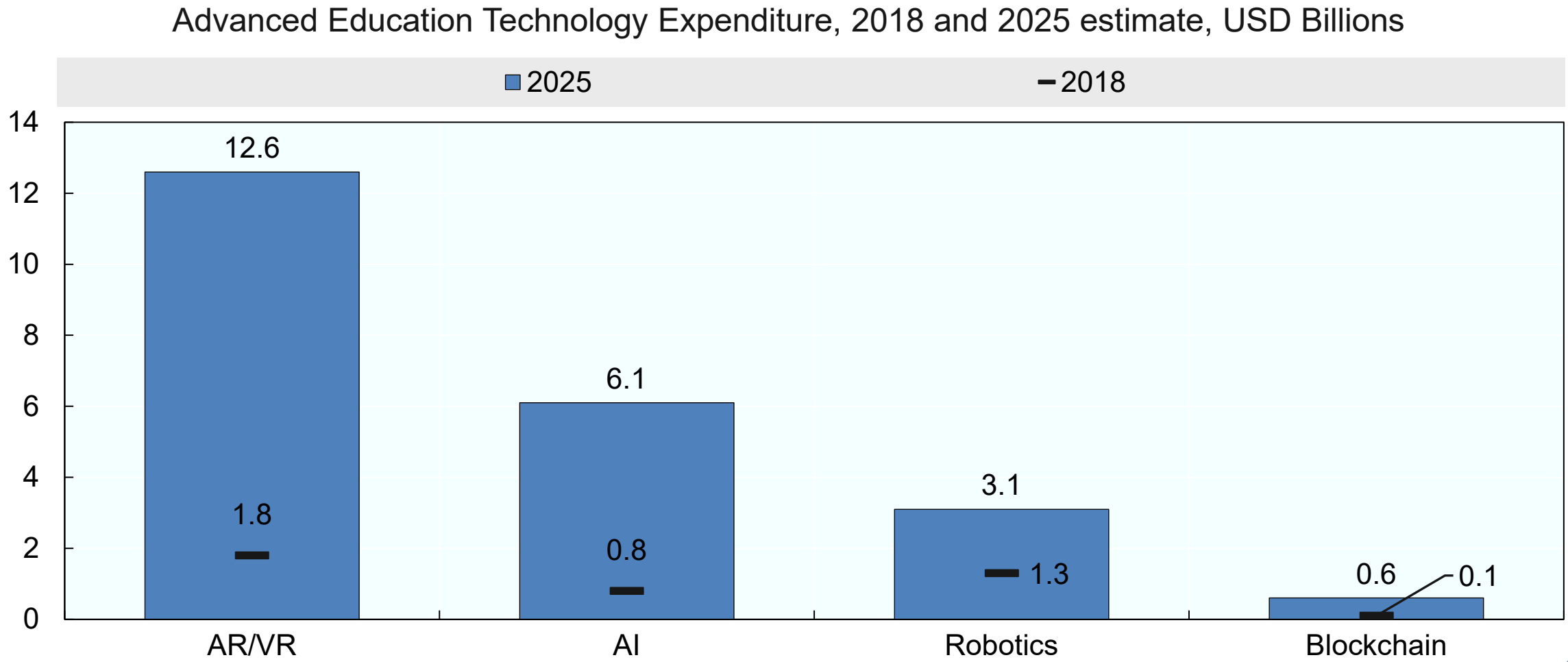
Sources: HolonIQ, World Health Organization, Goldman Sachs, Standard & Poors. All figures are rounded estimates based on source research.

But growing global education technology expenditures



Source: HolonIQ, January 2021

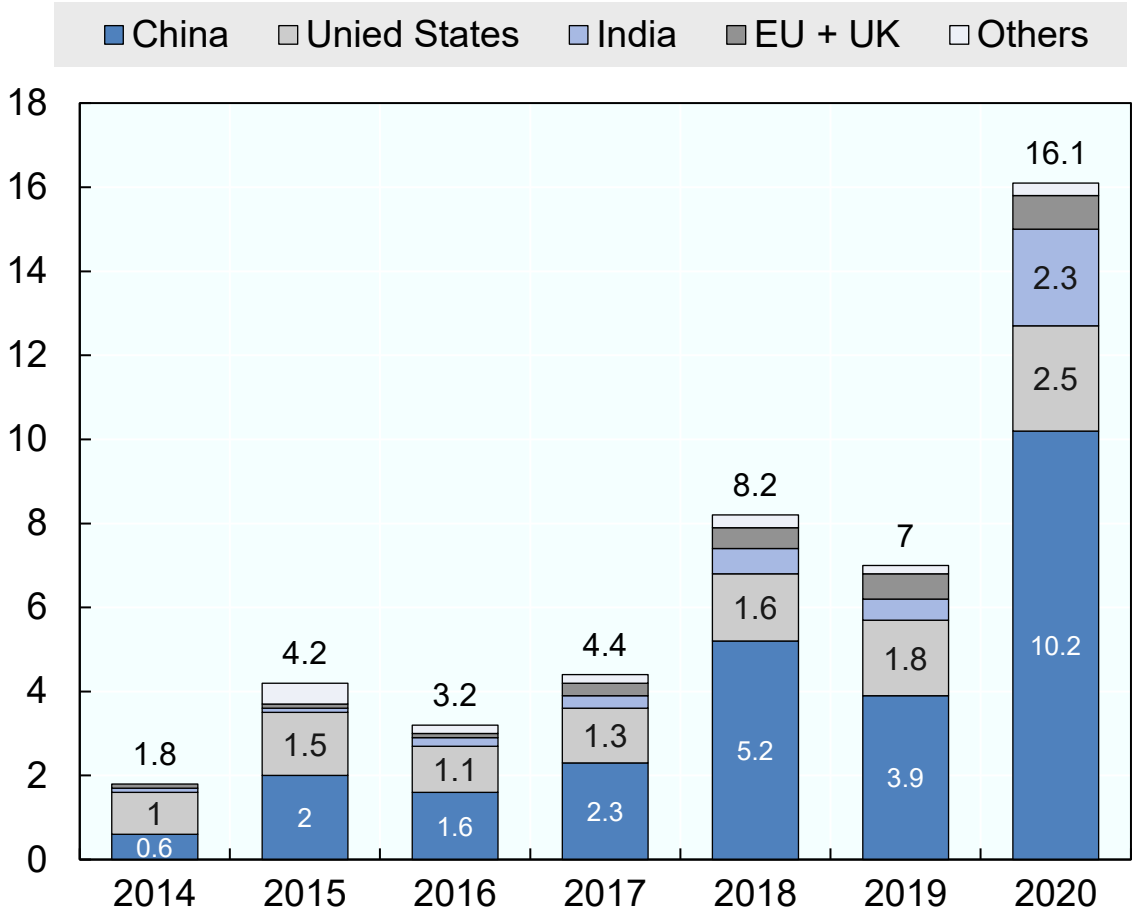
Current and estimated expenditures in advanced education technology

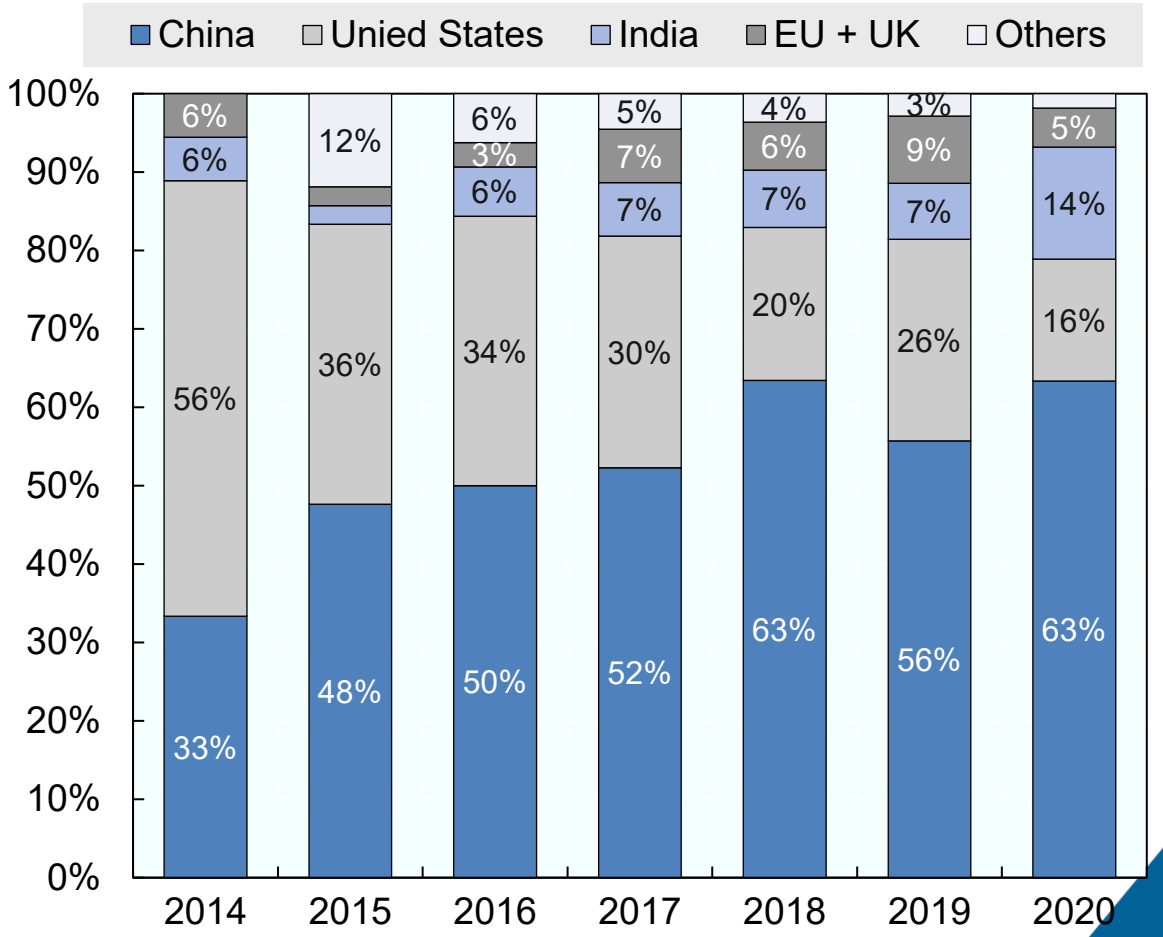


Source: HolonIQ, January 2021

China represents over 50% of global education venture capital investment

Venture capitalists have invested USD 16B in 2020, up from USD 2B in 2014 – mainly from China



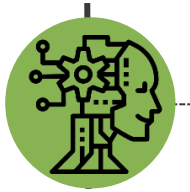


Source: HolonIQ, January 2021

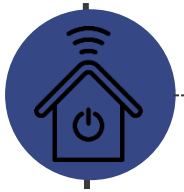
smart data and digital technology in education

Digitalisation and the « AI » galaxy

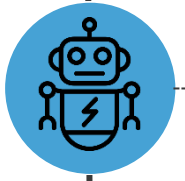
- **Learning analytics**



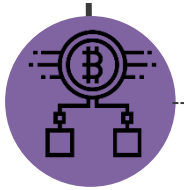
- **Artificial intelligence (AI)**



- **Internet of Things (IoT)**

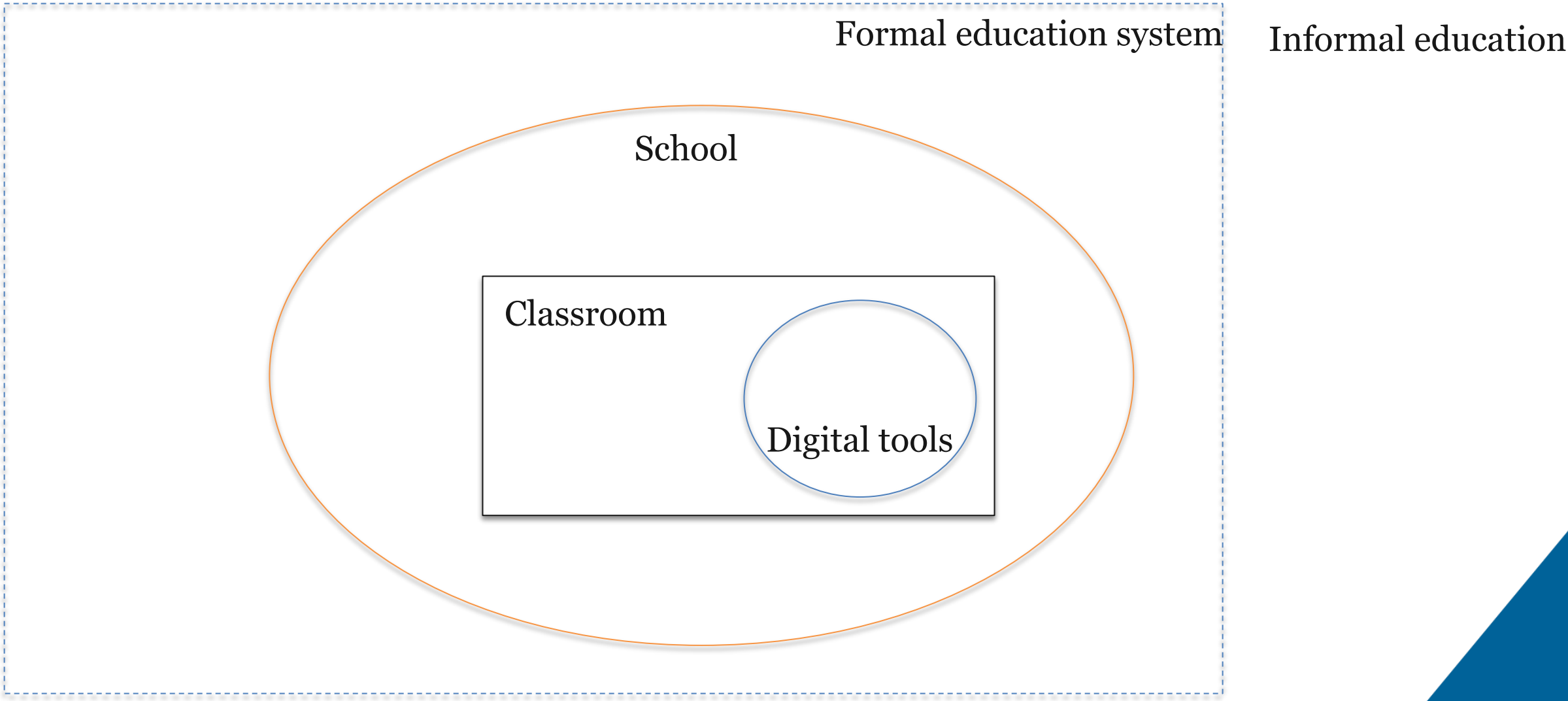


- **Robots**

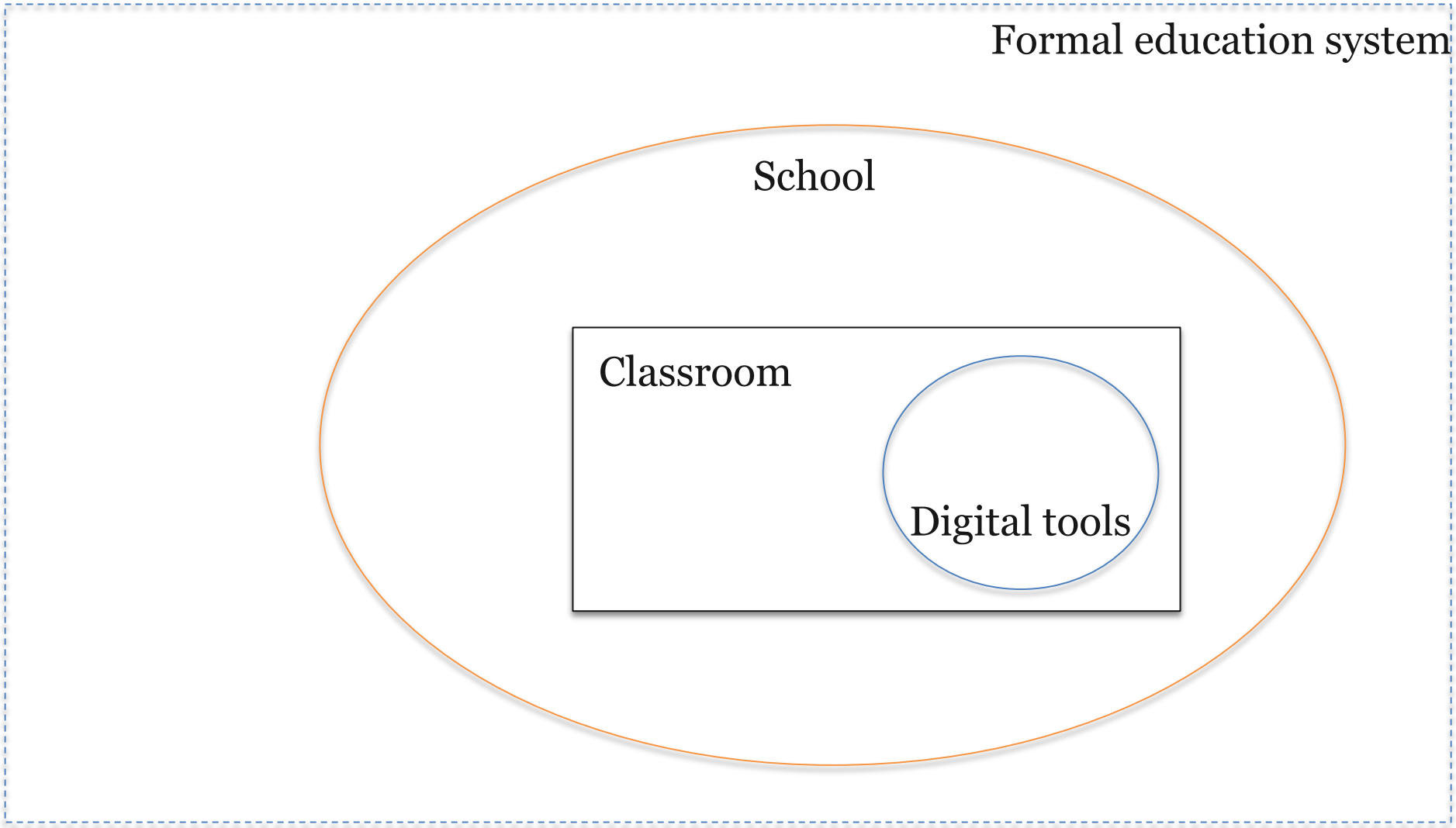


- **Blockchain**

Different levels of application of « Learning Analytics »



Different levels of application of « Learning Analytics »



Informal education

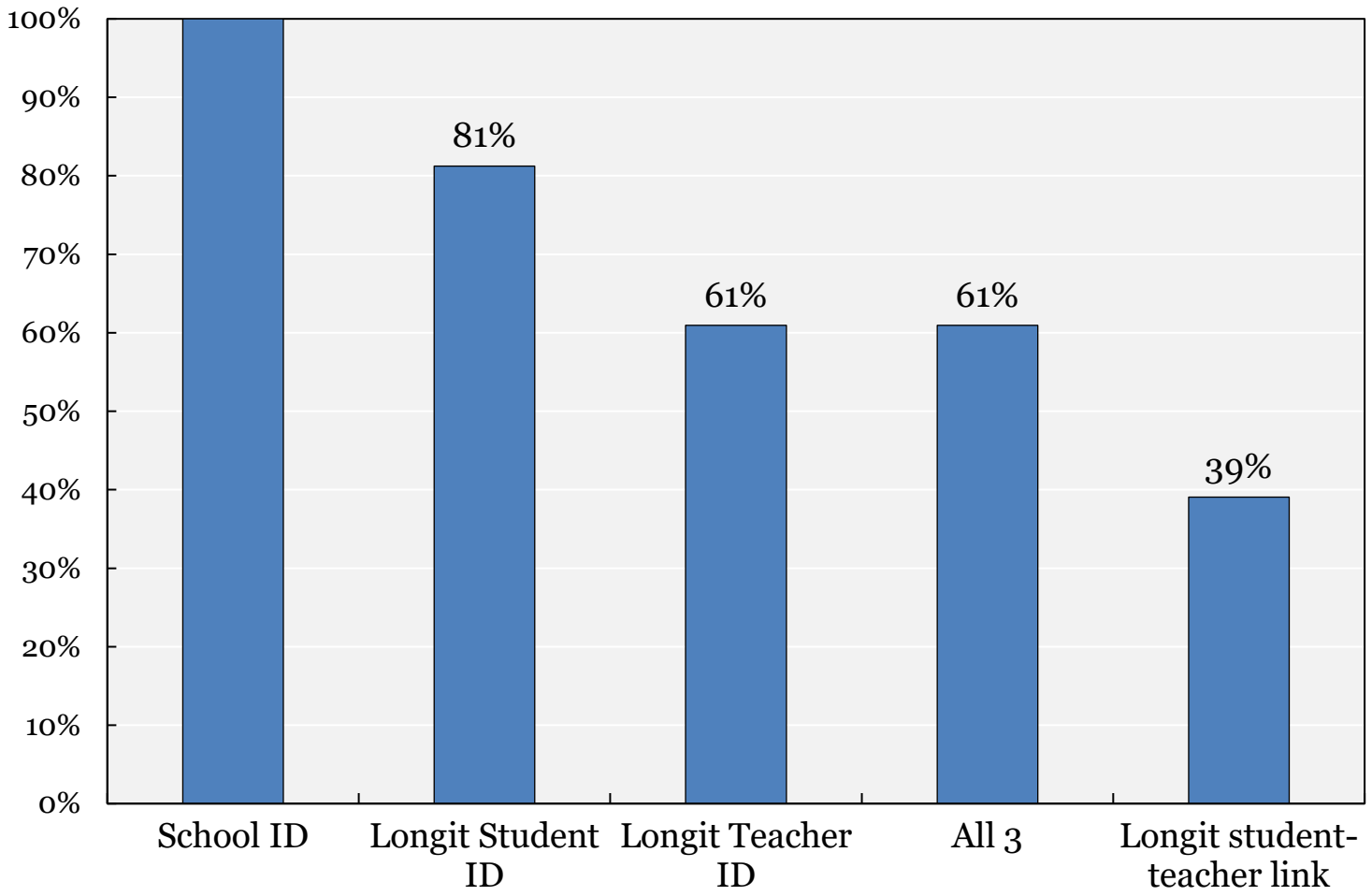
- Parenting
- Career guidance
- Lifelong learning
- Tutoring
- Exam preparation
- Informal learning in diverse areas
- Peer to peer learning

learning analytics and artificial intelligence to manage schools and systems

System and school levels

- **Longitudinal information systems** create an administrative data infrastructure providing new opportunities:
  - They link individual-level data over time and trace the academic and performance history of each student
- **Next-generation systems** integrate and link (more) administrative, including learning management system data:
  - incorporate visualisation and learning analytics tools
  - Provide recommendation/diagnosis tools
  - Bank of resources for all stakeholders

System and school levels



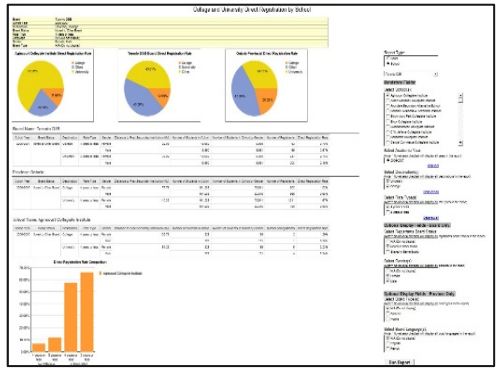
OECD/CERI survey covered **67 systems** from **33 countries/economies** (as of 2016)**:**

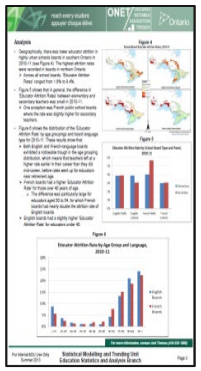
- A large majority of systems can track students longitudinally
- Less than two thirds of systems provide teacher and course identifiers
- Student- and school-level data matched, but teacher and student data linked only by a third of the systems, mainly US
- Some cases where link does not exist despite availability of both identifiers

Reporting and research data systems

- Statistical reporting and evaluation – from the traditional focus on reporting and accountability requirements
- Accountability of systems and school performance cards enriched thanks to longitudinal, individual-level data
- Reports seek to inform mainly policy makers and the public
- In some cases, also designed to develop research capacity about educational issues

Canada: Ontario School Information System (OnSIS)



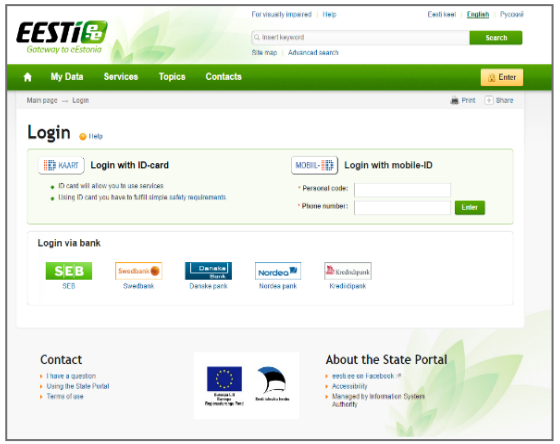


Mexico: Sistema Integral de Resultados de las Evaluaciones (SIRE)

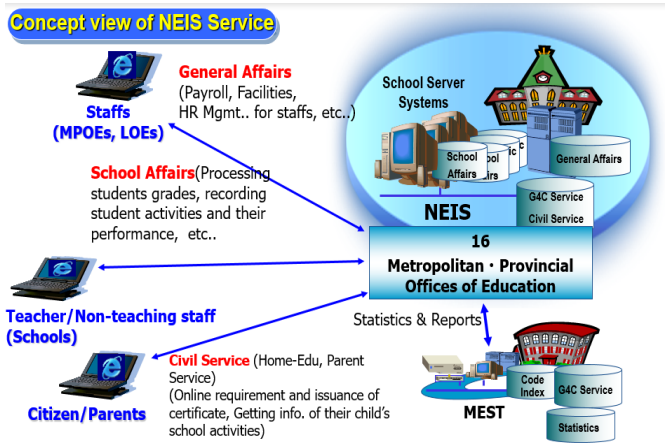
e-Government data systems

- Inspired by e-government approach promoting automated data integration across government agencies
- Data trails generated by the use of digital ID-cards and digital signatures
- Major objectives include making administrative processes more efficient (e.g. school transfer, school choice, university application, etc.) and informing resource allocation (e.g. school funds)
- Great potential for linkages with data from other sectors

Estonia: Estonian Education Information System (EHIS)



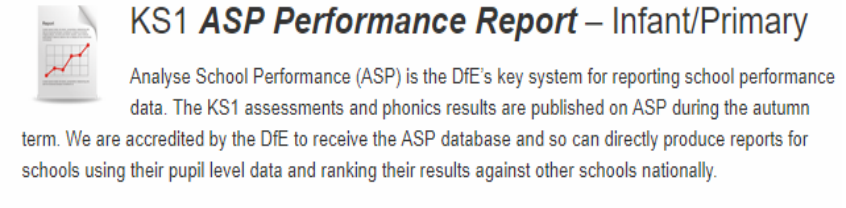
Korea: National Education Information System (NEIS)



School improvement data systems

- Systems designed to support school improvement efforts by putting data in the hands of principals and teachers
- Key features include customisable school reports and visualisation tools such as dashboards
- Enable new « improvement routines » (data teams, enquiry teams, etc.) and digital communities of practice
- Try to provide information at the individual level and with a granularity that makes data more relevant to teachers

England: Analyse School Performance (ASP) system (formerly RAISEonline)

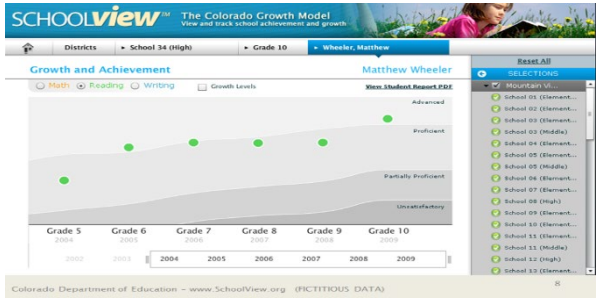


Portugal: Escola 360° (E-360°)

Expert data systems

- Aim to help personalise teaching and learning and to provide real-time feedback to teachers, students and principals
- Combine administrative data with process and formative assessment data from learning management systems
- Learning analytics and other diagnosis techniques
- Allow adjustments in ongoing instruction cycles – vs. end-of-year feedback
- Advanced features: links to banks of educational resources, recommendations and networking platforms for teachers

Colorado (US) state-wide longitudinal system and *SchoolView* website



New developments in New Zealand and Denmark

4 types of longitudinal data (EMIS) systems

- Reporting and research data systems
  - Ex: Ontario School Information System (OnSIS) (Canada)
- E-government data systems
  - Ex: Estonian Education Information System (EHIS); National Education Information System (NEIS) (Korea).
- School improvement data systems
  - Ex: Analyse School Performance (ASP) (England); Escola 360° (Portugal)
- Expert (data) systems
  - Ex: Colorado and some in US; Australia, New Zealand (?)

Colorado state-wide longitudinal system and *SchoolView* website

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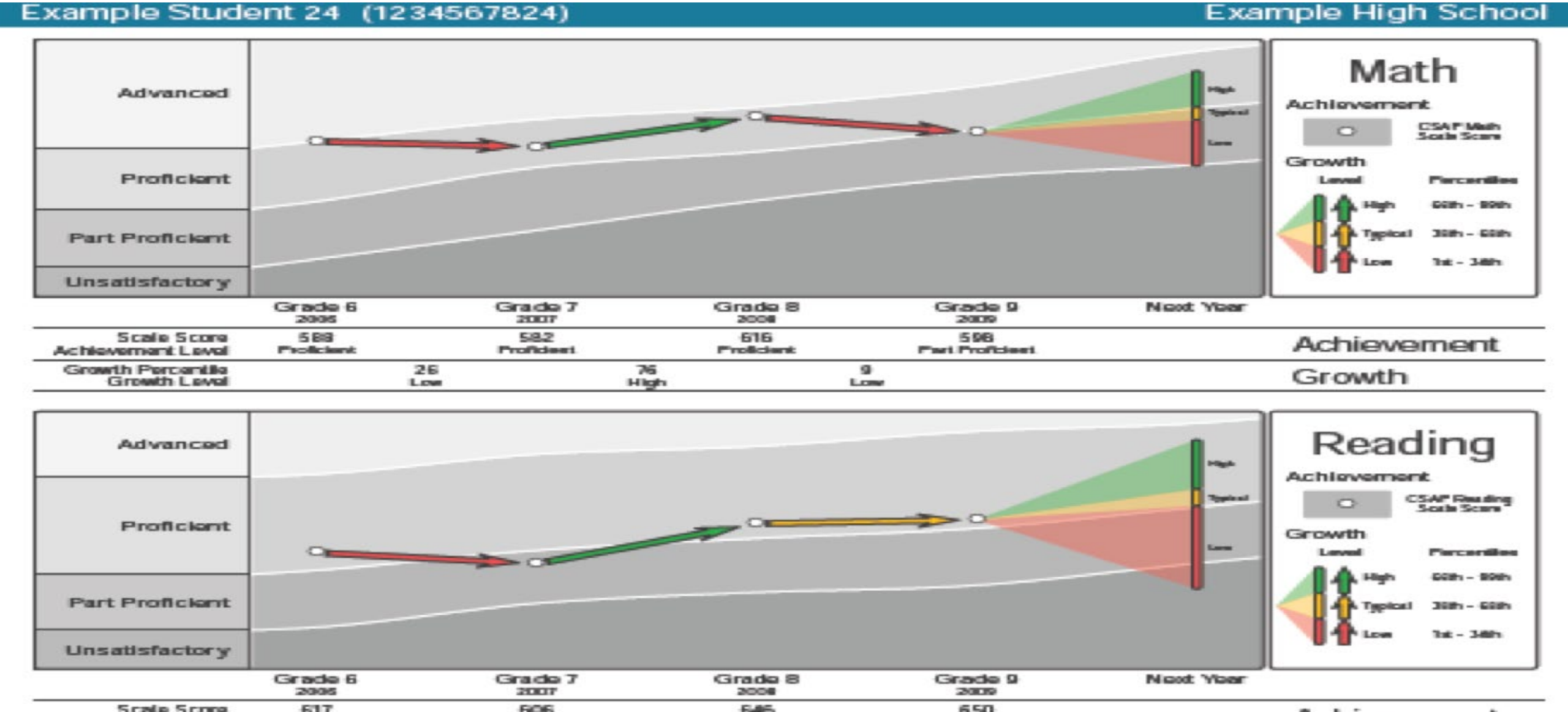
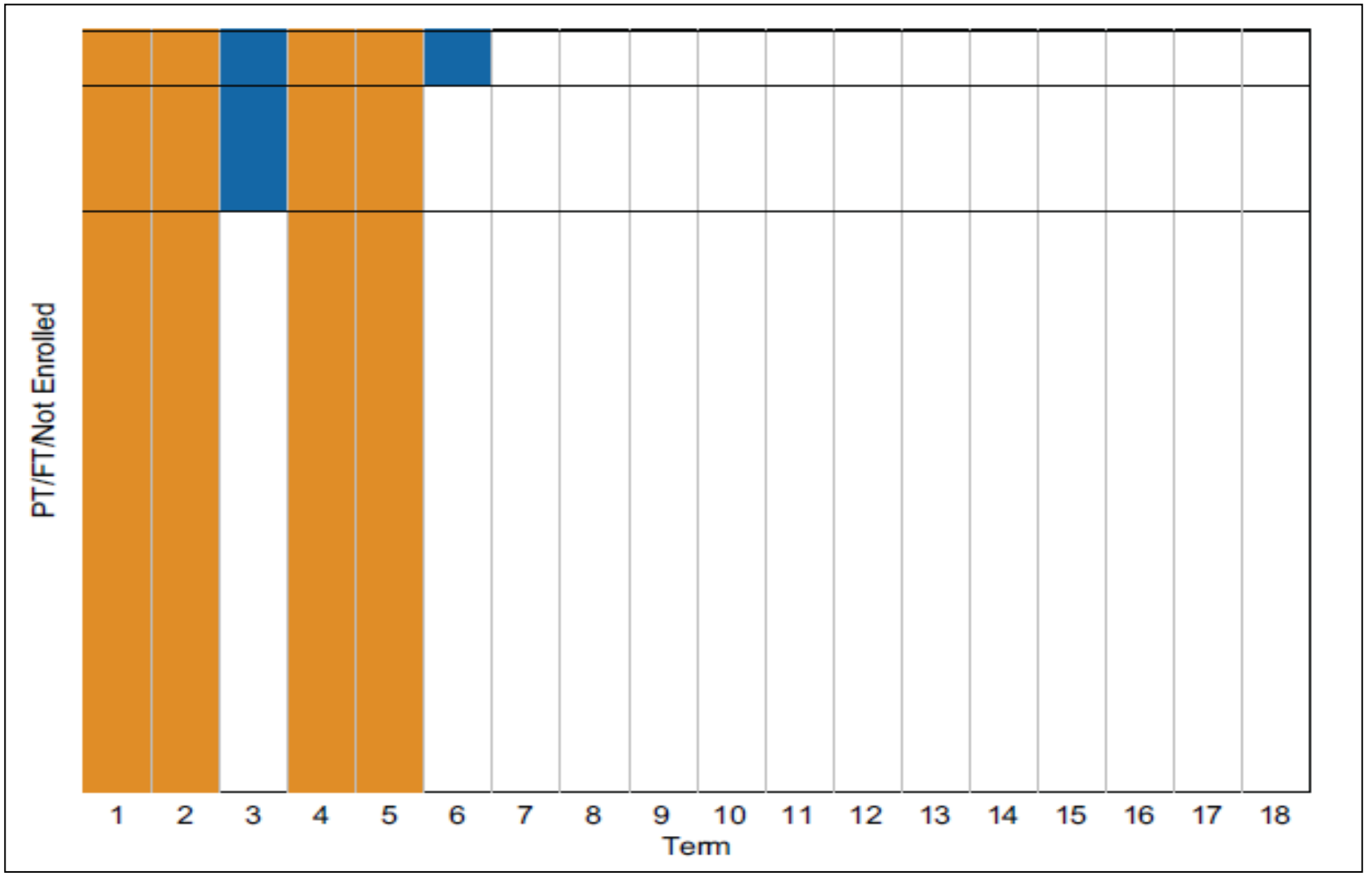


why smart data improve education systems

Presumed enrolment patterns in US community colleges

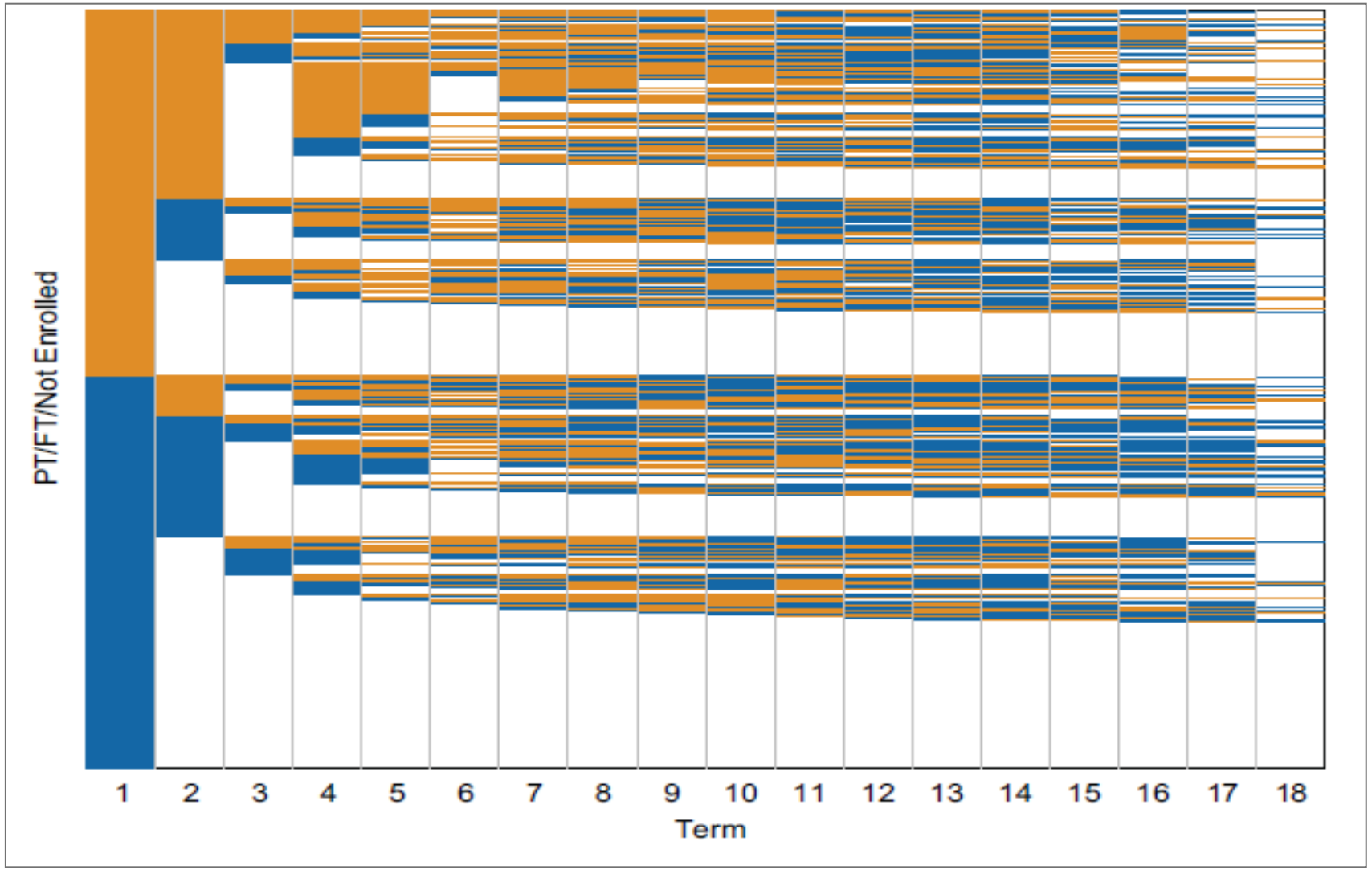
Blue: Part Time (PT)
Orange: Full Time (FT)



Source: Crosta (2013)

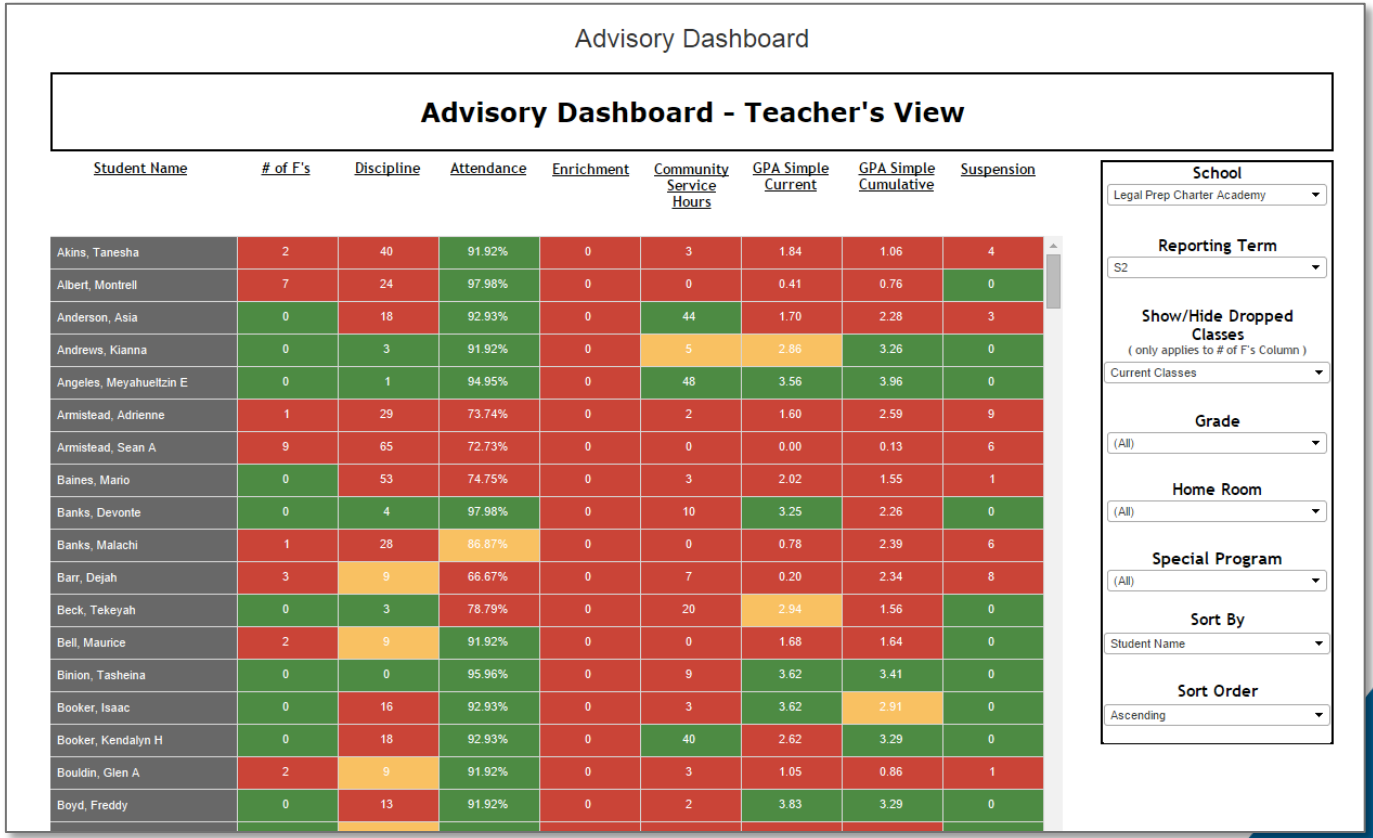
Actual enrolment patterns in US community colleges

Blue: Part Time (PT)
Orange: Full Time (FT)



Source: Crosta (2013)

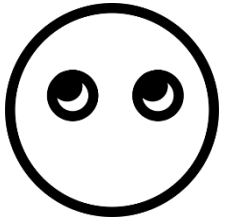
Early Warning Systems



Source: www.illuminateed.com/blog/2016/01/give-your-teachers-x-ray-vision

Better understanding patterns of dropout

38%: **Jaded dropouts** (don't like school, low and declining grades)



53%: **Quiet dropouts** (like school, low and slowly rising grades)

9%: **Involved dropouts** (like school, high grades, but unexpected need to take an additional course or significant life event)

Source: Bowers and Sprott, 2012

policy challenges

A few policy pointers

- **Usefulness**
  - Develop solutions with stakeholders (teachers, etc.) – not just EdTech
  - Work with schools on the benefits of the technological solution so it gets used
- **Effectiveness**
  - Verify that AI solutions do what they say (e.g. gives accurate diagnosis/predictions)
  - Ensure it improves outcomes (e.g. supports interventions to solve the problems)
- **Equity**
  - Privilege cheap solutions running on existing platforms (digital divide is bigger than we thought)
  - Establish standards and facilitate inter-operability

A few policy pointers

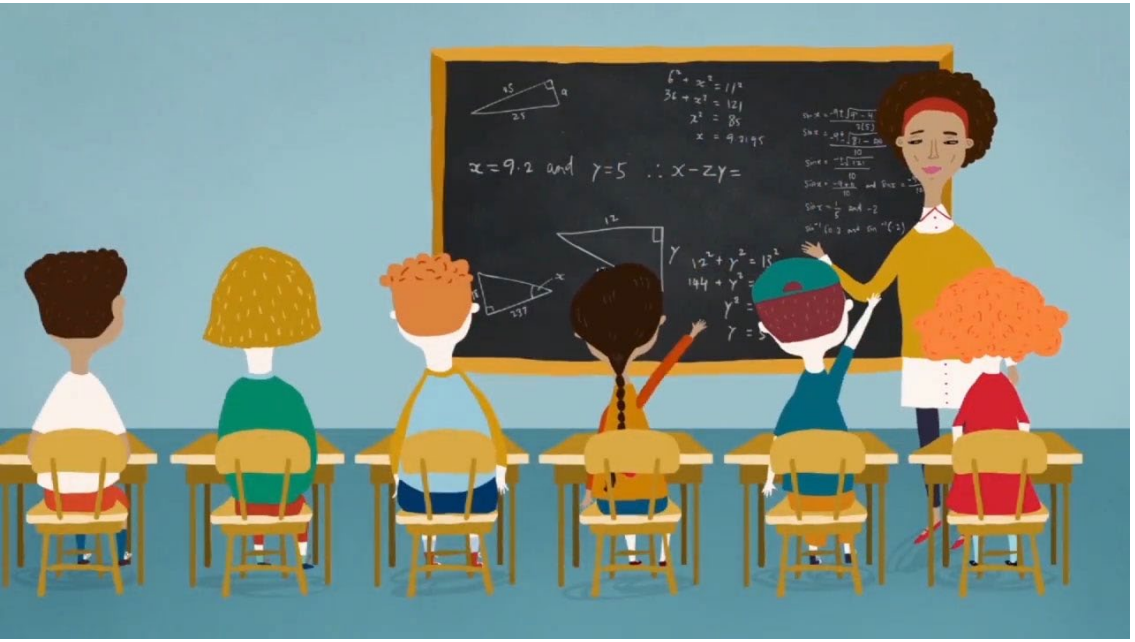
- **Fairness**
  - Ensure that you are not replicating biases due to your historical data (e.g. machine learning) or due to the human choices in designing the algorithm
  - Ensure that you are not creating new biases (e.g. look at the results)

- **Transparency**
  - Open data/open algorithm: allow anyone (i.e. other experts) to see and verify/challenge/improve the algorithm
  - Explain how the algorithm works and which choices were made (to the extent possible)
  - Involve stakeholders to discuss the choices made when there is high stake

- **Data protection**
  - Data protection regulation in most countries: GDPR in Europe, FERPA in the US, etc.
  - Risk management policy: zero risk policy is not possible

How do we reimagine education with AI and smart technologies? Scenarios

Scenario 1: Continued digitalisation



- **Adoption remains relatively limited in the classroom**
- **Teachers and learners have an increasing number f digital learning resources to use (or not) – but they remain largely disconnected**
- **Administrative functions become increasingly digitalised**
- **The EdTech market and use of digital resources mainly targets non-formal or out-of-school uses**

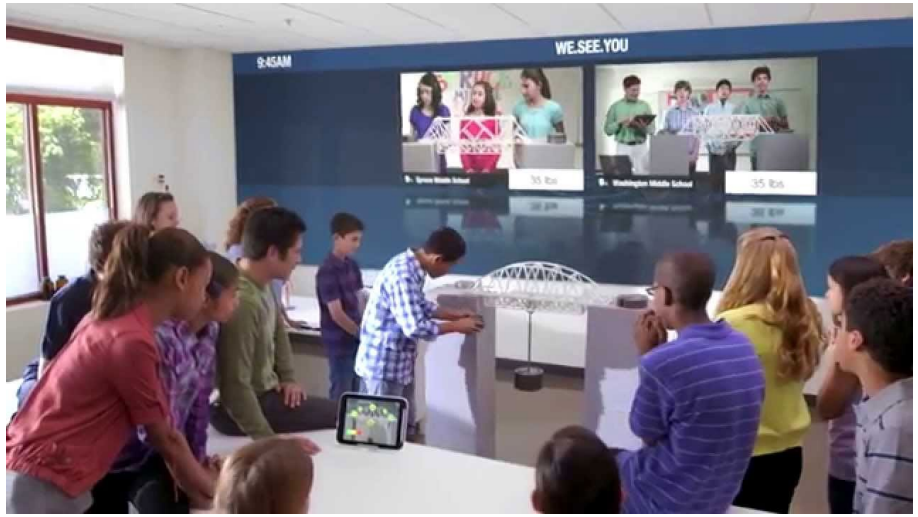
➢ **Investments and use in digital education infrastructure follow pre-COVID trends in education**

Scenario 2: Smart schools and universities

- **Technology is pervasive, but not necessarily visible at first sight (connected devices + sensors/cameras)**
  - **Smart classrooms and smart campuses**
- **Teachers and learners use digital resources on a regular basis and receive constant feedback/support based on learning and classroom analytics**
- **Administrators and parents receive real-time information and advise on students, schools or systems**
- **The formal sector becomes a key sector for the EdTech industry, which creates new tensions and risks for public authorities**

➢ **Investments in digital education infrastructure and in the use of AIED accelerate**

Scenario 3: Social transformation



- **Technology is pervasive, but not necessarily visible at first sight (connected devices + sensors/cameras) and gives information to all actors**
- **The adoption of digital tools and other social changes (teleworking, etc.) leads to a reorganisation of schooling practices**
- **Students use digital tools out of class, on school premises or at home – and class is devoted to social learning**
- **School pathways are more personalised, learners have more choices and autonomy while still being supervised by teachers**

➢ **Investments in digital education infrastructure, including in the use of space and time use in school**