



LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Ministère de l'Éducation nationale,  
de l'Enfance et de la Jeunesse



2<sup>nd</sup> international event  
Rome  
06<sup>th</sup> – 07<sup>th</sup> June 2019

# Luxembourg's experience in e-assessment for learning



# Country presentation - LUXEMBOURG

2

## LUXEMBOURG in FLIP+

- Sharing content: technology-enhanced items
- Sharing knowledge and experience
- Teacher development
- Research on User eXperience
- Big data and learning strategies



# Country presentation - LUXEMBOURG

3



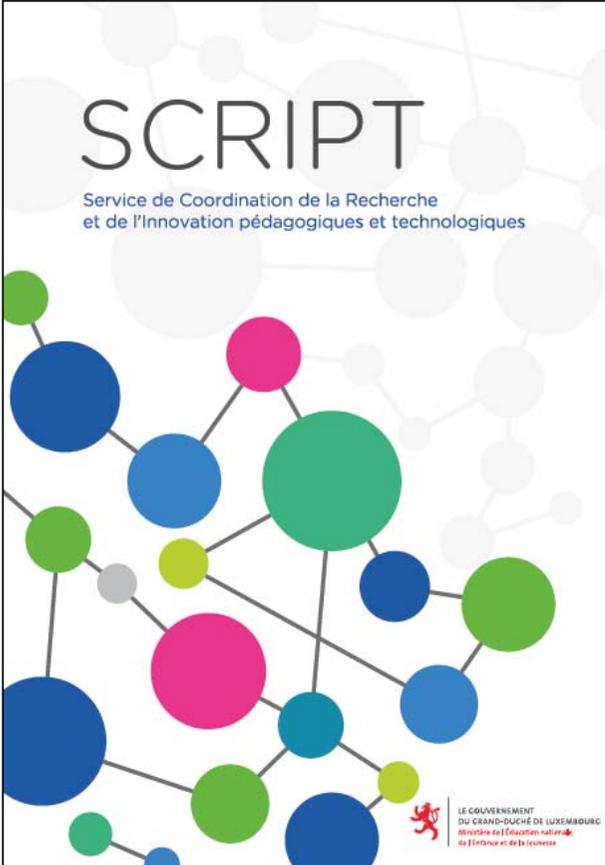
## LUXEMBOURG in figures

- ~590k inhabitants 48% foreign residents
- 88k students, ~ 42% foreign origin
- 156 primary & 40 secondary schools
- 1 university
- 180, 000 cross-border workers  
- 45% of jobs



# Country presentation - LUXEMBOURG

5



**SCRIPT**  
Service de Coordination de la Recherche  
et de l'Innovation pédagogiques et technologiques

LE GOUVERNEMENT  
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The Department for the Coordination of Educational and  
Technological Research and Innovation

THE **KEY PLAYER** IN  
**EDUCATION** IN  
**LUXEMBOURG**

SCRIPT is the driving force behind the development of education in Luxembourg.  
It is responsible for implementing the priorities of educational policy.

**6** TO FULFILL ALL  
ITS MISSIONS,  
THE SCRIPT HAS  
SIX DIVISIONS:

- Division of Pedagogical and Technological Innovation
- Division of Coordination of Initiatives  
and educational programs
- Curriculum Development Division
- Division of Development  
of Teaching Materials
- Division of Quality Data  
Processing and Educational  
Provision management
- School Development Division

[www.script.lu](http://www.script.lu)

# SCRIPT - our expertise

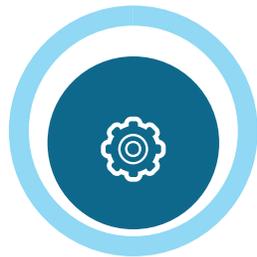


THE **KEY PLAYER** IN  
EDUCATION IN  
LUXEMBOURG

Innovation  
School initiatives  
Pedagogy & Didactics  
School development  
Curriculum  
Learning material  
Technology & Learning  
Assessment  
Statistics & Data  
Communication  
Data security  
Legal support  
Graphic design



# SCRIPT- Data Division



## Database management

Datalakes: link data  
content, quality,  
security



## Data production

Production,  
dissemination &  
publication: data,  
statistics for all education  
actors



## Student assessments

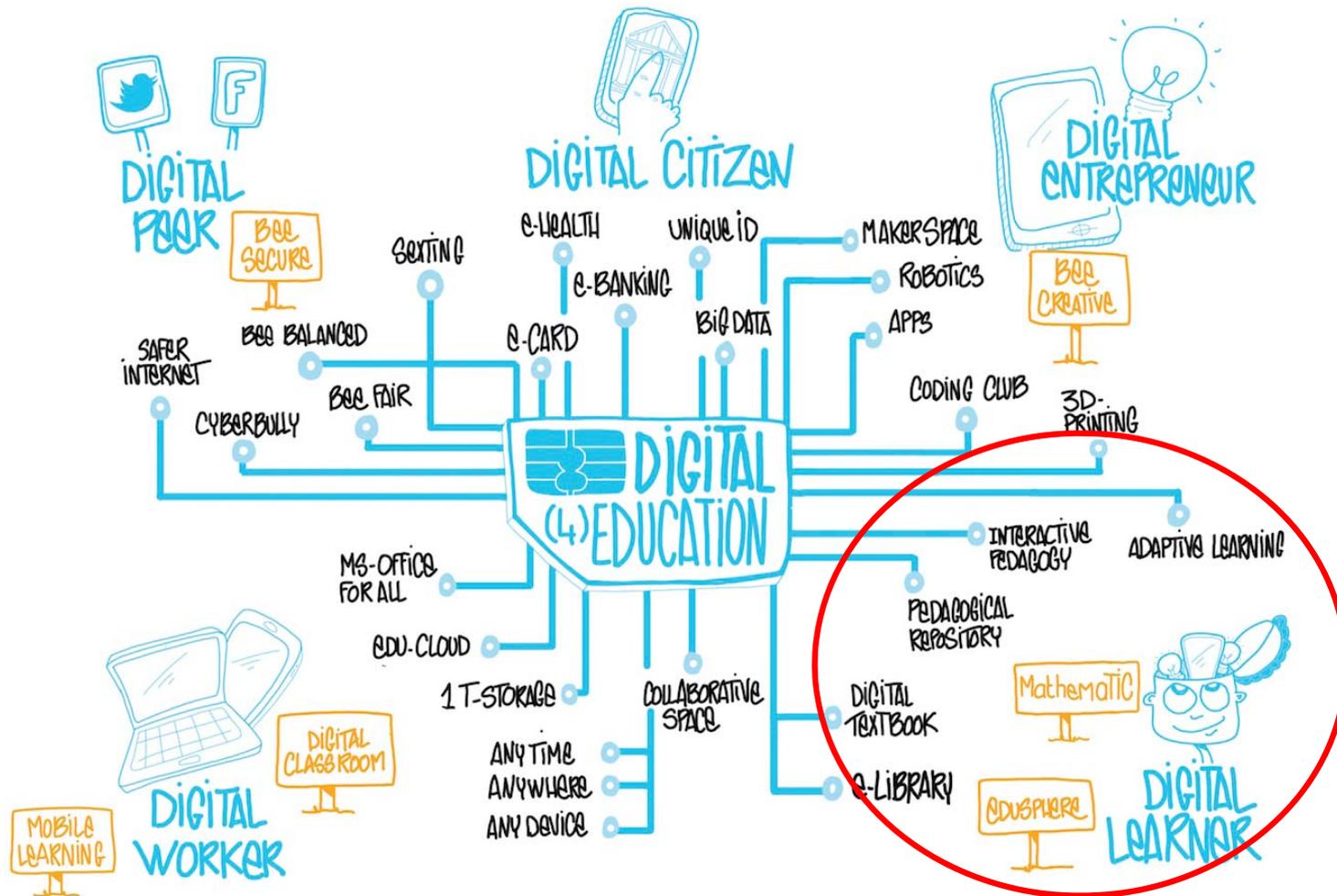
Coordination: national  
& international  
assessments



## Data use & literacy

Creation of data use  
framework, tools  
& data literacy  
programs

# Digital<sub>(4)</sub> Education - LUXEMBOURG



# MathemaTIC: personalized learning

## Assessment for learning

- Adaptive
- Multilingual
- Intuitive
- Curriculum-aligned
- Tech-enhanced items

[www.mathematic.lu](http://www.mathematic.lu)

**ACTIONABLE DATA**  
MathemaTIC provides teachers with real-time academic progress allowing for strategic and early learning intervention. The visualizations allow them to view feedback that directly aligns students' needs with learning outcomes.

**DIFFERENTIATED INSTRUCTION**  
Diverse resources enable teachers to tailor the instruction of mathematics for students resulting in an increase in engagement and motivational levels while achieving teaching and learning goals.

**PERSONALIZED LEARNING**  
Students interact with research-backed engaging resources that are tailored to their needs and aligned to the learning outcomes as per the curriculum.

**ITEM TYPES**  
In addition to diagnostic and summative items for every topic, students engage with interactive and voice-enabled learning items that connect abstract math concepts to practical applications through interactive videos, practice items that make computations tangible through various interactions, and application items that make critical thinking and problem solving an enjoyable experience.

**GAMIFIED EXPERIENCES**  
MathemaTIC contains game-based and problem solving items throughout its modules. These goal-oriented items allow students to apply the knowledge they learned in a fun and engaging environment.

**Learn**  
**Practice**  
**Apply**

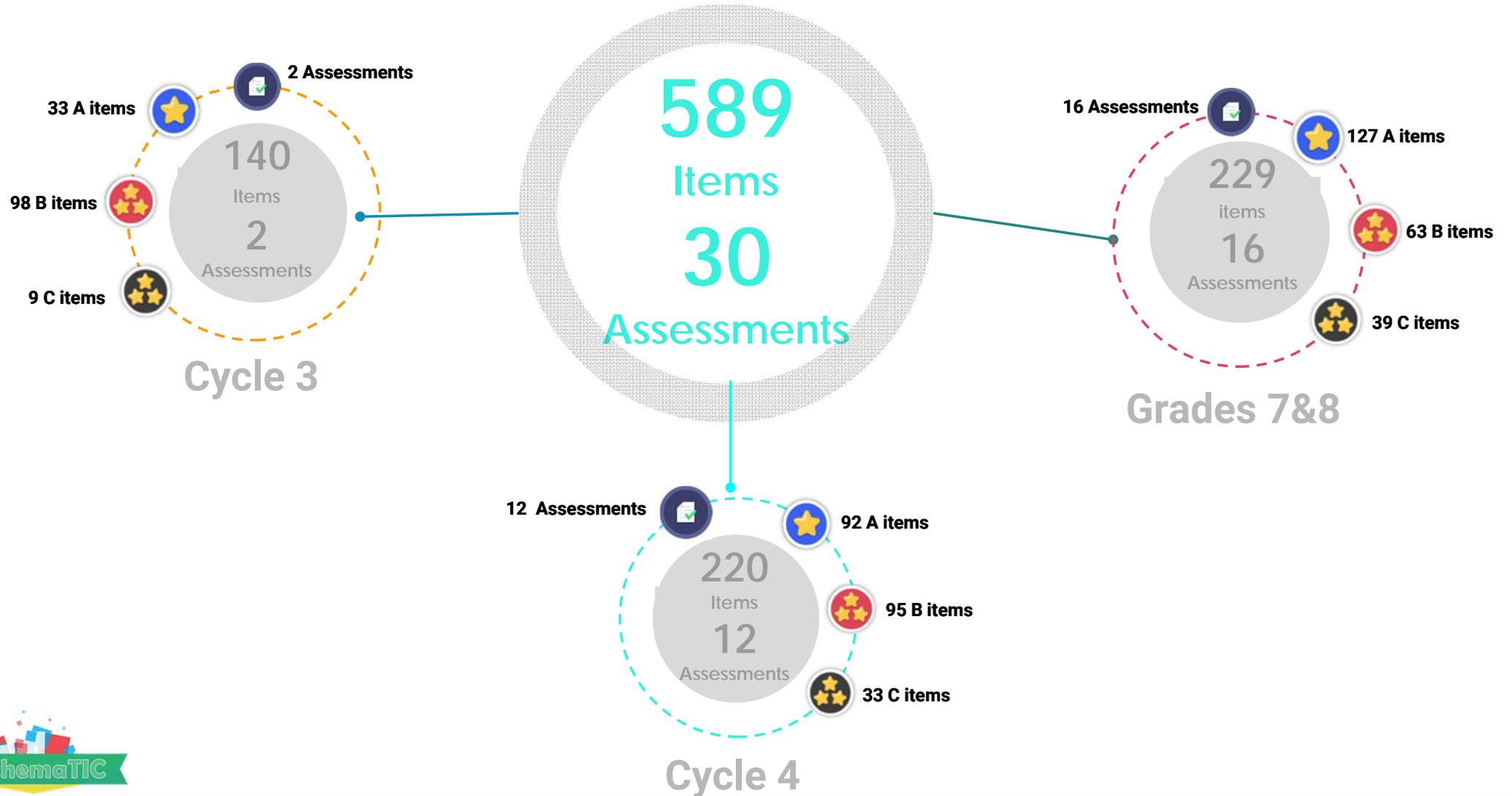
**MathemaTIC**  
Personalized Learning in Mathematics

MathematicaTIC.org

For inquiries, contact us directly:  
Tel: +1(866) 522-9228  
Email: info@mathematic.org



# MathemaTIC: technology-enhanced items



# 18 Modules

Area and  
Perimeter



Fractions



Data  
Management



Proportionality  
Calculations  
with letters  
Equations



Intro to  
Algebra  
Fractions



Perimeter,  
Area, and  
Volume



2015

2016

2017

2018



Project Start



Natural  
Numbers



Decimal  
Numbers



Geometry



Problem  
Solving



MathleTIC:  
Mental Math



Numbers  
and  
Operations



Shape,  
Space, and  
Measures



Integers



Statistics

# MathemaTIC- Learning tools

## Algebraic Terms

The interface shows a dark blue background with a toolbar at the top. Below the toolbar, there is a text prompt: "We use the word term to describe sections of an expression that are separated by an". At the bottom, there are "RESET" and "NEXT" buttons.

## Fraction Line Tool

The interface has a purple background. The main text says: "One way to see if fractions are equivalent is to place them on a number line". Below this is a "FRACTION LINE TOOL" window showing a number line from 0 to 2. The fraction  $\frac{2}{4}$  is placed at 0.5, and  $\frac{5}{10}$  is placed at 0.5. Below the number line, there are input fields for numerators and denominators, showing  $\frac{2}{4} = \frac{10}{20}$  and  $\frac{4}{5} = \frac{16}{20}$ . A "NEW FRACTION" button is at the bottom of the tool window. At the bottom of the main interface, there is a numeric keypad and a "CONTINUE" button.

## Fraction Multi-Tool

The interface has a red background. The main text asks: "What is the result?". Below this is a math problem:  $\frac{4}{9} + \frac{8}{9} = \frac{\square}{\square}$ . At the bottom, there is a numeric keypad and a "SUBMIT" button.

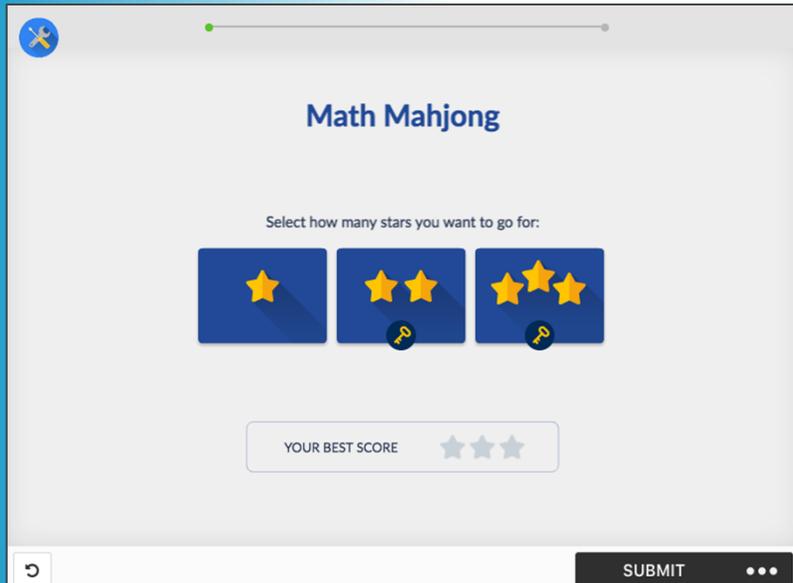
## Multiples Tool

The interface has a blue background. The main text says: "Complète les égalités suivantes." Below this are two multiplication problems:  $3 \cdot 0 = \square$  and  $3 \cdot 4 = \square$ . A "MULTIPLES" tool window is open, showing a list of numbers including 0. At the bottom, there is a numeric keypad and a "SOUMETTRE" button.

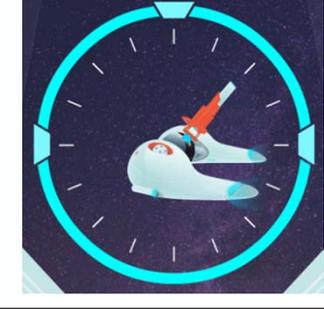
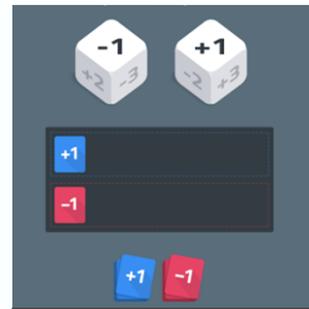
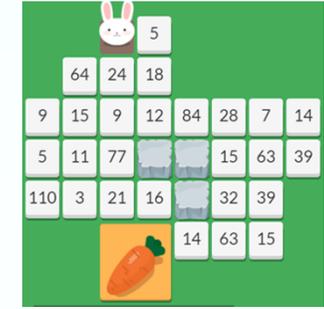
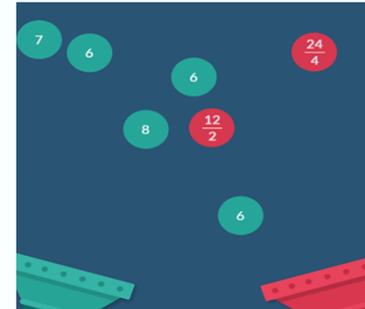
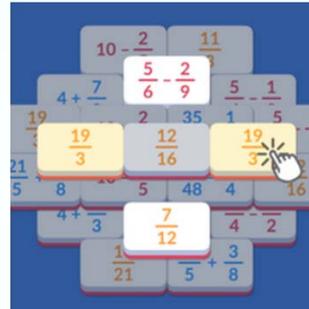
The interface has a green background. The main text shows a math problem:  $-13 + 5 = ?$ . Below this is a "NUMBER LINE" tool window showing a number line with a point at -13 and an arc moving 5 units to the right to a point at -8. At the bottom, there is a text prompt: "The result is at the end of the arc. If we think about starting at -13 and moving 5 to the" and a "NEXT" button.

The interface has a blue grid background. The main text says: "Cut this parallelogram and rearrange it into a rectangle". Below this is a blue parallelogram on the grid. At the bottom, there is a numeric keypad and a "SUBMIT" button.

# MathemaTIC- Gamification



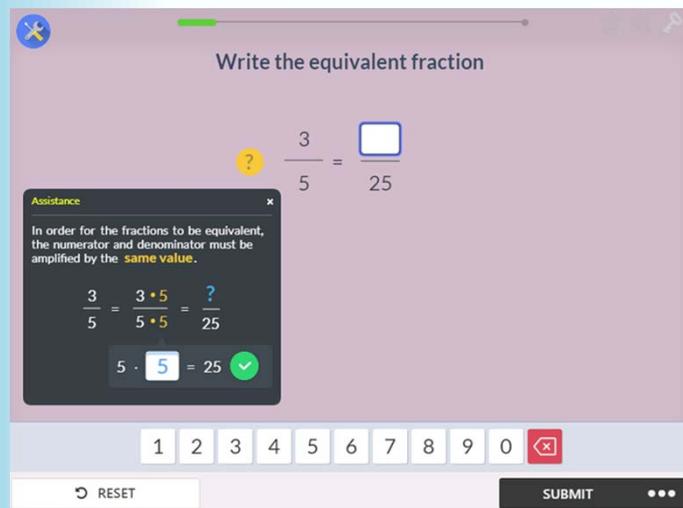
Difficulty Selection



Game-Like Items

# MathemaTIC- Key features in items

## Step-by-step Assistance



Write the equivalent fraction

$$\frac{3}{5} = \frac{\square}{25}$$

**Assistance**

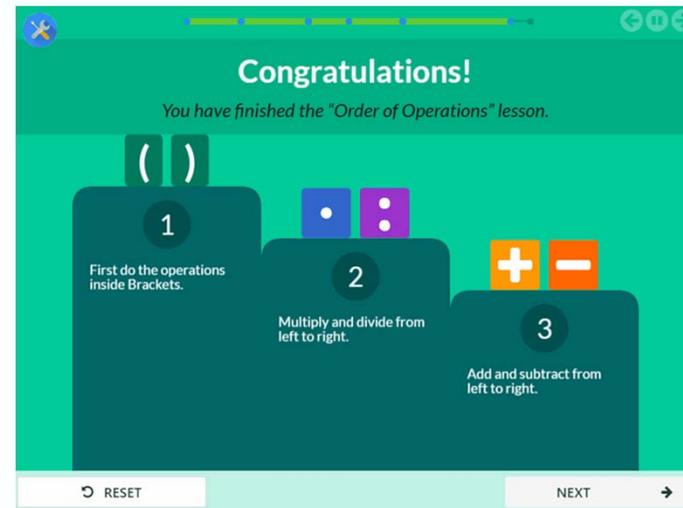
In order for the fractions to be equivalent, the numerator and denominator must be amplified by the **same value**.

$$\frac{3}{5} = \frac{3 \cdot 5}{5 \cdot 5} = \frac{?}{25}$$
$$5 \cdot 5 = 25$$

1 2 3 4 5 6 7 8 9 0  $\times$

RESET SUBMIT

## Reference Book



**Congratulations!**

You have finished the "Order of Operations" lesson.

- 1 First do the operations inside Brackets.
- 2 Multiply and divide from left to right.
- 3 Add and subtract from left to right.

RESET NEXT



# TEACHER RESOURCES

## Developed in 2017-2019



# MathemaTIC- dashboard to visualize progress

Mr. Smee

Current Class (Code: 24489c4594)

C4 Test (No Flash) ▾

- Dashboard
- Agenda
- Workspace
- Modules
- Documents
- Share my class

	First Name ^	Last Name ⇅	Student Report	Modules			
				Natural Numbers	Fractions	Decimals	Area and Perimeter
⚙	Tester Charles	1	📄	🟢🟡🟡	🟢🟢🟢	🟢🟢🟡	🟢🟢🟡
⚙	Tester Charles	2	📄	⬜⬜⬜	🟢⬜⬜	⬜⬜⬜	⬜⬜⬜
⚙	Student 395	Test	📄	🟢⬜⬜	🟢⬜⬜	⬜⬜⬜	🟡⬜⬜
⚙	Student 394	Test	📄	🟢🟡⬜	⬜🟡⬜	⬜🟡⬜	🟢🟡🟡
⚙	Student 393	Test	📄	🟡⬜🟢	⬜⬜🟢	🟢⬜🟢	⬜⬜⬜
⚙	Student 392	Test	📄	🟢⬜🟢	🟢⬜⬜	🟢⬜⬜	🟢⬜🟢
⚙	Student 391	Test	📄	⬜⬜⬜	⬜⬜⬜	🟡⬜⬜	⬜⬜🟡
⚙	Student 386	Test	📄	⬜⬜⬜	🟢⬜⬜	⬜⬜⬜	⬜⬜🟢
⚙	Student 385	Test	📄	🟡⬜⬜	⬜⬜⬜	🟡⬜🟢	🟢⬜🟢
⚙	Student	Grade 7 and 8	📄	🟢🟡⬜	⬜🟡⬜	⬜🟡⬜	🟢🟡🟡
⚙	Ryan	Student	📄	⬜⬜⬜	⬜⬜⬜	⬜⬜⬜	⬜⬜⬜
⚙	Mister	Student	📄	🟢🟢🟢	🟢🟢🟢	🟢🟢🟢	🟢🟢🟢
⚙	Cycle	Fourster	📄	🟢🟡🟡	🟢🟢🟢	🟢🟢⬜	🟢🟢🟡

# MathemaTIC- agenda to assign lessons to overall class or individual students

The screenshot displays the MathemaTIC Agenda interface. At the top, the navigation bar includes 'MathemaTIC Agenda', 'Calendar', and 'List' tabs. The user is logged in as 'Test Teacher 009' with the current class 'Cycle 4 (Primary)'. The main area shows a calendar for November 2018 with lessons assigned to various dates, such as 'Area and Perimeter' on the 4th, 11th, and 18th. A 'NEW UNIT' modal is open, allowing the user to select a topic for 'LUXEMBOURG'. The modal includes checkboxes for 'Diagnostic', 'Formative', and 'Summative' assessments. The available topics are: Area and Perimeter, Natural Numbers, Fractions, Decimals, and Data Management. The modal also features a 'Custom Resources' option and an 'Import an Agenda' button. Navigation buttons for 'Back' and 'Continue' are at the bottom of the modal. A green plus icon is visible in the bottom right corner of the calendar view.

# MathemaTIC- scheduling or customizing units to overall class or individual students

The screenshot displays the MathemaTIC interface for scheduling a unit. On the left is a sidebar with navigation options: Dashboard, Agenda, Workspace, Modules, Leaderboard, Documents, and Share my class. The main area shows a calendar for November 2018. A 'NEW UNIT' dialog box is open, titled 'NEW UNIT When?'. It prompts the user to 'Click to adjust the start and end dates'. The 'Start' date is set to 'Tue November 2018' and the 'End' date is set to 'Mon November 2018'. Below this, two calendar views are shown: 'November 2018' and 'December 2018'. In the November calendar, the 6th and 12th are highlighted. At the bottom of the dialog box are 'Back' and 'Continue' buttons. A green plus icon is visible in the bottom right corner of the main interface.

# MathemaTIC- activity log with detailed performance data by student and class

MathemaTIC Activity Log

Test Teacher 009  
Current Class (Code: 7542c2052)  
EF: Cycle 3 - Cycle 3 (Primary)

- Dashboard
- Agenda
- Activity Log
- Modules
- Leaderboard
- Documents
- Share my class

On-preview

All students

	%	Time spent (m:s)
<b>tester student one testerlastname</b>		
★★★★ Level 5 - Addition	100%	01:03
★★★★ Level 3 - Division	100%	00:29
★★★★ Level 3 - Division	100%	00:29
★★★★ Level 3 - Division	100%	00:28
★★★★ Level 2 - Division	100%	00:28
<b>Test Student 035</b>		
Diagnostic		00:29
Diagnostic		00:29
Level 1 - Addition		00:09
★★★★ Moving in a maze	100%	01:38
Moving in a maze		00:19
<b>Test Student 045</b>		
Level 3 - Division		00:20
Level 3 - Division		00:20
★★★★ Level 2 - Division	100%	00:44
★★★★ Level 1 - Division	100%	00:43
★★★ Level 8 - Multiplication	50%	00:57
<b>C3 Test</b>		
Level 8 - Addition		00:31
Level 8 - Division	100%	00:56
Level 8 - Division	50%	00:44

EF: Cycle 3 / All modules

- Space, Shape and Measures
- Numbers and Operations
- Math4TIC Mental Math
- Problem Solving

# MathemaTIC- leaderboards

The screenshot displays the MathemaTIC user interface. At the top, a navigation bar includes a user profile icon, a help icon, a language dropdown set to 'ENGLISH', and a 'My Classes' button. A left sidebar contains navigation options: Dashboard, Agenda, Activity Log, Modules, Leaderboard (highlighted), Documents, and Share my class. The main content area features a 'MathemaTIC Leaderboards' banner with a podium graphic. Below this, four 'Current Leaderboards' are shown, each with a 'View Results' button. A 'Class Certificate' section is visible, containing a table of student performance data. The table has columns for Rank, Stars, Badges, and Score (Total). The row for '80 - (My Class)' is highlighted in yellow.

Rank	Stars	Badges	Score (Total)
75	★ 74	🏆 16	9000
76	★ 67	🏆 20	8700
77	★ 64	🏆 21	8500
78	★ 62	🏆 10	7200
79	★ 47	🏆 9	5600
80 - (My Class)	★ 39	🏆 11	5000
81	★ 31	🏆 9	4000
82	★ 27	🏆 9	3600
83	★ 25	🏆 8	3300

# MathemaTIC- student reports

**Student 350 Test**

Module: Integers  
 Test Completed on: Fri, Oct 26, 2018 09:51  
 Class of: Teacher 410 Test

Assessment Report  
 Exported on Wed, Oct 31, 2018  
 Page 2

No.	Question	Student Response	
4	Complete the inequality by inserting the correct sign. <i>Expected Response: <math>-23 &lt; 22</math></i>	$-23 < 22$	✓
5	Complete the inequality by inserting the correct sign. <i>Expected Response: <math>-15 &gt; -16</math></i>	$-15 > -16$	✓
6	Click on the smallest number. 9,2 ; -10,8 ; 10,01 <i>Expected Response: -10,8</i>	-10,8	✓
7	Click on the smallest number. -7,4 ; -8,8 ; 0 <i>Expected Response: -8,8</i>	-8,8	✓
8	Click on the largest number. -3,51 ; -3,52 ; 0 <i>Expected Response: 0</i>	0	✓
9	Order the numbers below from smallest to largest. <i>Expected Response: <math>-17 &lt; -13 &lt; -5 &lt; -2 &lt; 2 &lt; 14</math></i>	$-17 < -13 < -5 < -2 < 2 < 14$	✓
10	Order the numbers below from smallest to largest. <i>Expected Response: <math>-5,3 &lt; -5,2 &lt; -5 &lt; -4,7 &lt; 0,7 &lt; 2,1</math></i>	$-5,3 < -5,2 < -5 < -4,7 < 0,7 < 2,1$	✓
11	$-5,6 + 2$ is equal to... <i>Expected Response: -3,6</i>	-3,6	✓
12	$-1,8 + 3,8$ is equal to... <i>Expected Response: 2</i>	2	✓

**Student 350 Test**

Module: Integers  
 Test Completed on: Fri, Oct 26, 2018 09:51  
 Class of: Teacher 410 Test

Assessment Report  
 Exported on Wed, Oct 31, 2018  
 Page 1

QUESTIONS CORRECT: 20/22  
 QUESTIONS SKIPPED: 0  
 TIME SPENT: 08:20 (min: sec)

RESPONSES ON THE ASSESSMENT

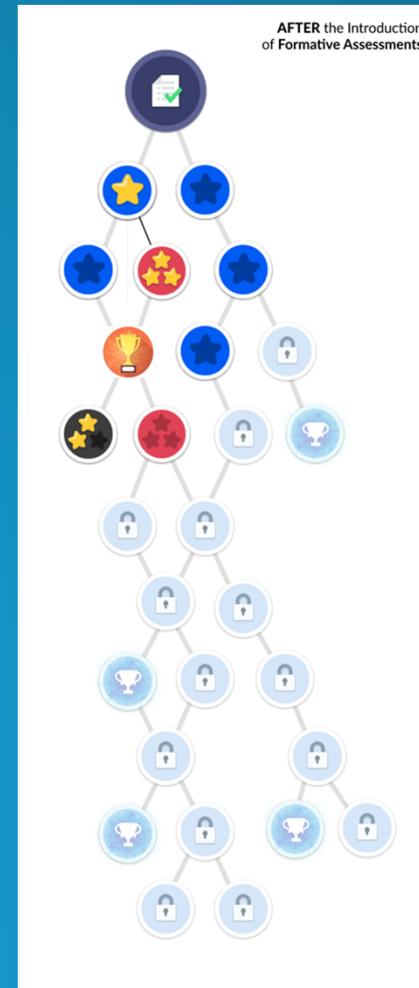
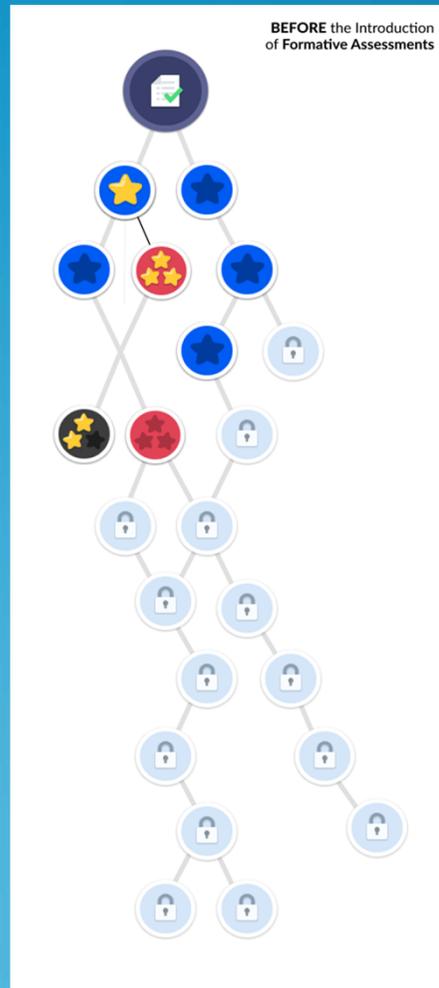
No.	Question	Student Response	
1	Click on the statement that is false. <i>Expected Response: The point A has a value of -6</i>	The point A has a value of -6	✓
2	Place these points on the number line: <i>Expected Response:</i> A → -11 B → 8 C → -12 D → -6 E → 4 F → 9 G → -13 H → -1	A → -2 B → -4 C → -3 D → -1 E → 0 F → 1 G → 2 H → 3	✗
3	Place these points on the number line: <i>Expected Response:</i> A → -1,7 B → -1,5 C → -1,2 D → 0,7 E → -0,5 F → -0,9 G → -0,1 H → 0,3	A → -0,9 B → -0,7 C → -0,8 D → -0,5 E → -0,6 F → -0,3 G → -0,4 H → -0,2	✗

# MathemaTIC- sharing agenda

The screenshot displays the MathemaTIC Agenda interface. The top navigation bar includes the MathemaTIC logo, 'Agenda' tab, 'Calendar' and 'List' views, and utility icons for email, help, and language (ENGLISH). The user is logged in as 'Test Teacher 009' for 'Current Class (Code: 7542c2053)' at 'Secondary School'. A sidebar on the left contains navigation options: Dashboard, Agenda, Activity Log, Modules, Documents, and Share my class. The main area shows a calendar for April 2018 with a context menu open over the 9th. The menu options are: Edit, View report, Share Agenda, and Archive. The calendar grid shows various agenda items as blue bars: 'testingunlock' (8-9), 'unlocktest' (9-16), 'test444' (16-17), 'Proportionality' (19-20), 'Proportionality' (20-21), 'Proportionality' (21-22), 'test444' (22-23), and 'Proportionality' (23-24). A 'Share Agenda' button is visible in the bottom right corner.

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

# MathemaTIC- formative mini-assessments



# MathemaTIC – in a collaborative partnership



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Researchers



SCRIPT  
Service de Coordination de la Recherche  
et de l'Innovation pédagogiques et technologiques



Teachers, IT and  
curriculum specialists



DEPP

Technology learning architects



Vretta



# MathemaTIC: teacher development

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## PLC for MathemaTIC

- online interactive tool
- tailored to teacher needs
- 20% of schools
- 90' of team work per month
- shared practice and reflection

**Professional learning community**

# MathemaTIC: research on User eXperience

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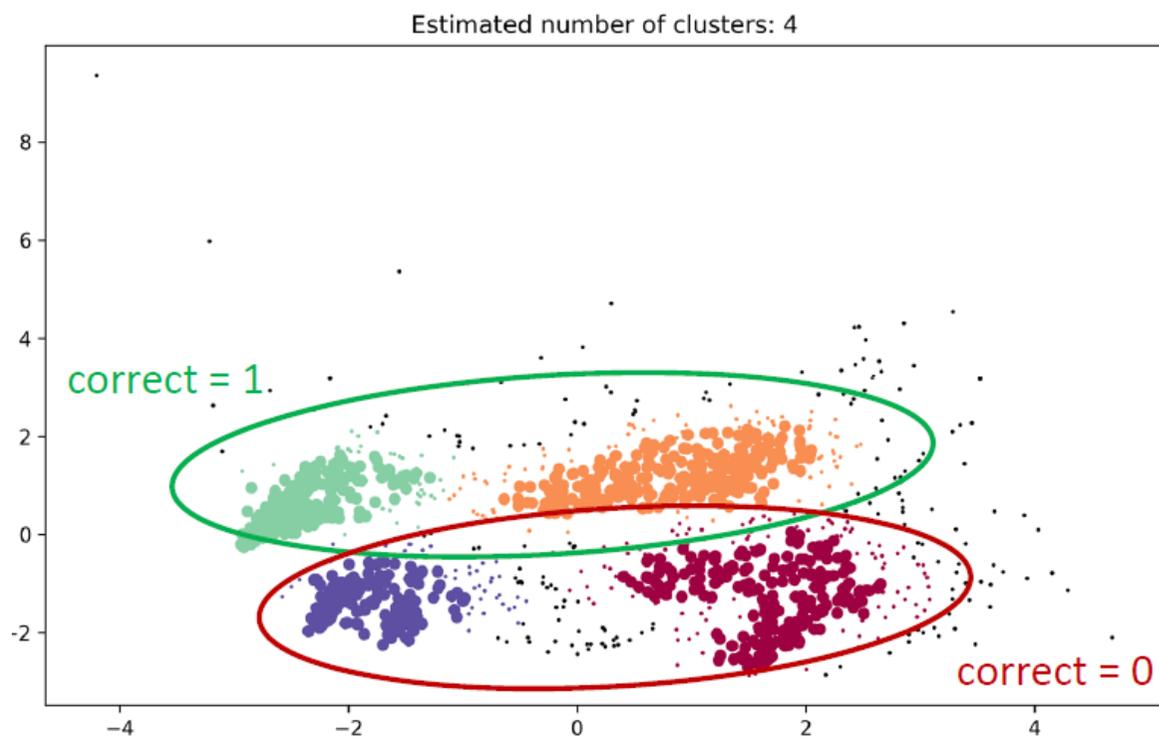


## UX & MathemaTIC

- perception of usability
- video-taping of classroom
- 360 view of interaction
- eye-tracker to capture emotions
- field observation

## Assessment MicroAnalytics

# MathemaTIC: big data & learning



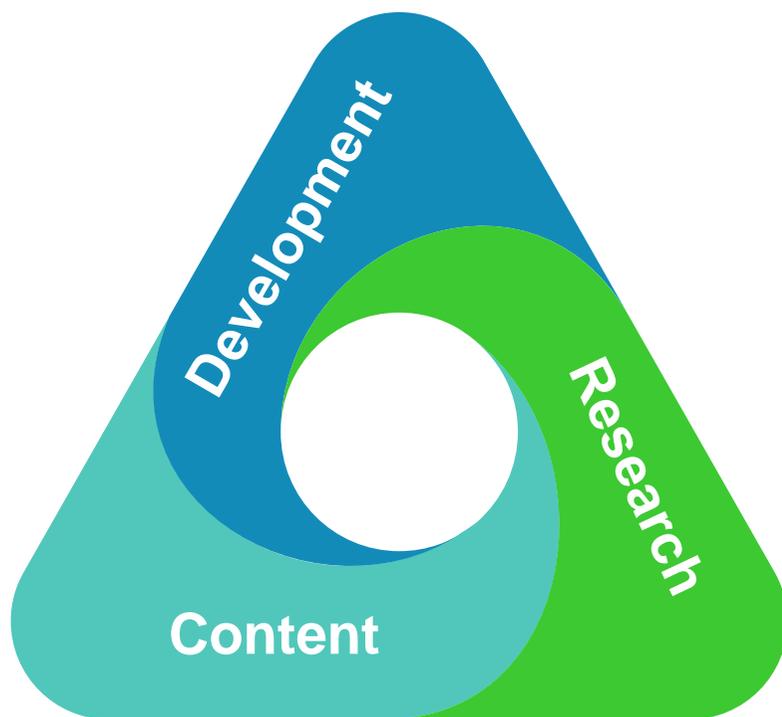
## Patterns in problem-solving

## Learning strategies in MathemaTIC

- use data from an online formative assessment
- examine item from a didactical point of view
- use data to illustrate possible paths for solving problem
- identify patterns in strategies applied by students
- provide data reports to teachers

# MathemaTIC – sharing in FLIP

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## Sharing in FLIP+

- access to items
- sharing further development
- conversion to PCI
- professional development and research
- bilateral conventions

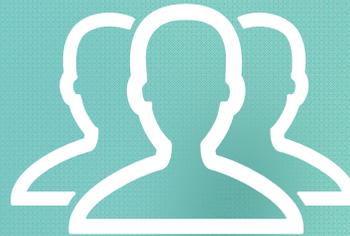
**Sharing content, adaptation of items and research**

## GET IN TOUCH



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Service de Coordination de la Recherche  
et de l'Innovation pédagogiques et technologiques

# THANK YOU!



website  
[www.script.lu](http://www.script.lu)

