



## Students' outcomes in four-year secondary courses: data from State exams and Invalsi tests

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## The 4-year experimentation context

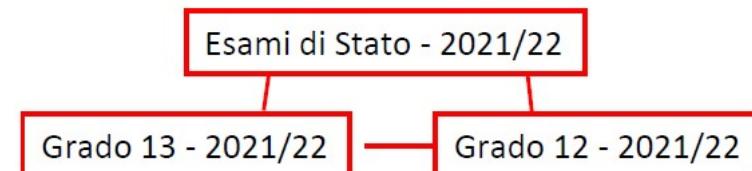
- In the 2018/19 school year the Italian Ministry of Education proposed a national experiment of 4-year upper secondary education programs, rather than to the 5-year length of the ordinary programs.
  - The call for proposals was addressed to lyceum and technical programs
  - A total of 192 classes were authorized to participate in the pilot programs, mainly lyceum classes, one third in private schools
  - The Ministry's experimentation guidelines stressed the need for an innovative educational approach (lab methodologies, effective CLIL, elective classes, restructured school agenda and weekly lesson timetable...) that would ensure students acquire in 4 years the skills expected in the 5 year programs
  - In June 2022, the first cohort of students which initially began the pilot programs graduated, taking both INVALSI standardized test ("grade 12" instead of grade 13), and the State Exam, likewise their 5-year peers
  - In June 2023 even students of the 2<sup>nd</sup> cohort of 4-year classes graduated, alongside the students who in 2018/19 started an ordinary 5-year program.

# The research questions

- Some pertinent questions are
  - whether the final skills of 4-year students (both disciplinary and life skills) are comparable to those of their 5-year mates
  - whether social and cultural status affected the decision to enroll in the 4-year courses and affected the final individual results
  - whether the implementation of innovative teaching planning, more active student learning, workshops, technology mediated learning, had an impact on students' skills
- To the best of our knowledge, this is the first attempt to quantitatively analyse the outcomes of this reduced-school-length experimentation; this may be of interest for policy makers' decisions.

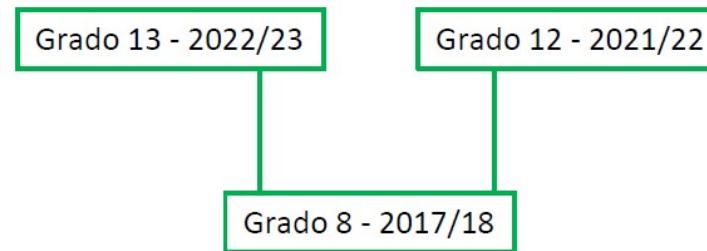
# Methodology

- All the eleven 4-year tracks in our region were examined
  - 6 scientific lyceums (traditional, science-enhanced, sport)
  - 4 linguistic lyceums
  - 1 technical program (Information Technology)
- Cross-sectional analysis. Data from State Exam in 2022 (and 2023)
  - Individual scores: written test (I-ita and II-track specific), oral test
  - Scores of 4-year students (approximately 200) were compared to those of 5-year ones of the **same program** (e.g. scientific with scientific) **limited to the same 11 schools** (approx. 1500 students), both in 2022 and in 2023 exams
  - This approach aimed to **enhance the comparability** of context and evaluation criteria



# Methodology

- Invalsi data longitudinal analysis
  - Data from grade 12 and 13 in year 2022 were merged with grade 8 data (2017 for 5-years; 2018 for 4-years) to gather parents and context information
  - WLE in 2017 and 2018 are not comparable due to different CBT and P&P methods]
  - Data from grade 12 in 2022 and grade 13 in 2023 (same age-cohort) were merged with grade 8 in 2018 allowing comparison of parents' education, ESCS, grade 8 WLE of the “peer students” who separately accessed 4- & 5-year tracks in sept. 2018.



- For comparison purposes, grade 10 data was also analyzed, both for 2022 and 2023 test, connecting to grade 8 data

# Methodology

- Some additional data was collected from schools (grade 8 state Exam mean results, class size, possible school preliminary tests for incoming 4-year students, presence of special educational needs)
- Qualitative interviews were conducted with the boards of examiners at State Exams during the oral test in june 2022 and 2023
- Note: schools were “high level” ones, both for 4- & 5-year tracks
  - Higher school and Invalsi results for the ordinary 5-year traks
- We examined mainly 2022 data and in a preliminary view 2023 data

- State exam 2022 scores  
For 4-year students
  - I test (ITA): similar results

## Results-1

1 prova	Quattro	Cinque
<b>Fascia</b>		
<b>A-Insufficienza grave</b>	1%	0,07%
<b>B-Insufficienza</b>	4%	6%
<b>C-Sufficienza</b>	14%	17%
<b>D-Buono</b>	37%	32%
<b>E-Ottimo</b>	27%	28%
<b>Massimo</b>	19%	16%
<b>Totale complessivo</b>	<b>100%</b>	<b>100%</b>

- State exam 2022 scores
  - For 4-year students
  - I test (ITA): similar results
  - II test (program specific): fewer lower levels, more higher levels

## Results-1

1 prova	Quattro	Cinque
<b>Fascia</b>		
<b>A-Insufficienza grave</b>	1%	0,07%
2 prova	Quattro	Cinque
<b>Fascia</b>		
<b>A-Insufficienza grave</b>	9%	7%
<b>B-Insufficienza</b>	10%	15%
<b>C-Sufficienza</b>	11%	16%
<b>D-Buono</b>	25%	27%
<b>E-Ottimo</b>	25%	19%
<b>Massimo 10</b>	22%	16%
<b>Totale complessivo</b>	100%	100%

- State exam 2022 scores
  - For 4-year students
    - I test (ITA): similar results
    - II test (program specific): fewer lower levels, more higher levels
    - Oral test: more higher level
- Therefore 4-year students seem to
  - \* achieve same or better results compared to their 5-year peers
  - \* II test: Over-perform in track- specific skills compared to their 5-year peers
  - \* Oral test: Show better soft-skills (problem -solving, autonomy, proactivity, multi-disciplinary connection abilities)

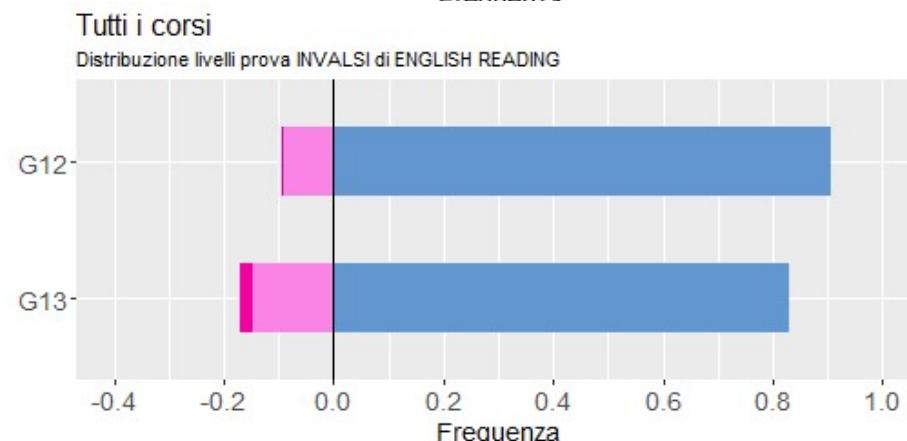
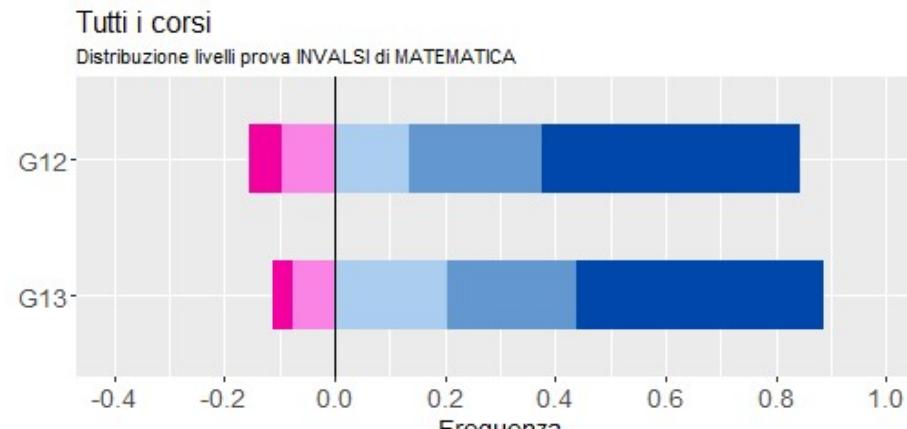
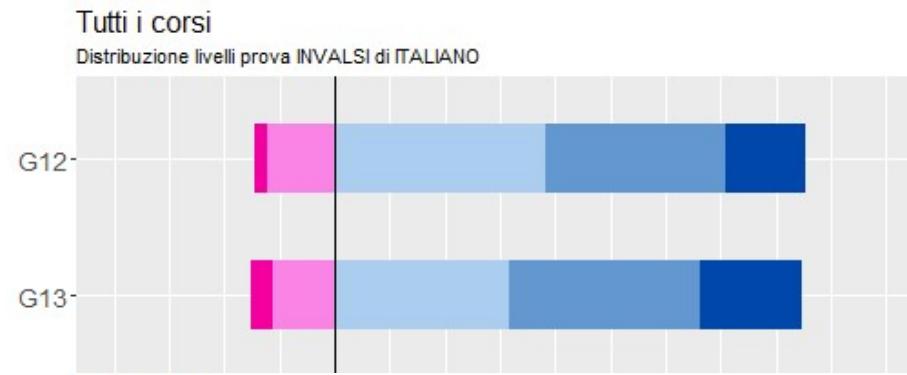
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1 prova	Quattro	Cinque
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<b>Fascia</b>		
<b>A-Insufficienza grave</b>	9%	7%
Colloquio	Quattro	Cinque
<b>Fascia</b>		
<b>A-Insufficienza grave</b>	3%	2%
<b>B-Insufficienza</b>	10%	13%
<b>C-Sufficienza</b>	11%	14%
<b>D-Buono</b>	16%	19%
<b>E-Ottimo</b>	39%	30%
<b>Massimo 25</b>	22%	22%
<b>Totale complessivo</b>	100%	100%

## Results-2

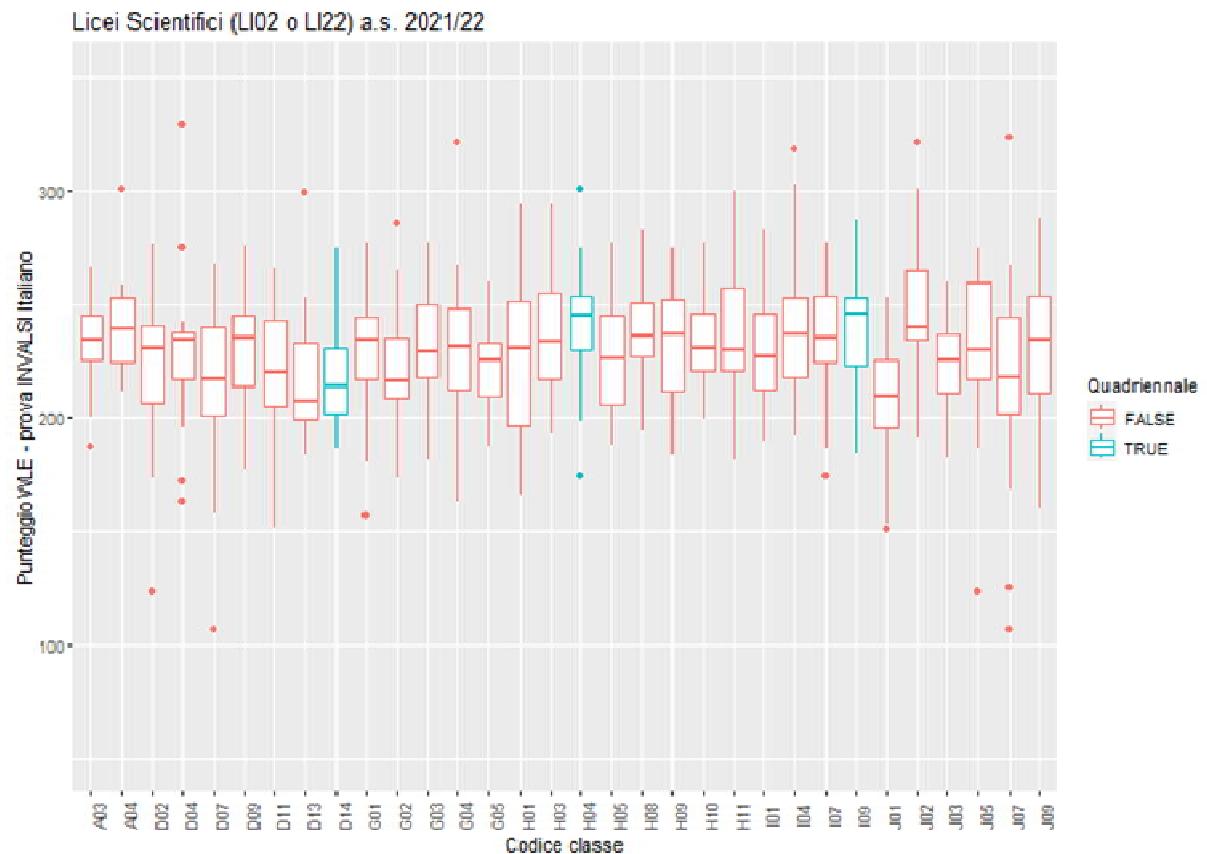
- Invalsi test 2022 **Levels 1-5**
  - \*Comparable results for G12 and G13
  - For 4-year students
  - \*ITA: interm.levels more populated
  - \*MATHS: levels 5&1 more populated
  - \* ENG: better results for 4-year
  - Confirm that expected skills are achieved in 4-year classes
  - Correlations between Exam and Invalsi test seem not significant in both 4- and 5-year

Exam scores: non normal distribution



# Results-2

- Invalsi tests 2022 – Single class **WLE** points
  - [for traditional scientific tracks only]
  - 4-year classes in light blue: ITA: no relevant differences



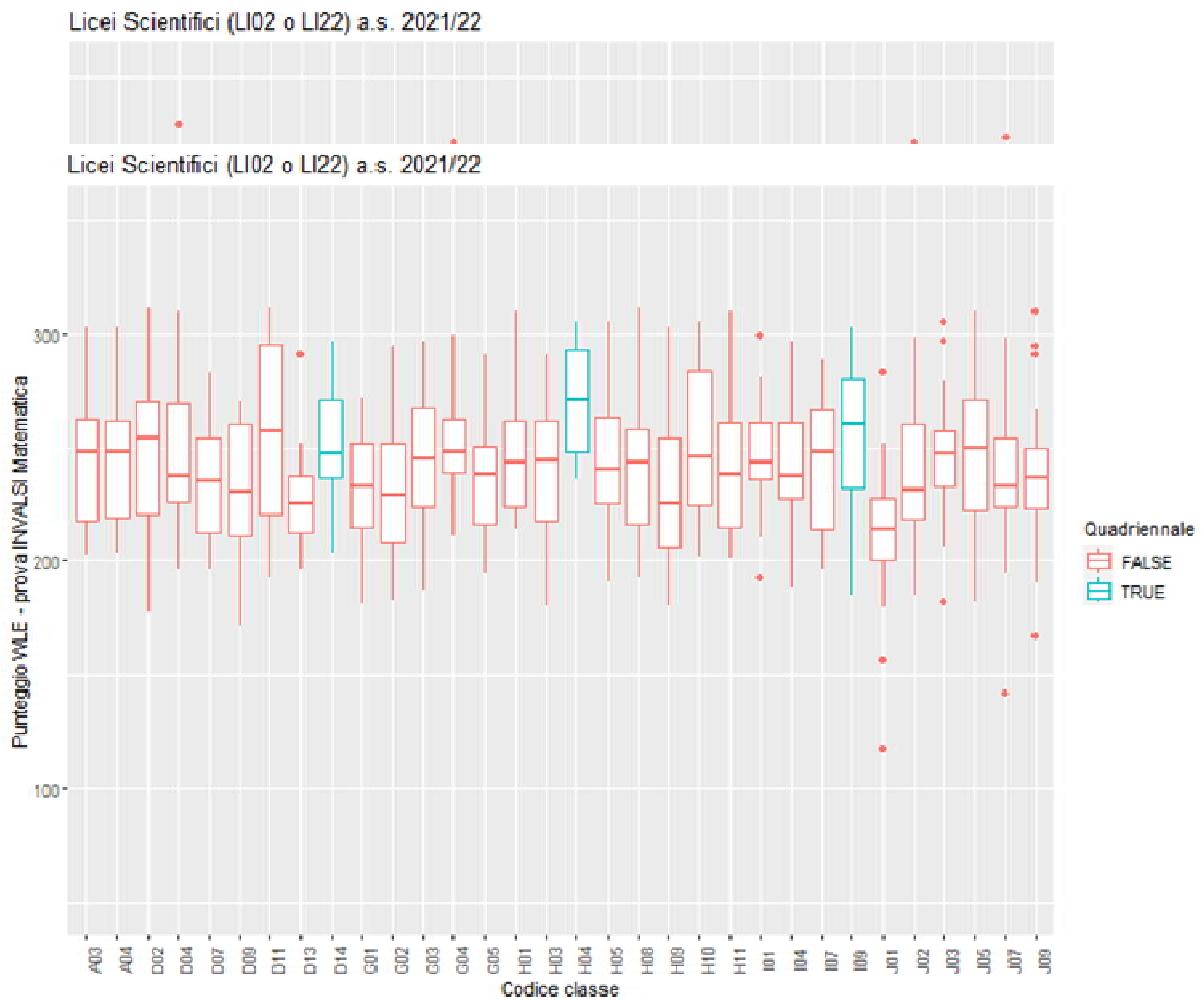
# Results-2

- Invalsi tests 2022 – Single class **WLE** points

[for traditional scientific tracks only]

4-year classes in light blue:  
 ITA: no relevant differences  
 MATHS: better results

Fits with State exam results



## Results-3

- Is there selection o self-selection in accessing 4-year tracks?
- In 2018 there was a difference in entry levels between 4-year students (2022 graduates) and 5-year student (2023 graduates)
  - The majority of classes had higher grade 8 entry level
  - 2 schools had an entry selection for enrolling students (requests > seats)
  - But 3-4 classes had lower grade 8 levels

Good overlap  
Exam/Invalsi  
data

COD	Entry Selection	DELTA 8 grade Exam	DELTA WLE_ITA8_18	DELTA WLE_MAT8_18	DELTA WLE_ENR8_18	DELTA WLE_ENL8_18
A	NO	0,3	-3,56	11,22	15,75	16,06
B	NO	N/A				
C	YES	0,5	10,03	22,45	11,43	9,78
D	YES	0,7	17,65	23,94	7,5	9,78
F	NO	-0,3	-15,26	-19,33	-9,14	-2,55
G	NO	0,3	10,17	-5,65	-2,4	-5,4
H	NO	0,2	13,53	16,62	12,67	28,05
I	NO	0	23,76	9,93	21,99	17,67
J	NO	0,3	-6,78	-9,72	-0,57	1,41
K	NO	-0,3	-4,27	8,24	6,05	-16,32
L	NO	0,5	0,85	-2,85	14,18	11,18

## Results-3

- Parents' education for 2022 graduates
  - 5% more parents of 4-year students have at least one degree - detectable even in grade 10 students - Family cultural "self-selection"?
- 2022 scores (Exam & Invalsi) of 4-year are similar or higher to 5-year

4-year students	Percent	WLE_ITA	WLE_MAT	Exam I test	Exam II test	Exam oral	Exam final grade
At least one degree	52%	224,3	241,9	12,5	8,2	21,1	87,2
No degrees	48%	207,1	221,7	11,9	7,2	20,2	83,4
Total	100%	216,0	232,1	12,2	7,7	20,7	85,4

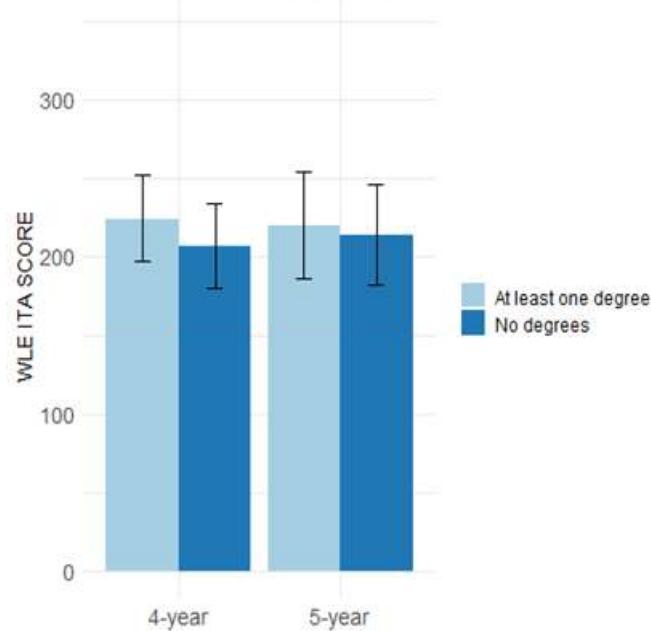
5-year students	Percent	WLE_ITA	WLE_MAT	Exam I test	Exam II test	Exam oral	Exam final grade
At least one degree	47%	220,0	234,8	12,2	7,6	20,4	84,5
No degrees	53%	214,0	224,6	11,8	7,1	19,7	81,8
Total	100%	216,8	229,4	12,0	7,3	20,0	83,1

- Both 4- & 5-year students' results are influenced by parents' degree
  - Well-known: significant role of parents' degree in Invalsi test (see 2021 paper)
- "Deltas" for parents' degree appear higher for 4-year in each column

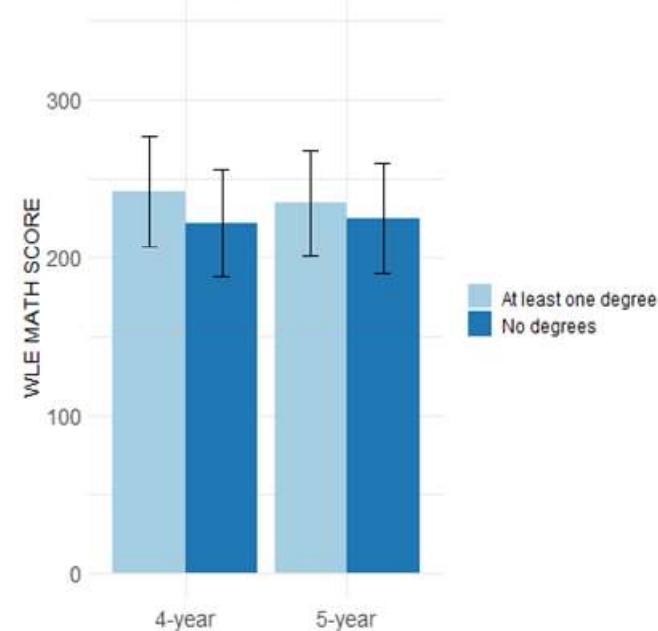
## Results-3

- Is family background more relevant in 4- than 5-year tracks?

INVALSI test 2022 - Mean and standard deviation



INVALSI test 2022 - Mean and standard deviation



- In 2023 differences seem less significant
- To be explored further, the matter is how schools activate intergenerational social mobility and help reducing social differences

# Crossing with qualitative data - 4

- Interviews to school and boards of examiners at state Exam
  - According to the teachers involved, the teaching approach is characterized by **significant attention to methodologies** such as multidisciplinarity, group work, flipped classroom, formative (self-) assessment, tutoring
  - Technologies play a crucial role: during pandemic lockdown in spring 2020 those classes were already prepared to technology mediated learning(for higher key-competencies of students) and they have headed the technological transition for the other classes in their school.
  - It is reported that these diverse methodologies are essential for organizing the curriculum within a compressed 4-year time frame.
  - **Teachers emphasize the development of cross-disciplinary skills in students**, (e.g. greater abilities in connections among disciplines and current events, group-work, problem-solving, increased autonomy, enhanced motivation, proactivity) **and attribute this to the diverse teaching methodologies**.
  - The design and communication work-load for teachers is significant, e.g. for interdisciplinary planning, which requires specific motivations and stability.

# Preliminary analysis of 2023 data

- 2023: Second cohort of 4-year students
- 2023: 5-years same-aged peers of the “2022 4-year first cohort”
- State Exams scores 2023: very similar for 4- and 5-year tracks
  - Max diff. 0,1 out of 100 points,
  - No higher levels for 4-year students, unlike in 2022
- Invalsi scores 2023: slightly lower results for 4-year tracks
  - Why? In 2019/20 there was less student selection or self selection
  - more 50% classes had lower grade 8 levels for 4-year students, who graduated in 2023
  - In 2023: 9 delayed students out of around 180 (none in 2022)
- Trends in parents’ degree levels are similar but less pronounced

# Preliminary conclusions

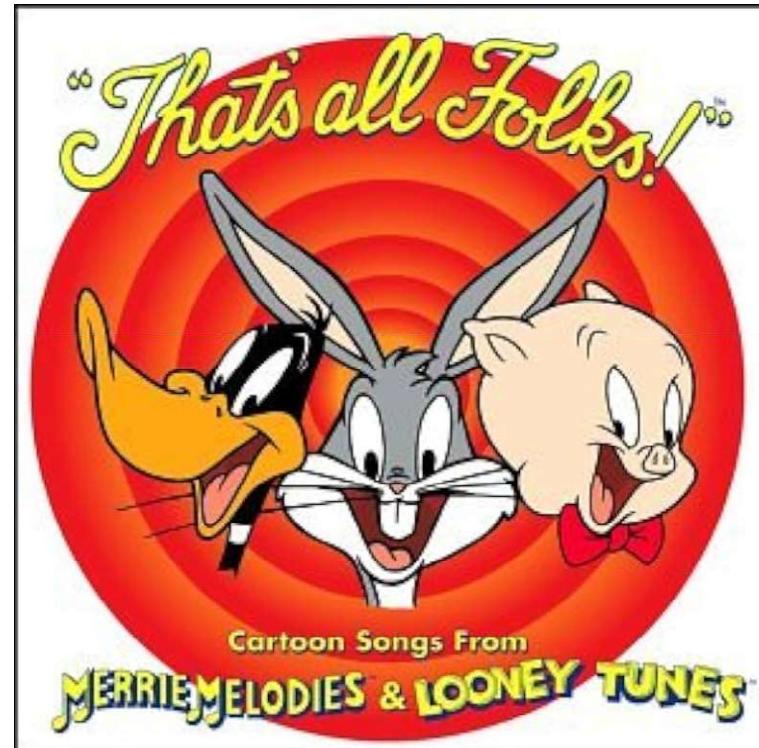
- There are no univocal results, but some trends anyhow emerge
- The differences between 4- and 5-year results seem not significant
  - Other factors (rather than the 4-5 year difference) have a greater impact on outcomes, as already well-known, e.g. students' outcomes at grade 8, parents' education, students' gender
  - The Ministry's experimentation aim appears to have been achieved
  - Exam and Invalsi data seem to show quite similar trends and results
- As for Exam data 2022, 4-year students seem to achieve
  - Exam II test: equal or better skills for the disciplines characterizing the tracks
  - Exam oral test: better soft-skills and multi-disciplinary connection abilities - teachers attribute this to the different teaching and lab methodologies
- In 2018 (→2022 exam) 4-year students had mean higher entry levels
  - 2023 data suggest lower entry levels in 2019 and similar or lower 2023 results

# Preliminary conclusions

- In 4-year tracks, classes appear to be more selective
  - more students appear to leave, migrating in 5-year tracks (parallel or other ones) due to higher student workload
- According to the interviewed teachers
  - the teaching approach emphasizes methodologies such as interdisciplinarity, group work, formative assessment, tutoring, technology integration, obtaining better students' soft skills
  - The design workload for teachers is relevant, which requires specific motivations and stability
- Research future development
  - Expand to a national level (more data, fewer possible artifacts)
  - Influence of parents degree on students' results in 4-year track should be further analyzed (in 2023 data seems less relevant)
  - Study the “4-year school effect” related to entry levels

# Thank you for your attention!

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“...the school as we would like it...”