“Computer Science and Nursery Rhymes” A Learning Path for the Middle School

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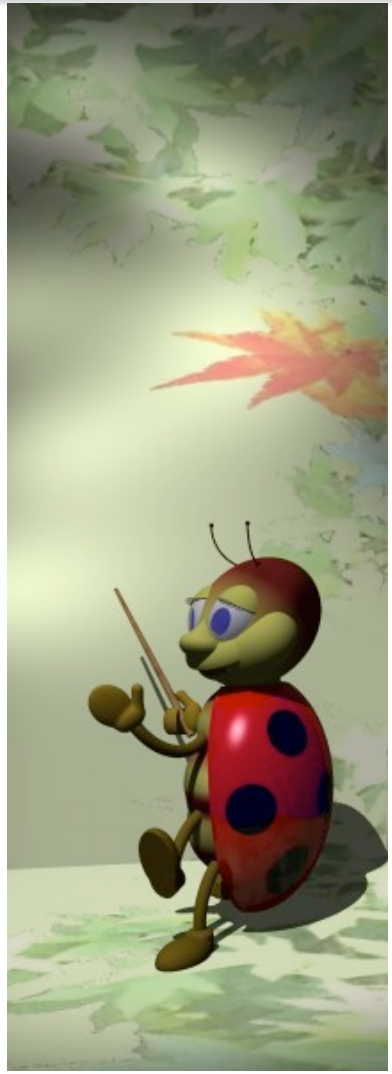
Outline



Outline

Motivations

Informatics as . . .

instrument	**pervasive technology**	**discipline**
focus on product	general patterns	focus on process
operating skills	analogical approach	methodology
imitation	cognitive invariants	critical thinking
can do	can generalize	can create
short-term	mid-term	long-term
training	enabling	educating

Motivations

Middle school Informatics is usually perceived as a tool

instrument	pervasive technology	discipline
focus on product	general patterns	focus on process
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imitation	cognitive invariants	critical thinking
can do	can generalize	can create
short-term	mid-term	long-term
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Motivations

Or, at best, as a category of software artifacts

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Motivations

Is there room to link Informatics to Science?

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Path structure

I. Taking a “computational perspective”

II. Understanding the nature of programming

III. Thinking about potentials and limits of computing

Extra-curricular units to be scheduled in three years.

Compatible with the middle-school context.

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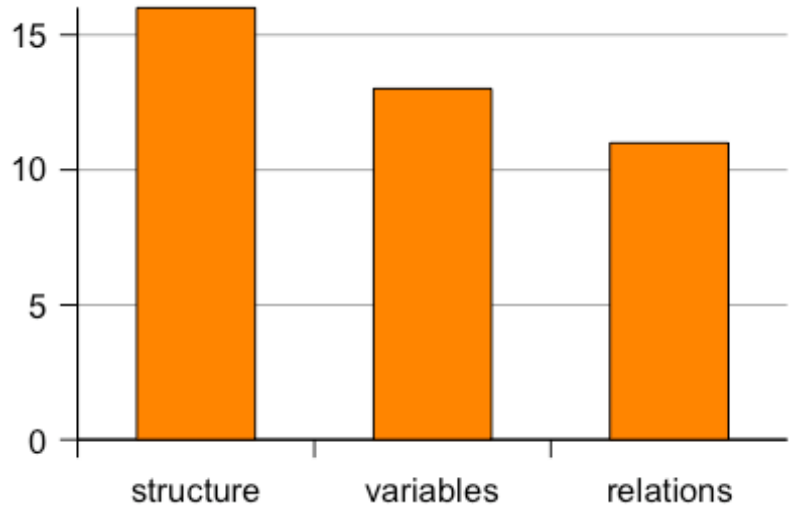
To sum up...

The ideas should be understood in their broader sense, after seeing (and mapping between) a variety of instantiations:

- Analysis and discussion: Abstract/conceptual models;
- Cardboard implementation: Concrete/physical models;
- Experiments with *ladybug*: Interactive/relational models;
- Program design and development: Algorithmic models;
- Further discussion: Transfer of models to related domains (critical thinking).

Outline

Analysis of nursery rhymes (1st year)



Analysis of nursery rhymes (1st year)

Fila la lana
Fila la lana
e con lei
Fila le stagioni
Arriva la primavera
E il cuore spera
Arriva l'estate
E porta giornate assolate
Arriva l'autunno
E il cuore si fa taciturno
Arriva l'inverno
E il freddo sembra eterno.
Il tempo passerà
E il tuo cuore crescerà.

Il gelato
Ho mangiato un bel gelato
Colorato e profumato.
Marrone
è il color del cioccolato
Bianco
È il color della panna
Giallo
È il color della crema
Verde
È il color del pistacchio.
In un lampo l'ho inghiottito
E la pancia lo ha digerito.

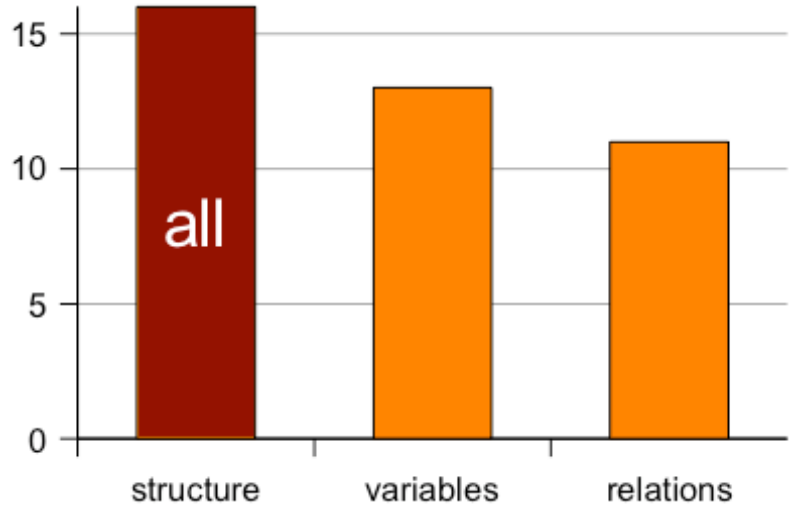
Le oche
Un'oca, un'ochina e
un'ochetta andavano a bere
alla fonte del Re
Due oche andavano a ber
Un'oca, un'ochina e
un'ochetta andavano a bere
alla fonte del Re
Tre oche andavano a ber
Un'oca, un'ochina e
un'ochetta andavano a bere
alla fonte del Re
Quattro oche andavano a
ber
Un'oca, un'ochina e
un'ochetta andavano a bere
alla fonte del Re
Cinque oche andavano a ber
.....

Nelle filastrocche ripetitive:

P.FISSA VARIABILE

2) individua quando è possibile: *prologo* , *strofa ripetitiva* ed *epilogo.*
3) nella strofa ripetitiva individua la parte fissa
4) nella strofa ripetitiva individua le variabili e definisci l'insieme in cui variano.

general structure
invariant vs. variant



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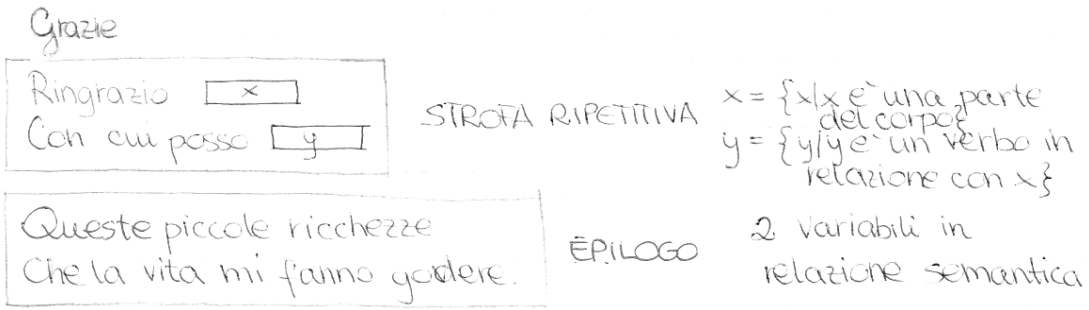
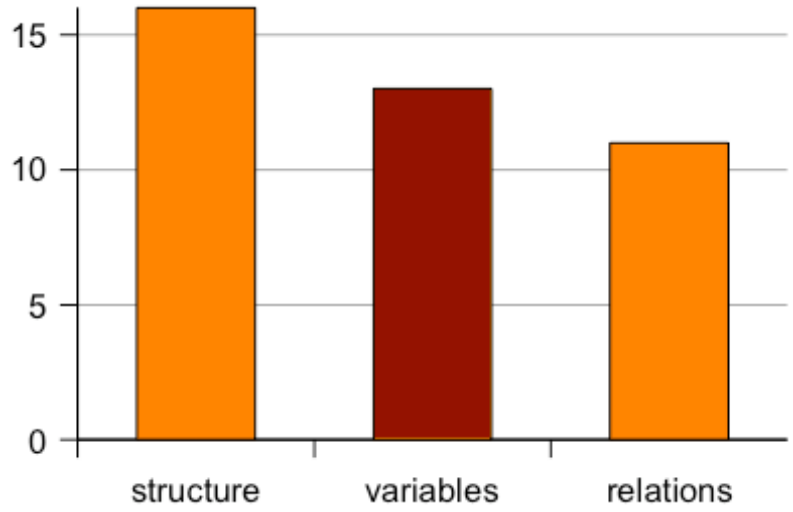


variables
domain of values



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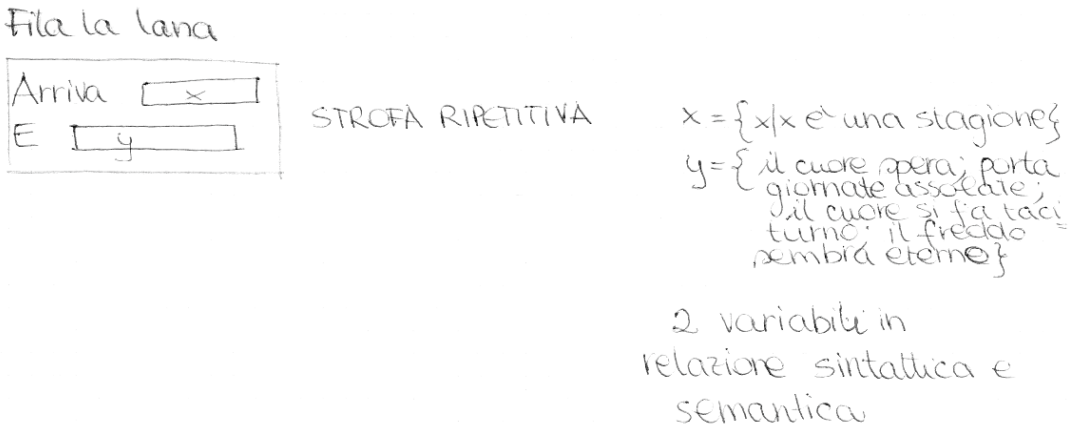
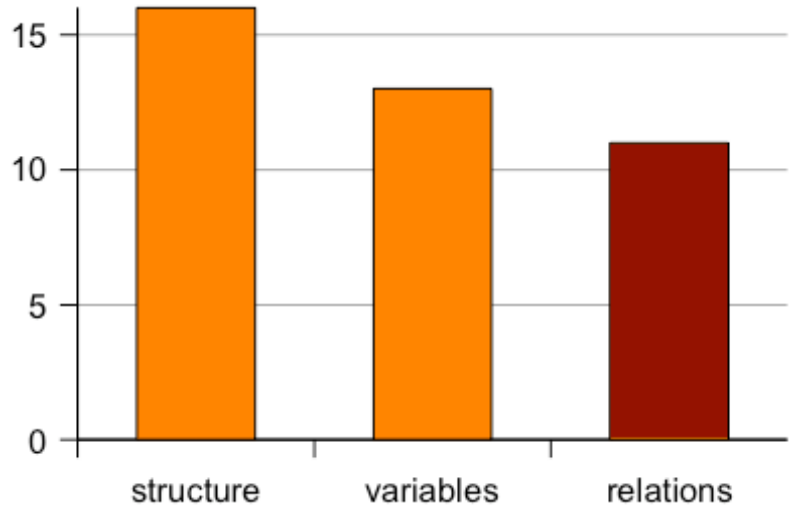
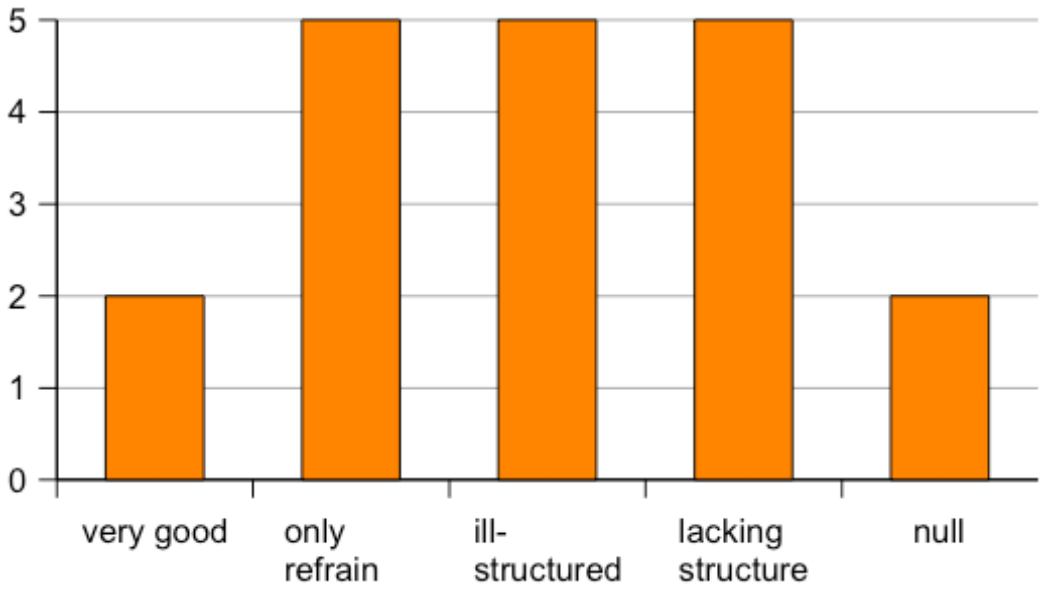


vars relationships
syntactic vs. semantic

vars relations:
rhyme and meaning



Programming in Logo (2nd year)



Programming in Logo (2nd year)

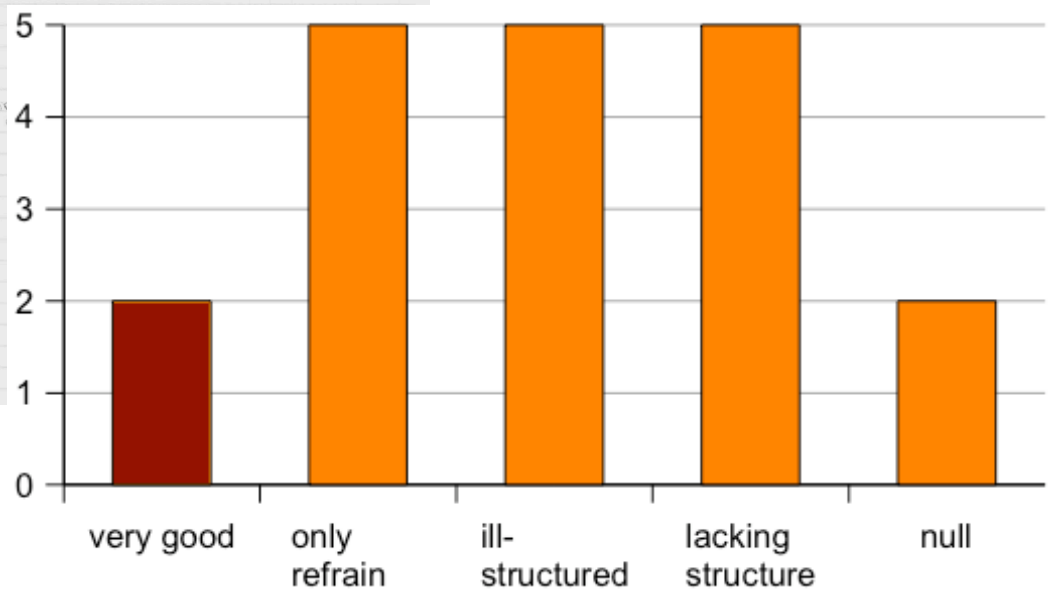
```
Per Titolo
Print [   ]
Print [LA GALLINA]
Print [   ]
Fine

Per Prologo
Print [Ti racconto la storia di una galli
Fine

Per Strofa :nome
Print (sentence[Si chiamava ]:nome)
Print [E cantava dalla sera alla mattina]
Fine

Devo assemblare le tre parti e aggiun

Per gallina :nome
Titolo
Prologo
Print [   ]
Strofa :nome
Foreach :nome "strofa
```



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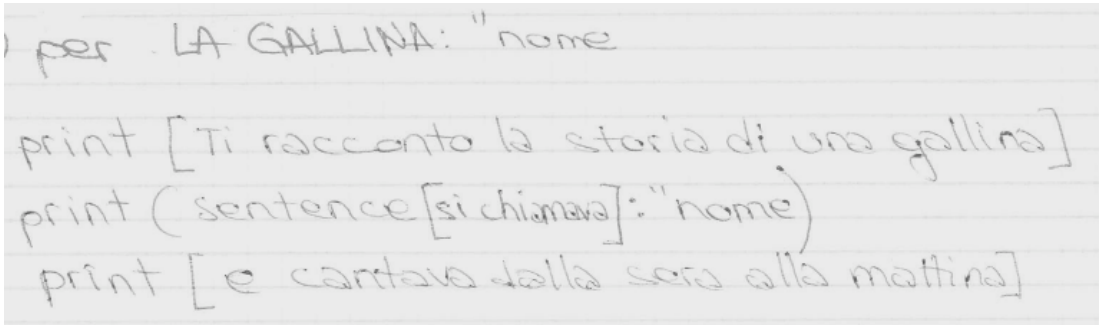
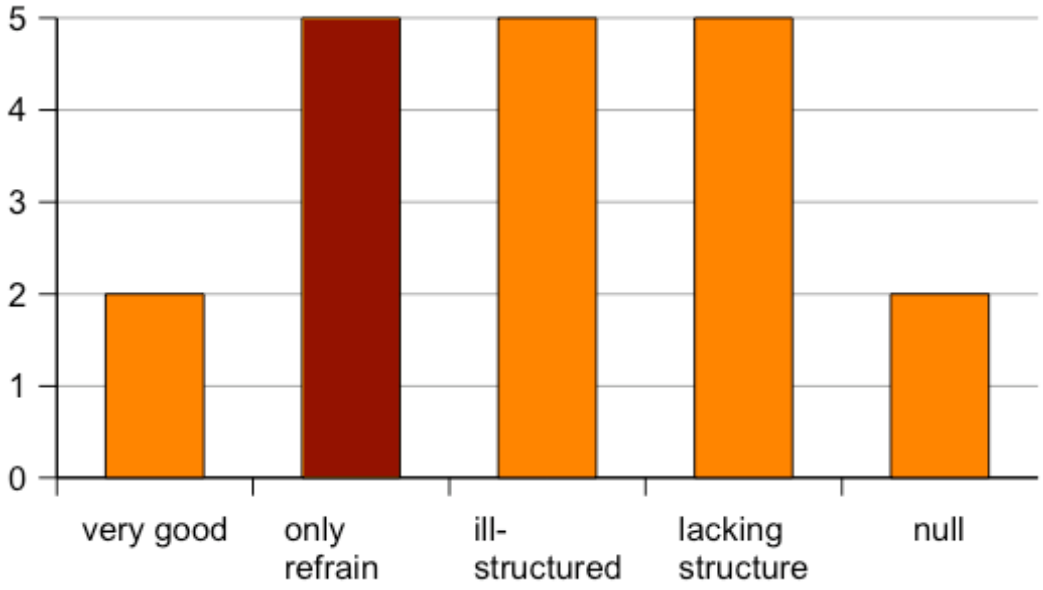


procedural structure



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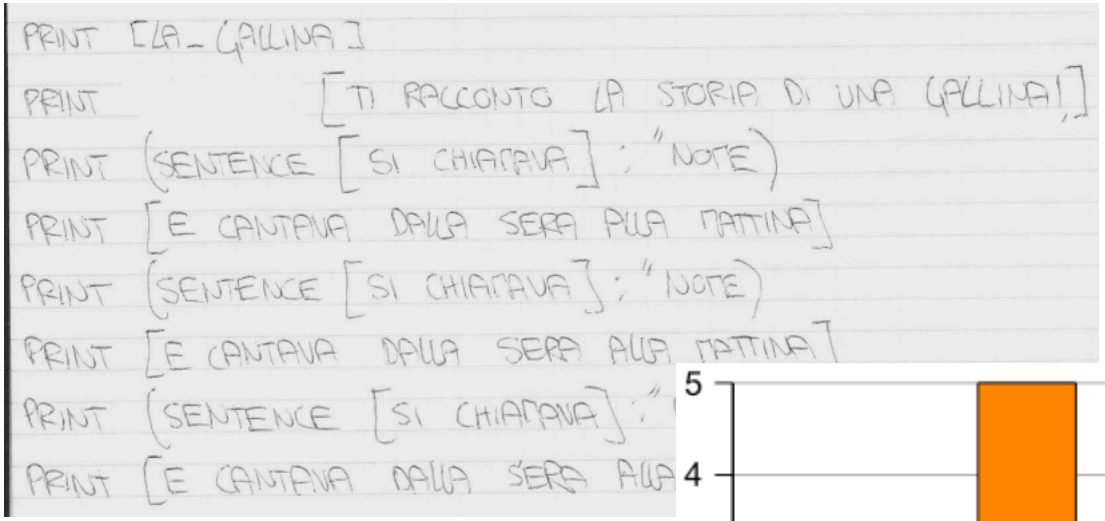

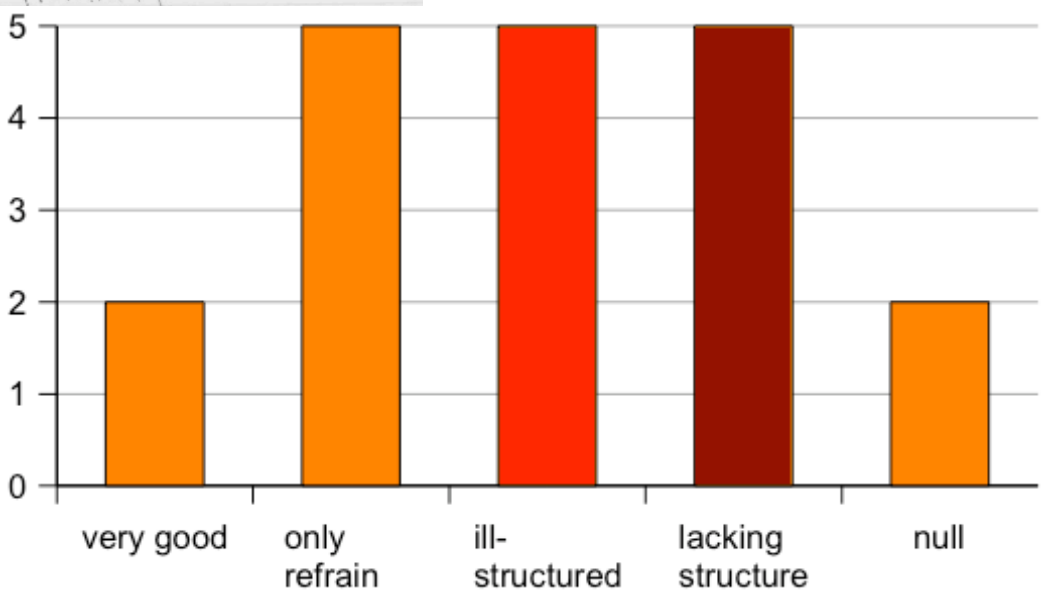

About the perception of Logo. . .

Did you prefer to use Logo or the Ladybug application?

students	2nd year	3rd year
7	Logo	Logo
2	Logo	both
6	Logo	Ladybug
1	Ladybug	Logo

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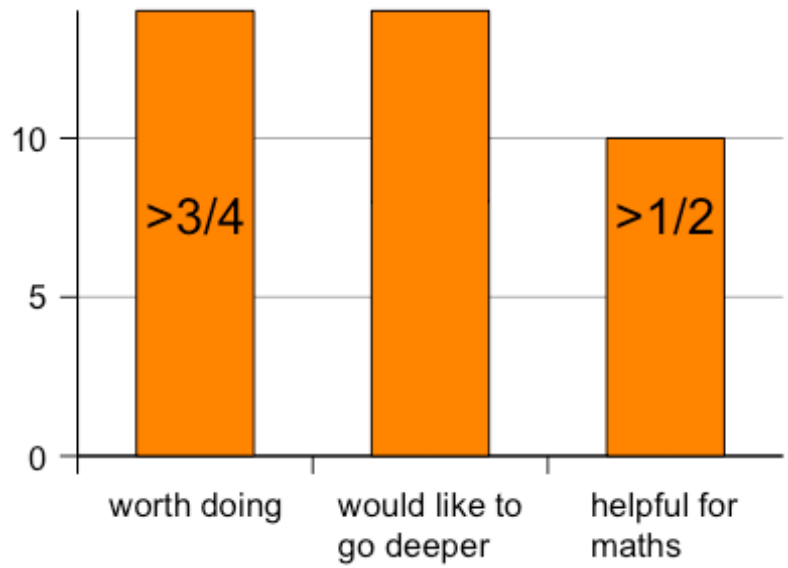
Perception of overall experience (3rd year)

Open-answer questions:

- Did you find the activity useful?
- Would you like to have done something more?
- Do you think that [...] it was helpful to better understand mathematics?



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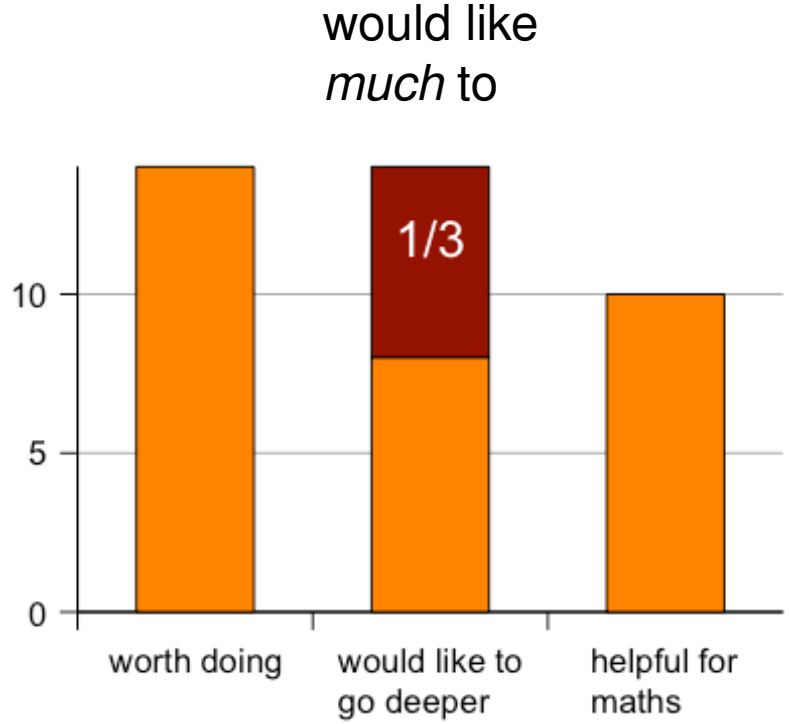

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References

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