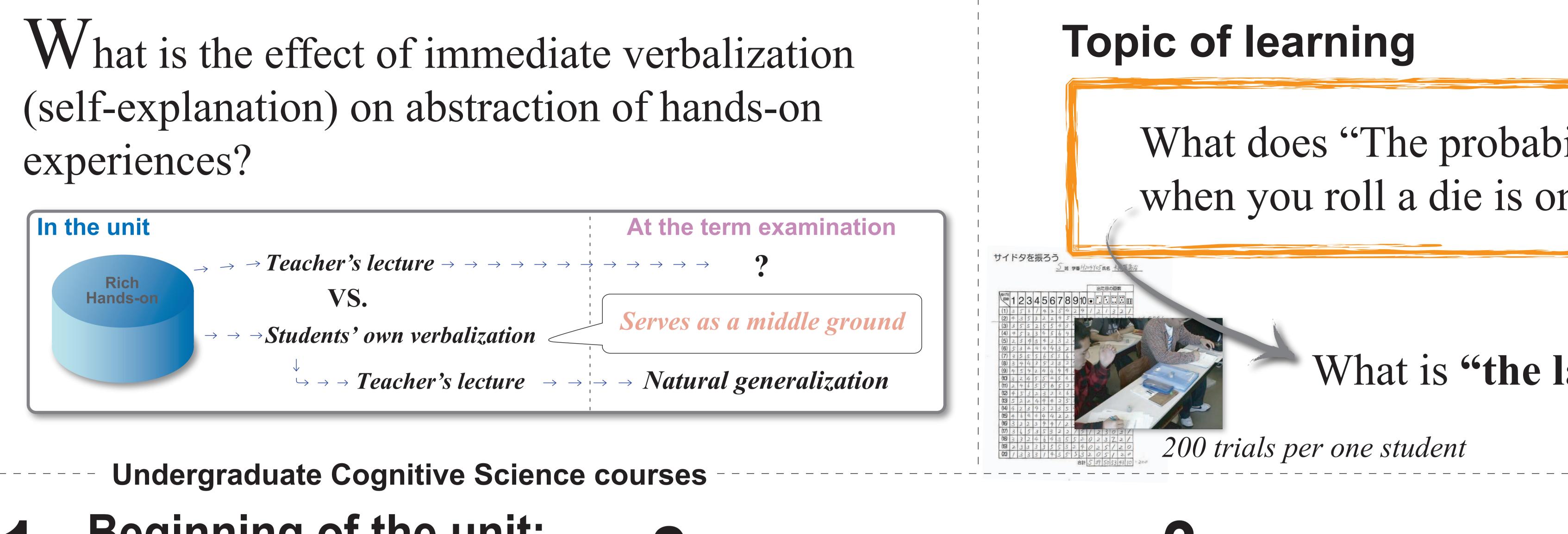
Learning through verbalization (1): Understanding the concept of probability

experiences?



Beginning of the unit: **Original question**

Class 1 (n=64)

Teacher categorized the student answers into three types of summaries below, and after students'vote explained why alternative III was right.

- I. "You get the pip ONE once per six rolls."
- II. "The pip ONE occurs 1/6 of the time because it is one of six equally possible events."
- III. "If you roll the die many times, the ratio of getting the pip ONE is 1/6 in average."

Class 2 (n=39)

Teacher picked out five students' answers as five alternatives (all like I or II), and after students' vote *went on to the next activity* without any explanation.

Who explained?

	1. Beginning 2. Dice 3		3. Deformed Dice		4. End of the unit		
Class 1	STUDENT + TEACHER		TEACHER	TEACHER		-	
Class 2	STUD	ENT	-	_		STUDENT + TEACHER	
		Types	of explanations		Expla Demon Normal Dice	nable stration Deformed Dice	
	WRONG	G-SImple	"You get the pip ONE per six rolls."		×	×	
	WRONG OTHER		 "When you get the pip ONE R times per N rolls, the probability is the ratio of R/N." "The pip ONE occurs 1/6 of the time because it is one of six equally possible events (but if not so, it does not occur 1/6 of the time)." 		×	×	
					0	×	
	LAW of LARGE NUMBERS	Concrete	"When we rolled the dice in the class, the ratio of getting the pip ONE was 1/6 (or P)."		Δ	Δ	
		Moderate	"If you roll the dice many times, the ratio is 1/6 (or P).		Δ	Δ	
		High	"If you roll the dice an infini the ratio approaches 1/6 (or		0	0	
					Te	eacher	's explanati



Showing the results tallied over the class, *The teacher explained* the law of large numbers.

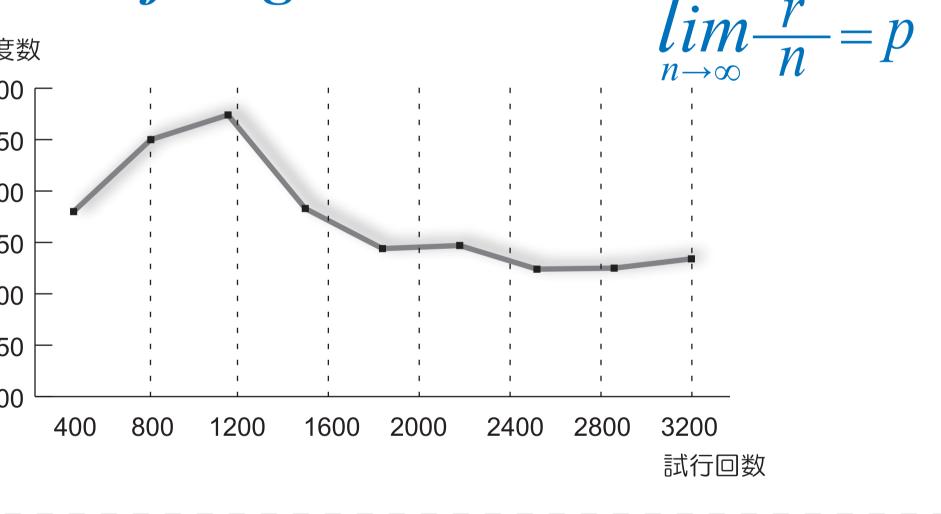
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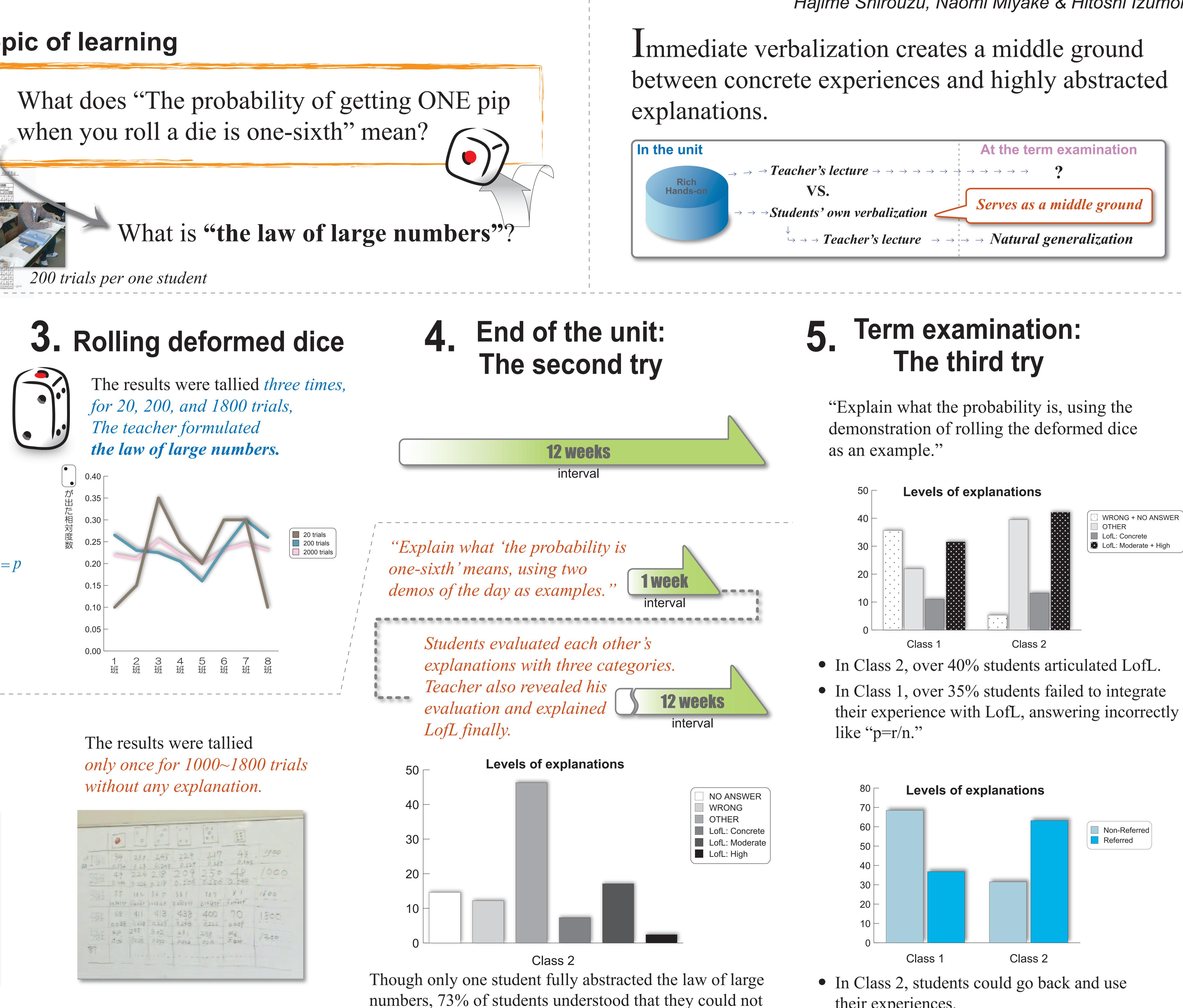


Z. Rolling dice

50 trials per student, 3200 trials per class







100 trials per student, 3900 trials per class. The results were tallied like.

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				THE R. L.			

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••••• These answers served as resources for collaborative reflection.

get the pip ONE per six rolls.

their experiences.