Oslo

Osloskolen

Norsma23

Education Agency – city of Oslo

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Collaboration between four parties

- Research department of Statistics Norway (SSB)
- Fafo research foundation
- Danish Institute for Education (DPU)
- Education Authority in Oslo municipality (UDE)

- The measurement
  - Check in: National tests in mathematics 8.th grade
  - Check out: National tests in mathematics 9.th grade (the main outcome variable)

Can high-dosage tutoring help low-performing adolescents?

- Randomized experiment to test a twofold intervention:

1. A teacher training program customized for instructing 8th graders who perform poorly in mathematics

2. Two 4-6 week periods of targeted math instruction for low-performing 8th graders,
   - a majority in small homogeneous groups
   - the rest in larger and more heterogeneous groups.

- We randomized 24 schools to treatment and 24 schools to control.

DPU and UDE incorporated six principles into the teacher training program and the instruction of students.

- Create a link between learning sessions
  - to activate student memory of mathematical concepts and help form mathematical connections
- Use low threshold and high ceiling tasks
  - to ensure that all students can get started and simultaneously make sure that the instruction is sufficiently differentiated so everybody can reach their potential.
- Foster motivation leading to improved performance – “Mo-formance”
  - acknowledging that affection and cognition are aspects of learning mathematics

- Initiate conversations
  - with and among students on mathematical processes and concepts to support mathematical understanding.
- Set realistic but high expectations
  - to support student motivation and engagement.
- Create a logbook
  - to activate students' concentration, reflections, and long-term memory

Didactic methods and small-group instruction for low-performing adolescents in mathematics: Results from a randomized controlled trial. Discussion Papers no. 957, Statistisk sentralbyrå, June 2021

Teachers can endorse these six principles in the classroom by using four didactic tools.

- Mathematical Models:
  - bar models/thinking blocks
- Persistent pairing of students (learning partner)
- Organization of instruction and learning at three levels: individual - group – plenary
- Linguistic expressions to enrich students' oral communication
  - Talk moves

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PBG – «sylteglasset»

- Create a link between learning sessions
- Use low threshold and high ceiling tasks
- Create a logbook
- In all parts of the sessions, IGP, learning partners, rich and enriched tasks, and bar models/illustrations can be implemented.
- «Mo-formance» and realistic but high expectations should permeate throughout the sessions

Lindenskov, 2018

Academic Advicer
Lena Lindenskov DPU

Lesson plans
Autumn term and Spring term

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2

Forord

Utdanningsetaten i Oslo deltar i et forskningsprosjekt som har som mål å få flere elever til å fullføre og bestå videregående skole. Dette er ett av fire nasjonale forskningsprosjekter i *Program for bedre gjennomføring – spor 2*, som er finansiert av Kunnskapsdepartementet. Prosjektet går over tre år, skoleåret 2016-17, 2017-18 og 2018-19, og er et samarbeid mellom:

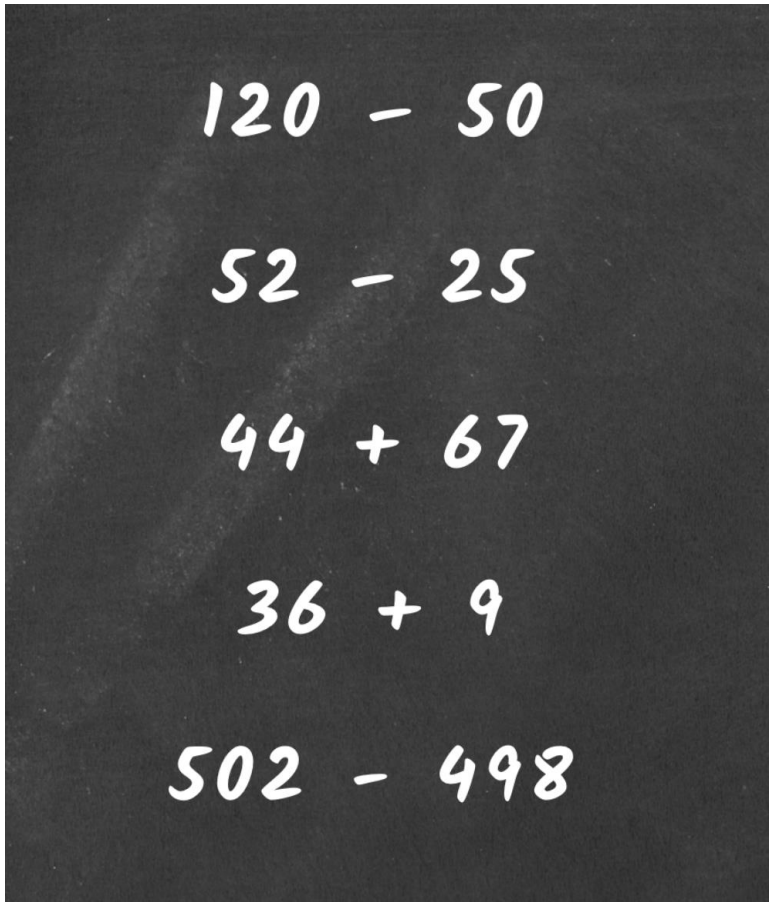
- Statistisk sentralbyrå (SSB), prosjekteier og ansvarlig for den kvantitative forskningen
- Utdanningsetaten i Oslo, skoleeier og ansvarlig for implementeringen av tiltaket
- Danmarks institut for Pædagogik og Uddannelse (DPU), ansvarlig for innholdet i tiltakene i samarbeid med UDE
- Forskningsstiftelsen Fafo, ansvarlig for den kvalitative forskningen

Skolene i Oslo er trukket ut enten som tiltaks- eller kontrollskole, og satsningen vil foregå på 8. trinn og i Vg1. SSB har gjennomført trekningen av skolene.

I den forbindelse har Utdanningsetaten i Oslo, i samarbeid med Danmarks Institut for Pædagogik og Uddannelse, utarbeidet materiale til lærerne i prosjektperioden, deriblant dette heftet.

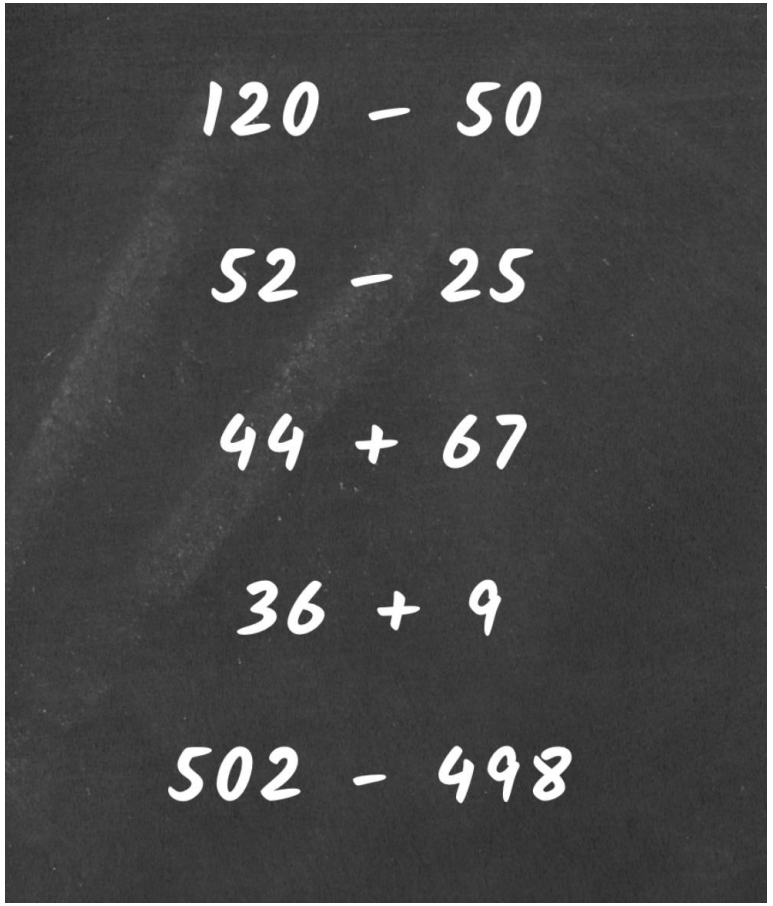
Lesson plans

- Number Sense and Mental Calculations
- Place Value and Decimals
- Multiplications
- Divisions
- Fractions
- Measurements


120 - 50
52 - 25
44 + 67
36 + 9
502 - 498

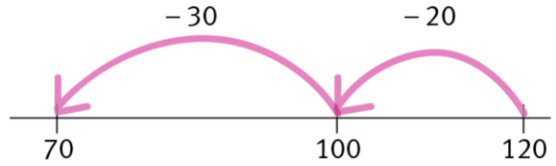
Number Sense

Number sense" enables students to understand numbers and number relationships and to solve mathematical problems that are not bound by traditional algorithms" (Bobis, 1996).



The target in this session is further developing of students' understanding of numbers and mental arithmetic strategies, for example

- 120 - 50; *empty number line*
- 52 – 25; *doubling* 25 + 25 = 50, 50 – 25
- 44 + 67; *combinations of ten;* 40 + 60 = 100, 4 + 7 = 4 + 6 + 1
- 36 + 9; *rounding to the nearest 10,* 36 + 10 – 1
- 502 - 498; *difference* 500 – 499, 500 – 498…



120 - 20 = 100 → 100 - 30 = 70

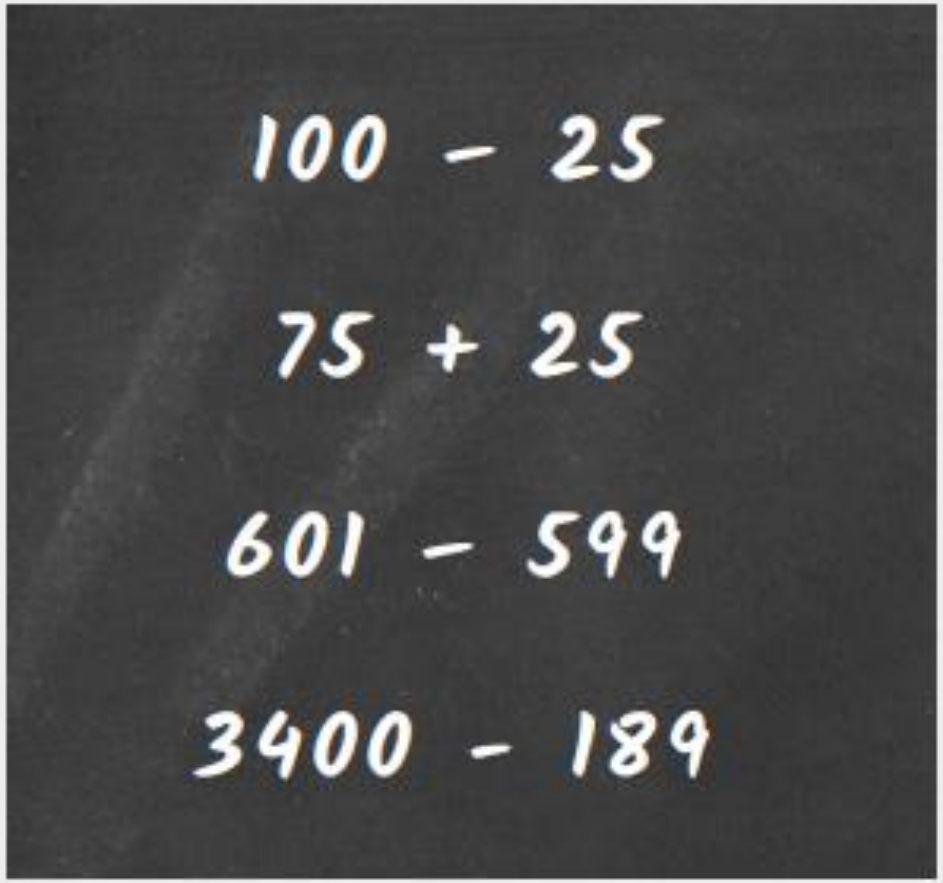
OPPSTART AV TIMEN

Hoderegning

Bruk oppgavene til oppstart av timen.

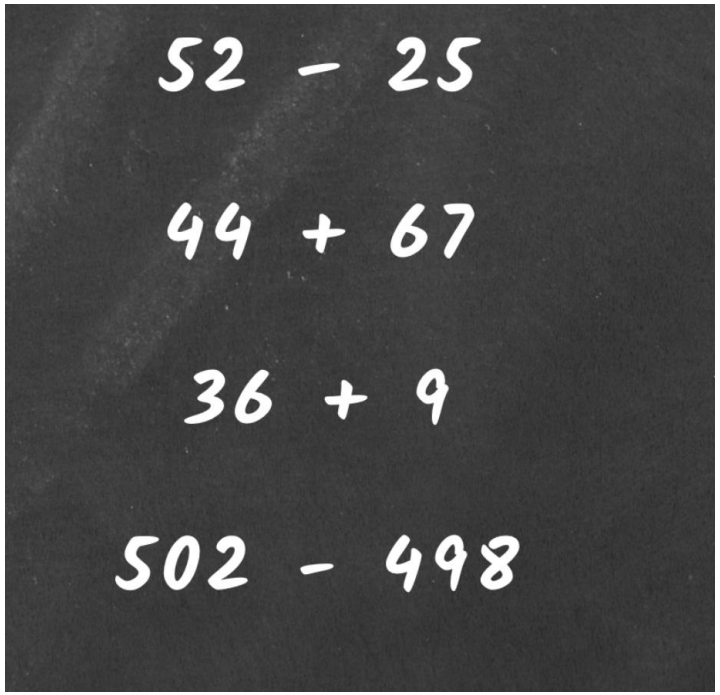
La elevene diskuterer og løse oppgavene ved hjelp av hoderegning. Gi elevene tid nok til å tenke alene, før de forteller og lytter til læringspartner (jf. IGP, se innledning).

Lytt til elevenes forklaringer, la dem forklare ulike strategier og vis og tydeliggjør strategiene i plenum.



Assesment as Learning Tracking

- Things to watch out for:
- Do the students use strategies such as doubling?
- Do the students use strategies such as differences (601– 599)?
- Can the students calculate with tens (think 40 when it says 39)?
- Do the students look at the numbers and «see» the combinations of ten (64 + 12 + 16 + 88)?



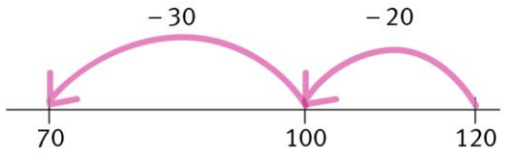
Model of the situation

Model of students strategies

Model as a tool for thinking

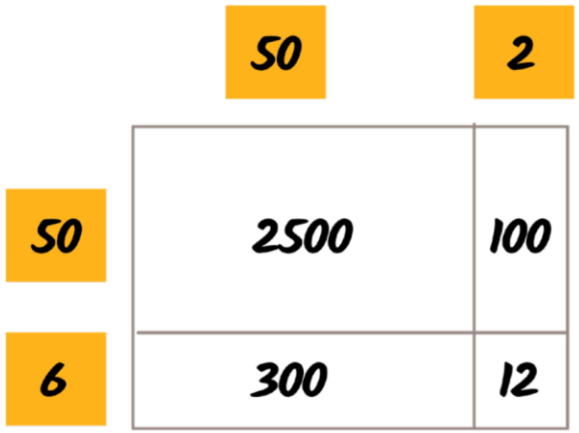
(Gravemeijer 1999; Fosnot and Dolk 2001)

Empty Number Line



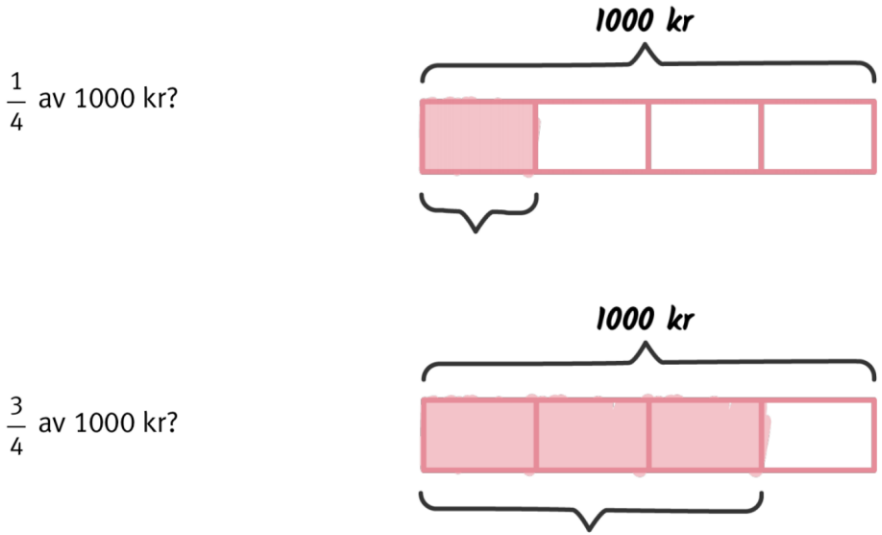
120 – 20 = 100 → 100 – 30 = 70

52 · 56



Arrey Model

Singapore Model Method



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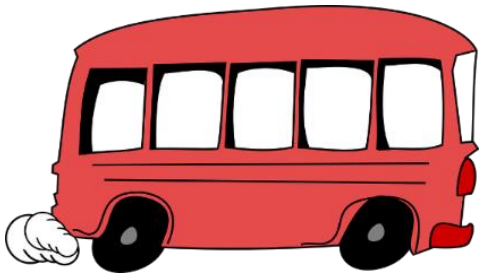

C 1.99

I et selskap kom 1/2 av gjestene i bil, 1/4 kom med buss, mens de tre siste gjestene kom til fots. Hvor mange gjester kom til selskapet?

«In a party, 1/2 of the guests arrived by car, 1/4 of the guests arrived by bus and the last 3 guests walked to the party. How many guests where there at the party?»

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Table 3: Treatment effects, target students in small groups 2017/18 and 2018/19

	(1) Dummy has y^9	(2) 9th grade score (y^9)	(3) Lowest proficiency (D^{L1})	(4) Low proficiency (D^{L2})
Effect estimates from specification with				
No controls	0.001	0.122**	-0.052**	-0.069**
	(0.017)	(0.036)	(0.019)	(0.025)
Family controls	0.001	0.104**	-0.048**	-0.061**
	(0.015)	(0.032)	(0.018)	(0.021)
Family $+y^8$ controls	-0.003	0.060**	-0.035**	-0.028*
	(0.015)	(0.021)	(0.014)	(0.016)
Family $+y^5$ controls	0.004	0.104**	-0.048**	-0.060**
	(0.015)	(0.030)	(0.017)	(0.022)
N	1142	1015	1015	1015
N clusters	48	48	48	48
$\bar{y}$	0.889	-0.720	0.141	0.603

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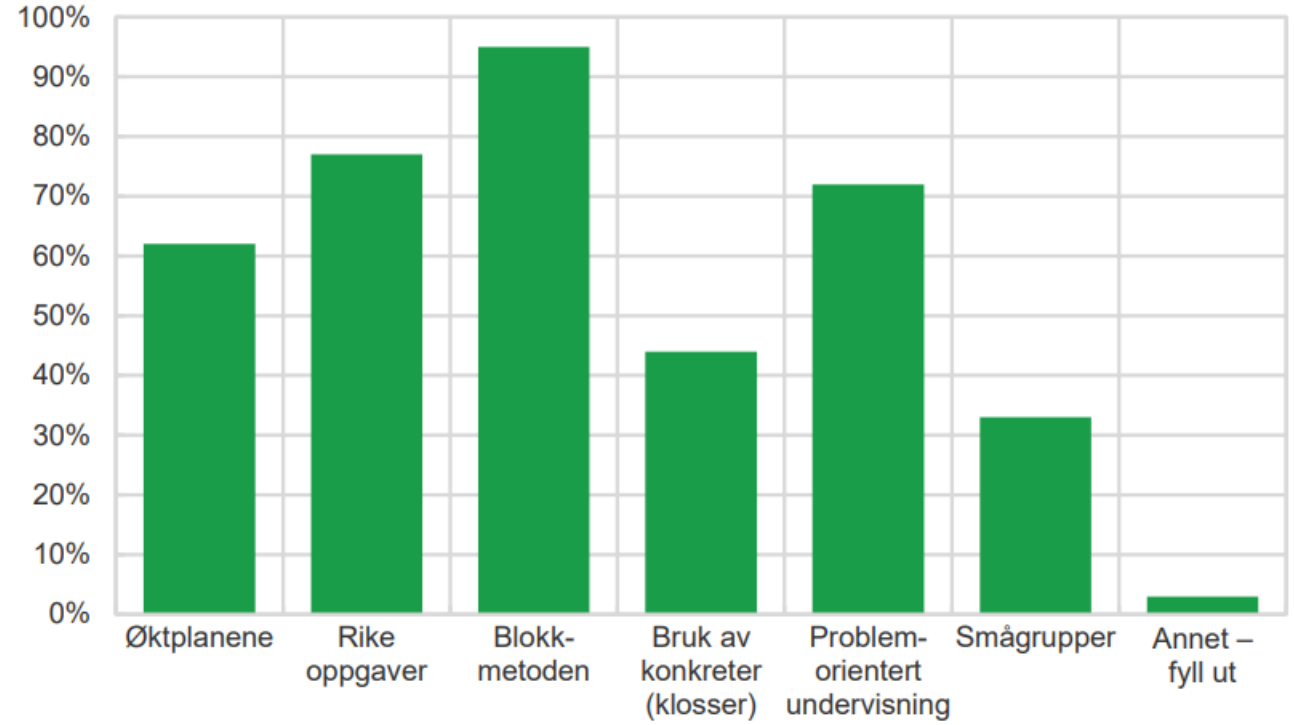
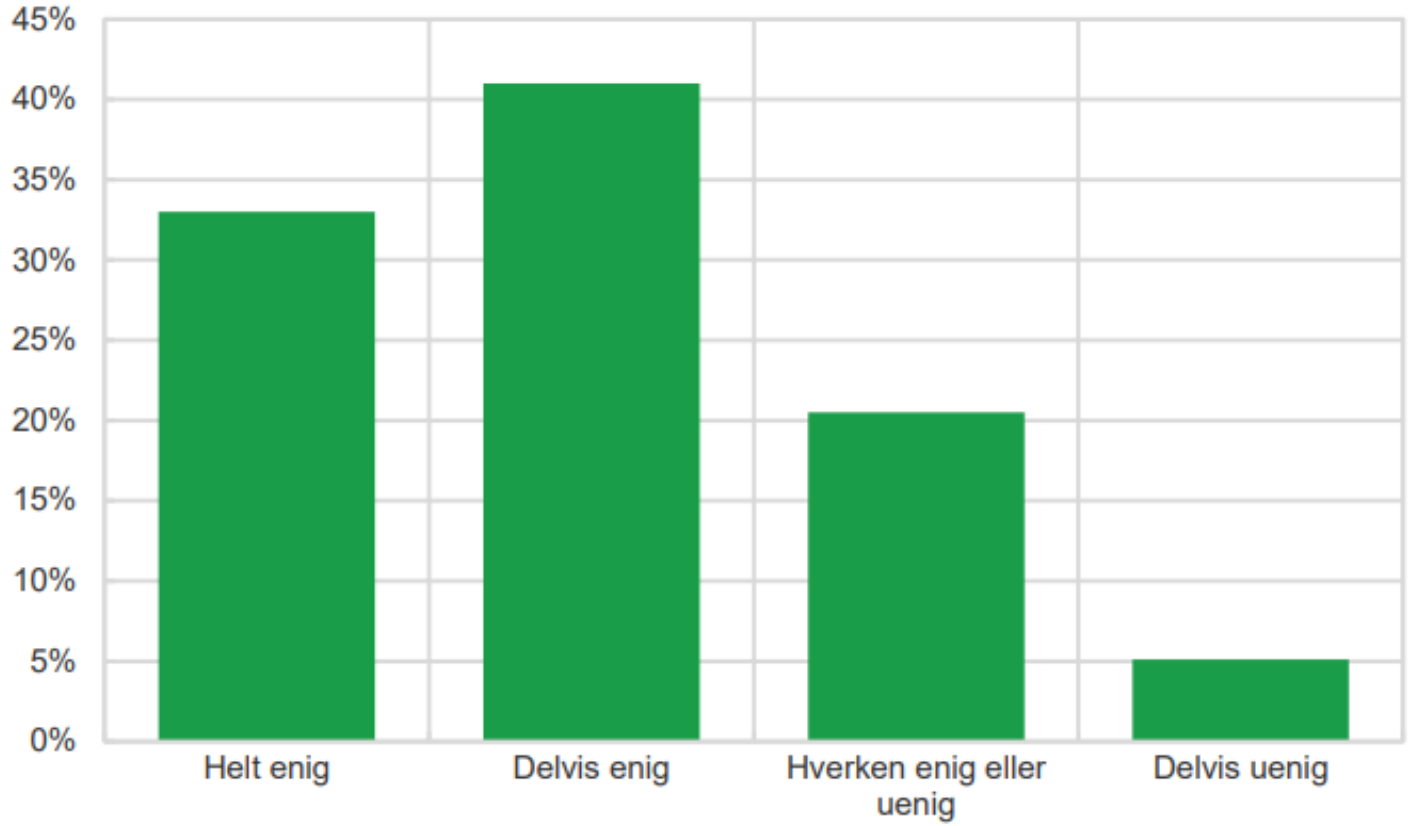
Figur 7.6 **Påstand: «Nå er tiltaksperioden over. Hva fra PBG vil dere ta med i videre matematikkundervisning ved skolen?» N=95**



Kilde: Statistisk sentralbyrå.

Claim: "Now the intervention period is over. What aspects from PBG will you incorporate into ongoing mathematics education at the school?" (N=95).

Figur 7.2 **Påstand: «Jeg tror alle er positive til metodene vi har lært gjennom tiltaket, og det kommer til å være nyttig framover» (N=39, 2019)**



Kilde: Statistisk sentralbyrå.

Claim: "I believe everyone is positive about the methods we have learned through the intervention, and it will be useful going forward" (N=39, 2019).

"In the first experience, I managed to grasp math. I was actually among the best in the class. I wasn't supposed to be there, really. But it's kind of cool, though. Suddenly, mastering everything. Could explain to the others what to do (student in lower secondary school, intervention 2019)."

"It's a bit like ripples in the water. They carry the positive experiences from the intervention with them. I found it a bit strange, but I think everyone who has experienced success, who has seen that it's possible, that you can do it, brings it into regular classes (lower secondary school teacher, intervention 2019)."

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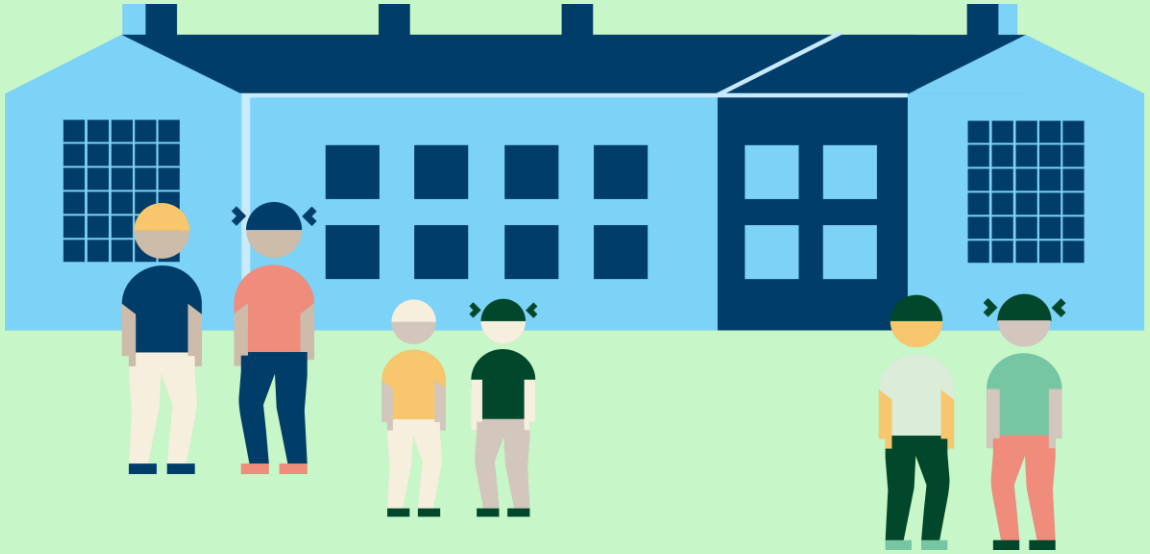
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