

Teachers' Specialized Content Knowledge for the Topic of Integers

Key Questions

- What are the teacher concerns for teaching and learning integers?
- What is Specialized Content Knowledge (SCK) for teaching integers?
- How can it be built upon through collaborative investigations?

Specialized Content Knowledge

SCK includes different representations of a mathematical concept, connections across representations and their affordances and limits.

Table 1
SCK framework for teaching integers

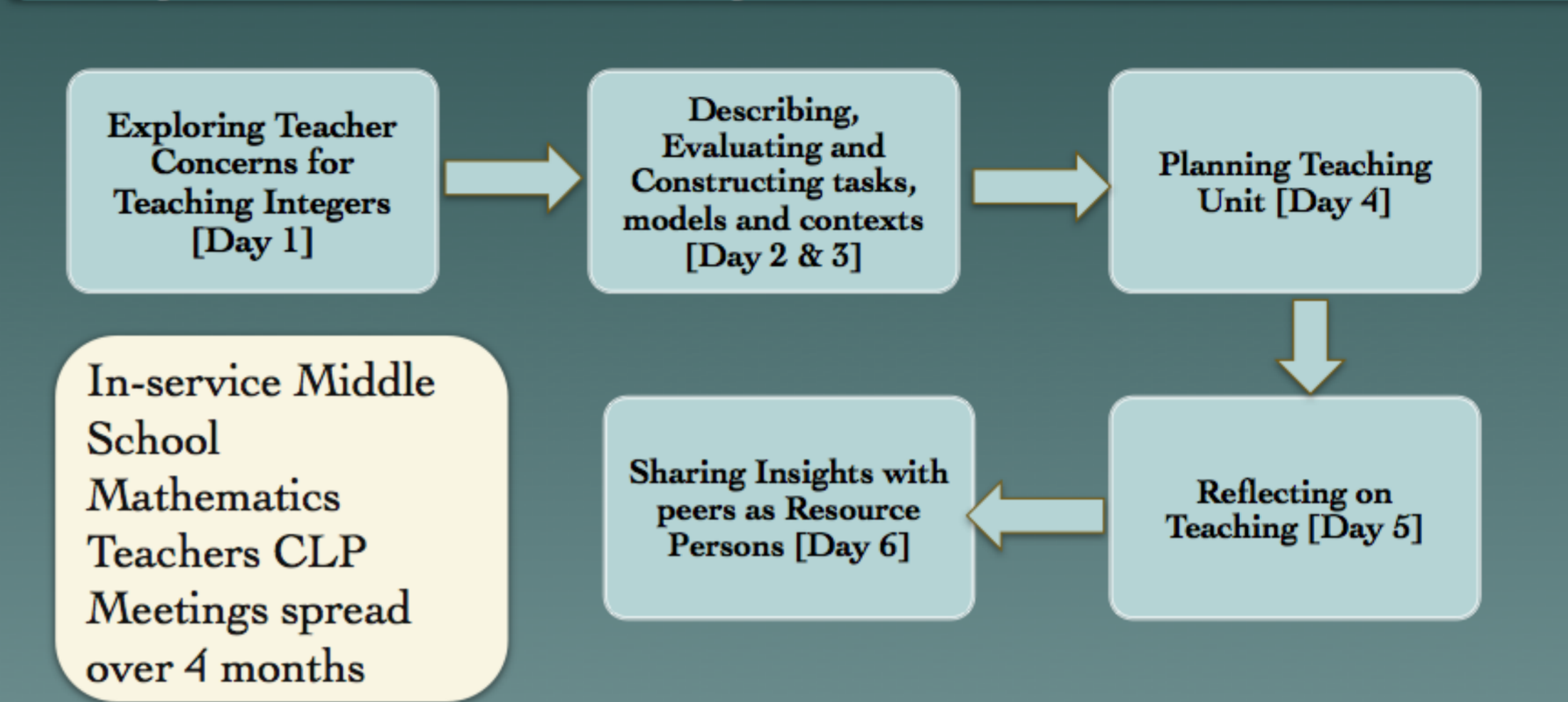
Meaning of the negative sign	Meaning of integers	Meaning of addition subtraction of integers
Unary function	State	Combine
Binary function	Change	Change
Symmetric function	Relation	Relation

Models: Number line models / neutralization models
Contexts: Eliciting salient quantities and derived quantities

Table 1

Theoretical framework of SCK for teaching Integers

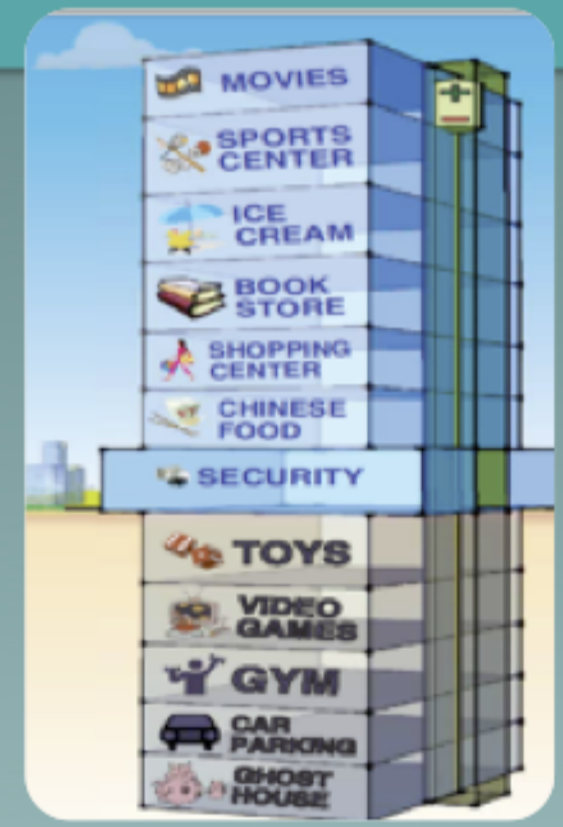
Design of the CLP Meetings



Teachers' exploration of the Framework

"Generally we take 0 as the reference point ... but in this particular question 0 is not a reference point... We have taken something [else] as reference with respect to it we are finding the position so it [i.e. -2] is a relation;" (Tr. Swati)

"Why don't we make rules through buttons – if white color is more then it is positive... this rule can be constructed" (Tr. Anuja)



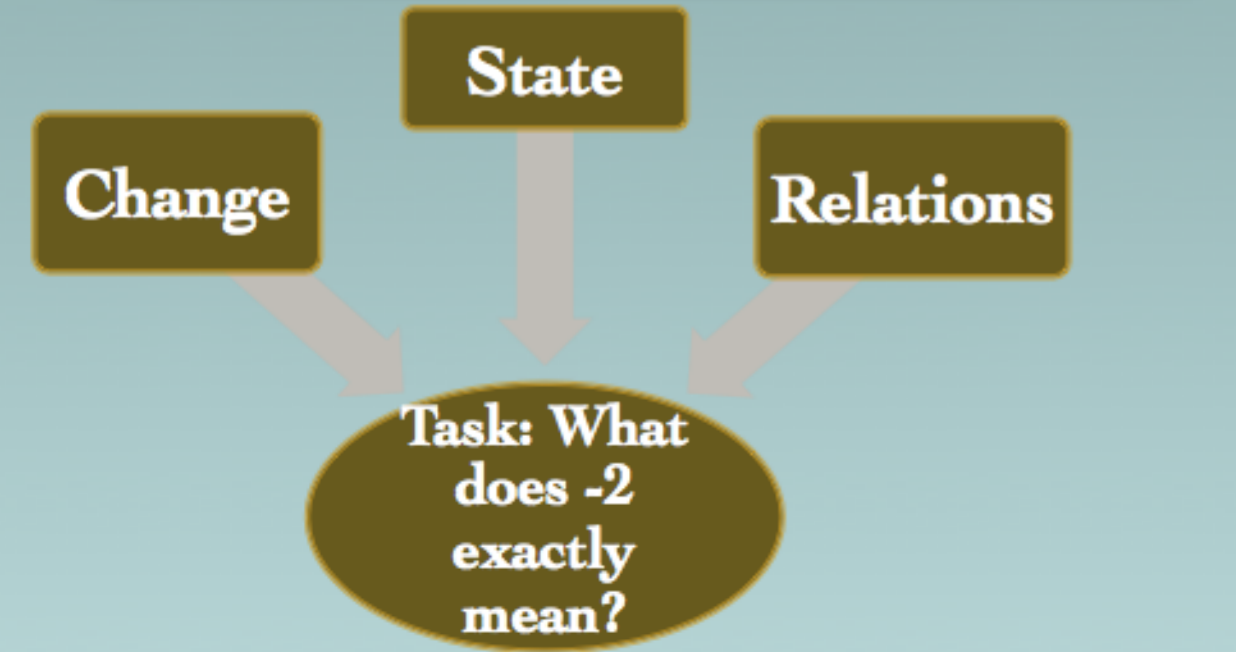
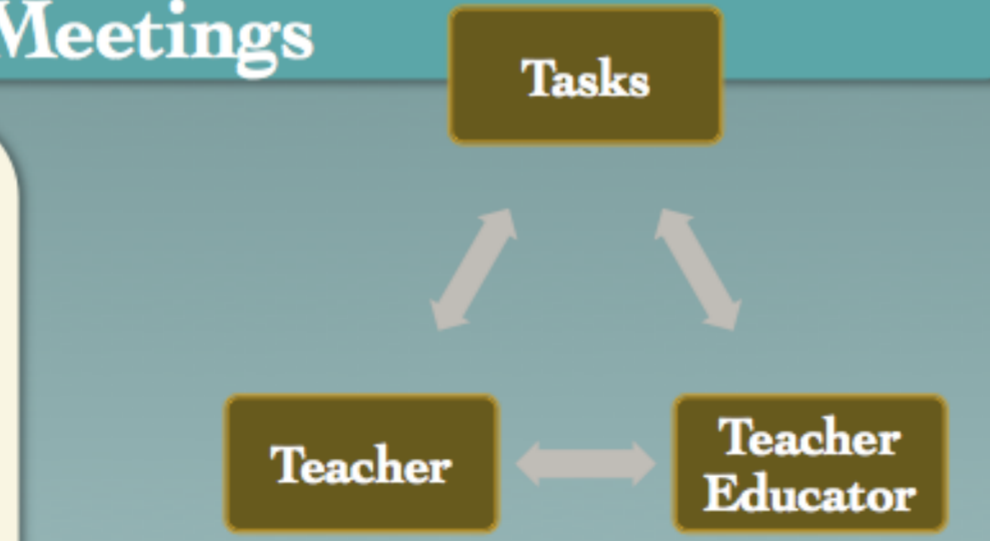
Contexts discussed	Total number of turns	Turns of teachers' talk
Integer mall – floors in building and movement of lift	211	89
Temperature	96	51
Marks/score	53	32
Baby's weight	51	26
Profit/ loss	44	24
Mixing water at different temperature	30	16
Ticket reservation	29	16
Loan taking/giving	28	17
Family size	26	16
Queue	26	12
Length of shadow	24	16
Water level	22	9
Journey by train	20	12

Change in Baby weight Task Constructed by Teachers:
"What could be the reason for 200 gm. decrease in first week? What could be the reason for 500 gm. increase in 6th week? How much does the baby weigh in the second week?" (Tr. Swati & Anuja)

Why would students accept using the minus sign for basement floors - when they know it as the sign for subtraction – Tr. Ajay

Collaborative Lesson Planning Meetings

Tasks that were collaboratively investigated: Use theoretical framework to give examples of context; evaluate representations for meaningfulness; discuss and develop contexts for integer addition and subtraction



Teachers explored & built, meaningful and mathematically rich repertoire of representations using the theoretical framework.