

Using Codes to Solve Algebraic Equations

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Abstract:

Statistically comparing students' performance on the unit exam, there seems to be little difference from those students who were taught to use codes to those who were not taught to use codes to solve algebraic equations. However, the benefit of using codes appears to be in algebra problem solving. Students who use codes seemed to have less trouble transferring and interpreting word problems to math operations. Further action research would be required to validate this observation.

Question:

By using codes to help solve algebraic equations, will Adult 10 students' overall performance improve on the unit exam?

The Intervention:

It started with my perusal of resources for the Level 3 math pilot when I came across Burt Thiessen's note in Math 09 pg 170. He stated, "For many years I taught students to solve equations without using codes. In more recent years a colleague, Brian Druckett introduced the use of codes to our math department. Since requiring students to use codes, I have noticed that class averages on unit tests for this chapter have been consistently over 80%. In fact, student success with this chapter is usually better than with any other chapter in Math 09."

I discussed the idea of teaching codes to my students with my math colleagues and I was encouraged to try it for the Level 3 Math pilot. The goal was to verify the improved performance of students who used codes to solve algebraic equations. A list of the codes is found in Appendix A and examples of how the codes were introduced and taught can be found in Appendix B.

The Findings:

The idea was to use the same unit end exam that was used for Adult 10 individualized program and do a simple comparison of mean, median, mode and range.

Without codes		With codes	
mean	84	mean	82
mode	90	mode	88
median	86	median	87
range	47	range	47

Statistically speaking, there appears to be little difference between the test scores of both student groups.

Reflections On or Implications for Practice:

After reflecting on the use of codes, I had to agree that there was not a marked performance difference between the two groups in the unit exam. What I found interesting is how much better students performed in the following unit – solving algebraic word problems. .

I suspect the reason for this better understanding and performance is the use of codes. Students who learned and applied codes were better able to transfer code skills into word skills and visa versa. Intuitively, I think students found it easier to link mathematical operations to operational words. This is probably another opportunity to apply action research.

As another antidote, I over heard a conversation between two students. The first student asks, “Why should I use codes?” The second student replied, “It makes it (algebra) easier!”

Appendix A

Code Summary

We use the following codes to indicate the transformation that is being applied to the equation.

A	add
S	subtract
M	multiple
D	divide
Simp.	simplify
R.P.	reciprocal property

The code **CLT** will be used to indicate “combine like terms”.

NOTE: The code **Simp.** is used **immediately following** a transformation of an equation by addition, subtraction, multiplication, or division. The code **CLT** is used to collect like terms in the initial form of the equation.

By coding our steps, we will be constantly reminded of the equality property that is being applied to transform the equation.

Appendix B

Example Solve: $3x + 2x + x - 17 = 16$

SOLUTION

Your Thoughts	Code	The Equation (transformed)
There are like terms to combine on left side.		$3x + 2x + x - 17 = 6$
Combine the like terms	CLT	$6x - 17 = 6$
Undo the subtraction of 17.	A17	$6x - 17 + 17 = 6 + 17$
Simplify.	Simp.	$6x = 23$
Undo the multiplication by 6.	D6	$\frac{6x}{6} = \frac{23}{6}$
Simplify.	Simp.	$x = \frac{23}{6}$

Example Solve: $-23 = 2w - 2 + 4w + 11$

SOLUTION

Your Thoughts	Code	The Equation (transformed)
There are like terms to combine on right side.		$-23 = 2w - 2 + 4w + 11$
Combine the like terms	CLT	$-23 = 6w + 9$
Undo the addition of 9.	S9	$-23 - 9 = 6w + 9 - 9$
Simplify.	Simp.	$-32 = 6w$
Undo the multiplication by 6.	D6	$\frac{-32}{6} = \frac{6w}{6}$
Simplify.	Simp.	$-\frac{16}{3} = w$