

Title: Using problem solving grids to improve independent problem solving

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Context:

New Forest Academy is a smaller than the average-sized secondary school. A new Principal Karen Godshal was appointed May 2014. She had a clear key focus -raise the aspirations and learning skills of the students

The Thinking like an Engineer project provided the best model for action research, based on an already accepted model of learning habits, and I was therefore pleased to take part in the project.

A group of 28 higher attaining students, based on KS2 performance, were selected to take part in the project.

The issue

Students often commented they 'did not get' science and lacked confidence, written work was ambiguous and lacked precision and therefore felt 'STEM was not for them.'

My premise was, that if students were to become more engaged with STEM subjects, they first had to gain insight and become skilled at 'sounding like a scientist'.

By providing simple grid template students were able to 'decode' the steps needed to elevate the quality of their discussions and written work.

The idea

Jane E. Pollock stated in her article September 2012 | Volume 70 | Number 1
Feedback for Learning-How Feedback Leads to Engagement

‘The most disengaged students in class are often the ones who receive the least feedback and direction.’

She then went on to suggest three techniques that improved student feedback including the use of goal template grids.

Area	Start	End
Keywords (KW)		
Link (L)		
Explain (E)		
Apply (A)		

Template 1

Area	Start	End
Keywords (KW)		
Link (L)		
Creative Question (CQ)		
Apply (A)		

Template 2

MAIN GROUPS OF HYDROCARBONS.

LO: Understand alkanes & alkenes.

	Start	End
• Covalent bonds	W	X
• Single bonds	L	✓
• double bonds	CQ	✓
• Saturated	A	✓
• Unsaturated	X	X

- a) C_2H_6 ✓
- b) C_2H_4 ✓
- c) C_3H_8 ✓
- d) C_3H_6 ✓

Alkane is ~~unsaturated~~ saturated $C_n H_{2n}$

Alkene double covalent unsaturated $C=C$
 $C_n H_{2n}$

☺

AG:

1	Fa	✓
2	T	✓
3	Γ	✓

19th March 2015

For
anti
emu
flav
food

aim:

- That explain why crude oil can be separated by fractional distillation.
- What is fractional distillation.

Keywords:

- Boiling Point
- Hydrocarbon
- Fractional distillation
- Intermolecular force

	start	end
W		✓
L		✓
CQ		✓
A		✓

1 + 8 + 14 ~~9 + 11~~
 2 + 12 + 4 ~~10 + 15~~
 3 + 7 + 5
 6 + 9 + 11
 13 + 10 + 15

Making use of crude oil.

20th March 2015

aim:

How did it look and work in practise.....



In parallel, several STEM opportunities were made available for students –
Stem 'BART' activity with Exxon
STEM careers event in school

In addition a group of girls were taken to the STEM Women in Science event at Winchester Science centre.



The outcomes.....

Test scores			Test scores		
B	B	0	B	A	1
B	B	0	A	*	1
C	B	1	B	B	0
*	*	0	A	A	0
B	B	0	B	A	1
C	B	1	C	B	1
*	*	0	B	B	0
D	B	2	A	A	0
C	B	1	C	C	0
B	A	1	B	B	0
A	*	1	B	B	0
A	A	0	B	A	1
B	B	0	C	B	1

Test Scores –
average difference =
 $13/26 = 0/5$ grade

Question posed	Start of TLAE project					End of TLAE project				
	1	2	3	4	to t	1	2	3	4	tot
1. I like making links between things in my head	1	6	11	0	18	0	11	8	2	21
2. I enjoy combining things together to make something new	1	6	8	3	18	1	7	9	4	21
3. I'll check and check again until satisfied	2	11	5	0	18	2	8	9	2	21
4. I love asking questions and coming up with my own point of view	0	8	6	4	18	5	9	6	1	21
5. I enjoy thinking out loud as I imagine what things look like	3	5	5	5	18	3	5	8	5	21
6. I like making models to demonstrate my ideas	3	6	5	4	18	1	5	10	4	21
7. I enjoy working on improving what I have done	2	5	10	1	18	2	8	10	1	21
8. I am honest with myself about how I am doing	2	2	10	4	18	3	4	8	6	21
9. My brain comes up with lots of creative ideas	2	5	5	6	18	1	8	12	0	21
10. I like working in a group even when I don't know people well	3	5	5	5	18	2	5	8	6	21
11. I'm happy to stick up for what I think in a discussion	2	7	3	6	18	1	7	7	6	21
12. I'm ready to put in hard work and practise, even when it is tricky	0	6	8	4	18	0	3	13	5	21

Key:

1= rarely 2 = sometimes 3= quite often 4 = very often

Tot = total in sample –

Due to different sample sizes if responses for 3 or 4 were over 50% of sample was counted as showing an improvement