



Using Dice Games in the Classroom

By Jennie Pennant

Let's have a look at dice games as a vehicle for engaging with formative assessment of your new class at the start of the academic year. We consider how such games can be helpful in developing an understanding of children's proficiency with key mathematical skills, their understanding of mathematical concepts and elements of their problem-solving abilities.

These games combine a mathematical skill or concept with elements of problem solving, reasoning and communicating and are engaging for children. This means they are a great resource for the classroom. Games support children to become mathematically literate, which means they are able to understand, use and justify their mathematics. (Hodgen and Wiliam p3).

Just as important - they engage children and motivate them to persevere with their involvement so that you as their teacher have a chance to observe what they are showing you they know and understand.

You could use these games for one or more of the below:

1. To promote a classroom culture of enquiry. We know that nurturing children's curiosity, and developing and refining their spirit of enquiry establishes skills for the future and reasons for learning in the present. (Burton 1984 p9)
2. To identify what the children know in terms of both the particular mathematical skills and the mathematical concepts which you will use to inform the learning opportunities that you will provide for them – formative assessment. Ideally these formative assessments can be shared with the children and used to identify the next steps in their learning journey for them.
3. To foster collaborative work, talk, listening, turn taking – paired and group work skills.
4. To consolidate a skill or concept that the children have been engaged with as a learning focus.
5. To assess what the children know at the end of a sustained learning focus – summative assessment.

In this article, the focus on the second of these - the use of games to find out what children already know. This gives you valuable information to help you design the next set of learning opportunities so that all children can be challenged, be at their learning edge and make good progress.

Take an example

Let's take a particular example from the Stage 1 set of dice games – [Dotty Six](#). The game, as introduced on the site, is intended for young children who are just beginning to become confident with small numbers. However there are many variations that make it suitable for older children.

A key thing to establish, to support assessment for learning, is the objectives for the game.



What are the number objectives?

- To recognise the number of dots in each iconic pattern and associate it with its number name and numeral.
- To match the iconic representation of the patterns on the die with their symbolic representation using numerals
- To become fluent with number bonds to and within six
- To understand the associated language of 'how many more?'

What are the Using and Applying objectives?

Problem-solving

- Beginner: engage with practical mathematical activities
- Beyond the basics: adopt a systematic approach

Communicating

- Beginner: respond to questions and ideas from peers and adults
- Beginner: refer to the materials they have used (the dice and the grid) and talk about what they have done, patterns they have noticed
- Beyond the basics: describe the strategies they used

Reasoning

- Beginner: explain numbers and calculations
- Beyond the basics: predict what could happen and give a reason

Your focus and your strategies

The important thing to decide is which aspects of the objectives you want to focus on and how you are going to gain insight into what the children think.

Asking

A useful strategy is to ask questions – open questions - that encourage the children to articulate their thinking. However, children learn to join in conversations by hearing what others saying, listening to how words are used and 'playing around' with them themselves. So some modelling of talk round this game could be useful – between you and the TA, you and a puppet or you and one of the more articulate children.

You may also like to capture some key phrases and words that you hear children using as they talk and put them up on your mathematics 'talk wall' or other display to support the



children in using them. Putting them inside ready-cut out speech bubbles can be very effective and create an appealing display.

You may also like to stimulate some talk by joining in with a pair/group of children and 'playing dumb'. For example, you could throw the die and then put more dots on the grid than there should be or put more dots in a box than are needed to make the 'full' six.

Open questions that could be useful are questions such as:

- How many more dots do you need to fill that rectangle?
- I think you need five more dots to fill that rectangle – am I right?
- How many rectangles have you filled so far?
- If you threw a three, which rectangle would you put the dots in?
- I've thrown this where could that go?
- I'm wondering what to do with this score. Can you help me?
- If I throw a six, how many spaces are left for me to put it in?

Allow enough wait time for the children to respond to your question.

Listening

Listening carefully to what the children actually say is sometimes harder than we realise. We may be expecting a fixed answer, their explanation may be part of a sentence or rather jumbled or rambling.

Try not to finish their sentence for them – try just repeating what they have said and see if that helps them to finish it.

Try checking whether you have heard what they said correctly – I think what you said was....am I right? – and try and use the same words that they used.

Responding

Often it is helpful to respond with another question, phrase or statement that helps explore the child's thinking. This will help you probe for deeper understanding and evidence of mathematical thinking and reasoning.

Starter Question	Follow-up Question
How many more do you need to fill that rectangle?	Are you sure? Convince me. Show me how you know that.
If you threw a three which rectangle could	I am curious to know why you chose that



you put that in?	one. I would choose this one....are we both right?
I've thrown a six, what can I do?	What could happen if I threw another six? How many sixes can I throw and still fit them on the board?

What do the children's responses tell us?

Rich questions and tasks lead to rich evidence. (French, D p10) Using these dice games along with some well-chosen questions and responses will enable you to harvest a lot of information about what the children can do and where the opportunities for development lie. This helps us to design the next learning opportunities we offer them to take their learning forward.

Take a look at the Teachers Notes in each of the dice games and you'll find some questions and information to help you to use the games for formative assessment. Enjoy!

Digging deeper into formative assessment

Here are some weblinks and references that will help you explore the topic of formative assessment further.

1. Assessment in schools – fit for purpose?

A commentary by the Teaching and Learning Research Programme
www.tlrp.org/pub/documents/assessment.pdf

2. Hodgen, J. & William, D. (2006) Mathematics inside the black box nferNelson London

3 .Resource pack for Assessment for Learning in mathematics French, D. (Ed)

4. Using assessment to raise achievement in mathematics QCA

www.nationalstemcentre.org.uk/elibrary/resource/4654/using-assessment-to-raise-achievement-in-mathematics

5. NCETM CPD study unit Leading Personalised Learning

www.ncetm.org.uk/resources/25651

6. Assessment for Learning in mathematics

www.ncetm.org.uk/public/files/1516039/Assessment+for+Learning+in+Mathematics.pdf



Using Dice Games in the Classroom

By Jennie Pennant

References

French, D. (2006) Resource pack for Assessment for Learning in mathematics. Leicester: Mathematical Association

Hodgen, J. & Wiliam, D. (2006) Mathematics inside the black box. London: NFER, Nelson

Burton, L. (1984) Thinking things through: problem solving in mathematics. Oxford: Blackwell