Justify and evaluate the effectiveness of your mathematical resource in supporting children's learning.

Introduction to the report

For this report I will be justifying and evaluating the effectiveness of the mathematical resource which was designed to support children's learning of Standard Metric Units. There will be relevant references to the appendices throughout the report as evidence to support the justification of the 'follow me' cards that were designed to support children's mathematical learning.

Introduction to mathematics

Mathematics has a special significance in the lives of children. It is recognised that mathematics, just as any other subject , has its origins in human activity, and as a subject, it grows and changes as a result of problem -solving, trial and error and the interpersonal exchange of ideas (Nickson 2000).
Bruce and Meggit state that,

> Mathematics is based on direct, everyday experience, which leads to an understanding of the relationships between things.
> (Bruce and Meggit pg 306 1999)

if what Bruce and Meggit (1999) state is so, teachers need to plan and make use of practical and appropriate resources, that children can relate and link to the wider world so that they can develop an understanding of the connections and relationships between things.

Justification of the choice and topic of the resource

The children have had previous experience of using follow me cards and there was always a positive atmosphere when I observed the children using them with their class teacher and so the idea of follow me cards to create a mathematical resource was straight forward. I did not want a resource that took time to explain how to use it and the rules involved, I wanted something whereby I could assess children's understanding of the topic and to monitor if the lesson was a success. The children the week before had been finishing off their work on angles and were due to start their work on Standard Metric Units. The lesson was based on a question sheet and so was ideal to use something stimulating at the end of the lesson.

Introduction to measure and Standard Metric Units

The National Numeracy Strategy Framework for Teaching Mathematics (DfEE 1999) includes a clear progression in the development of measurement concepts. With this in mind, children also need to be aware that, although theoretically they can discuss measures with a degree of accuracy, in reality all measurement is an approximation. A sound understanding of measure is vital for children, as so many every day tasks involve some kind of measurement. For the relevant links for the mathematical resource to the NNS see appendix 1, part 5.

Brief description of resource

The resource has been designed to support and facilitate children's learning for Standard Metric Units. The intended age and ability is focused at pupils in year 5/6 (appendices 1, part 2).The resource promotes appropriate reinforcement and accurate vocabulary, as this is a key aspect within the understanding of

measures. The 'follow me' cards have been designed to prevent any misconceptions that the children may have on the topic and give clear concepts of measure. The mathematical language used on the cards has not been abbreviated for the questions, but written out in full to cause less confusion and to keep the game flowing. As the questions on the cards have been written out in full, it aids lower ability pupils to grasp an understanding of Standard Metric Units and allows them to play the game successfully without confusion. The answers on the reverse of the cards however, have been abbreviated as one of the Desired Learning Outcomes, is to be able to read the abbreviations of Standard Metric Units (for the other DLOs, they are included in appendices 1, part 2). Information about the National Numeracy Strategy links and appropriate links to the National Curriculum are all included in appendix 1, parts 4 and 5.

Justification of the value of the resource to mathematical teaching and learning

Experiential education is based on the idea that active involvement enhances children's learning. This idea however is difficult applying it to mathematics, as mathematics it is so 'abstract'. One practical method for introducing experience to children's mathematical understanding is the use of resources. Using mathematical resources in teaching has come to be taken for granted as a method that will help to promote children's learning of mathematics in a more meaningful way. Though, teachers now in the primary classroom have generally accepted the importance of their use.

Some resources in the mathematical classroom are seen as useless or 'junk' where as the resource that has been designed, has been structured into the plenary part of the lesson to reinforce and assess children's understanding of Standard Metric Units (appendix 2).

The values of the use of structured resources and materials in mathematical learning have been questioned. Gravemeijer (1997) suggested that the use of materials alone does not equate with making mathematical sense of a topic. Therefore this means that a resource should not be used alone, but along side written or mental activities to promote a mathematical topic.

Both Pestalozzi, in the 19th century, and Montessori, in the early 20th century, supported the active involvement of children in the learning process.
Since 1940, an organisation called the National Council of Teachers of Mathematics (NCTM), has encouraged the use of mathematical resources for every age and ability. Also a recent issue of a journal titled "Arithmetic Teacher" , describes uses of resources in the mathematical classroom and an entire issue dated February 1986, considered answers to practical questions such as why, when, what, how, and with whom mathematical materials should be used. The Research contained in the journal suggested that mathematical resources are particularly useful in aiding children to move from the concrete to the abstract level. Knowing this, teachers must choose activities and resources carefully to support the introduction of abstract symbols.

Recent studies of children's learning of mathematical concepts and processes have created new interest in the use of resources across both Key Stages. There is extensive literature which supports the positive effects of using resources in the teaching and learning of mathematical concepts. Nevertheless mathematical resources in themselves do not necessarily lead to the information of what are correct concepts.

In order to play 'follow me' successfully ,children need grounding of the topic Standard Metric Units, as Gravemeijer (1997) pointed out, that if a child who

has never handled a cube, would therefore , have a very limited concept of what a cuboid is.

Mathematical resources are a successful way in supporting children's learning. Resources can be used to introduce or reinforce a mathematical concept, as was the one designed. With the concepts of Standard Metric Units, children also must have the appropriate language associate. Right from the Early Years, children will use a great deal of vocabulary when workin g with measurements. They will begin to explore to see , for example, if something is longer or shorter. The development of appropriate and accurate language is crucial in all mathematical areas. Teachers must constantly reinforce appropriate and accurate vocabulary within measure.

Analyse the effectiveness (in terms of children's learning of mathematics) of your resource

The resource designed helps promote children to store mental structures, which contribute to the development of mathematical concepts and their understanding. It allows children to thin k mentally, as the resource acquires them to convert one standard Metric Unit into another Standard Metric Unit with out the aid of any written calculations.

Resources also act as a successfully stimuli after a demanding lesson and also evidence from a questionnaire contained in appendix 3 , provides sound knowledge that the 'follow me' cards are a successful way for children to wined down after a lesson.

The role of the teacher in making effective use of mathematical resources

My role as a teacher was first to structure and plan the use of the resource appropriately into the plenary part of the session, as the evidence shows in the lesson plan in appendix 2. When using the 'follow me' cards my role was to, stimulate questions and prompts if a child was unsure about the answer(appendix 4).

Even though the role of successful teaching entails teachers to carefully select their resources, Sowell suggested that this happens

> "on the understanding of the context in which they will be used, research suggests that teachers should use mathematical resources on a regularly basis, in order to give children hands-on experience that assists them to be able to construct useful meanings, for the mathematical ideas that they are learning." (Sowell 1989 pg.36)

By taking into consideration what Sowell (1980) explains, to enable successful teaching, resources in the classroom setting, where they have apprioatrate meaning of the mathematical learning that is being taught , should always be structured and linked to the topic and used frequently to aid children's understanding of mathematics.

Bibliography

Bruce, T and Meggit, C (1999). Child Care and Education 2 nd Ed.
Hodder and Stroughton: London

Mooney, C et al (2000). Primary Mathematics, Knowledge and Understanding.
Learning Matters Ltd: Exeter.

Mooney, C et al (2000).Primary Mathematics, Teaching Learning and Practice.
Learning Matters Ltd: Exeter.

Nickson, M (2000).Teaching and Learning Mathematics. A Teacher's Guide to Recent Research and its Applications.
Cassell: London.

Sowell, E (1989). Effects of manipulative materials in Mathematical Instruction.
Journal for Research in Mathematics Education. Vol 20 pg 498-505.