I’ve Got a Luverly Bunch of Calculations. A ‘Market Stall’ of Activities that Develop Language and Numeracy

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The importance of language in the learning of mathematics and numeracy has been recognized for some time. This has now been embedded in the application of the standards for teaching and learning for adult numeracy specialists in England and Wales. In our new courses, we have asked trainees to produce an activity that is intended to develop language skills alongside numeracy and to display their wares on a ‘market stall’. This paper will show examples of these activities, discuss some ways of categorizing the activities and consider the lessons learned for professional development of numeracy teachers.

Introduction

Since 2002, all numeracy teachers in England have been required to undertake teacher training. The training has been based around standards initially produced by the then organisation Further Education National Training Organisation (FEnto) and then updated by Lifelong Learning UK (LLUK) the organisation which took over FEnto functions.

The 2002 standards for teachers of adult numeracy (FEnto 2002) placed much emphasis on teachers personal mathematical skills, as an example 3 out of 5 delivered units of one popular course (City &Guilds 2005) were devoted to teachers mathematics skills. They also specified that teachers should have knowledge and understanding of the social and personal factors which have an influence on learning numeracy, social factors include socio-economic status and ethnicity, culture and gender. The closest the standard came to discussing pedagogy was to include wider education issues

In particular, time should be spent in critical analysis of education issues. For example:

- the nature of current curriculum provision;
- curriculum approaches;
- validity in assessment;
- key theories related to numeracy.

The standards have been revised and new standards were published in 2007 (LLUK 2007a). In contrast the new standards concentrate to a much greater extent on pedagogy (teachers must now have the required mathematics skills as an entry requirement (LLUK 2007c)) and in particular have the following elements relating to language and the teaching of numeracy/mathematics
Element B6.Ma

Enable learners to develop appropriate specialist mathematical/numeracy language.

Element B7.Ma

Use a wide range of communication strategies to support conceptual understanding in mathematics and numeracy.

Element C17.Ma

Use understanding of the different ways in which language and literacy skills are integral to learners’ achievement, in numeracy and mathematics, to address the development of these skills within numeracy and mathematics.

Element C18.Ma

Use of communication to promote and develop conceptual understanding of mathematics via collaborative tasks and sharing of strategies. (LLUk 2007a pp. 7–10)

These requirements have developed from a sense that language is such an important component of all learning. Educational psychologists such as Vygotsky and Luria have argued that language and meaning are intrinsically linked. In mathematics education, there has been a history of work that encourages discussion in mathematics. For example, Hoyles (1985) argued that discussion should play an important part in the learning of mathematics. More recently, Malcolm Swan and others have developed a series of materials that use discussion as a tool for conceptual understanding (DfES 2005, DfES 2007). In addition to the importance of discussion in learning researchers such as Fullerton (1995) have revealed the importance for adult learners and mathematics teachers of being fluent with the mathematics register18 as an important part of feeling that they belong to the community of people understanding or teaching mathematics. In Fullerton's work with a group of women teacher trainees she discovered this was an issue of the women's prior unequal experience of mathematics learning: the women described their memories of learning maths in school where boys were given more opportunities to 'talk mathematics' than girls while at the same time girls were being ignored or even discouraged from talking, even about mathematics.

On a more practical level, many numeracy teachers have become aware of the need to consider language when teaching learners. There has been a recognition of literacy issues for some learners and language issues for learners for whom English is not their mother tongue. Nevertheless, this work while emphasizing the use of discussion in learning mathematics does not make any detailed analysis of the use of language in the discussions. In this paper we will describe a range of activities that are intended to develop numeracy with a language focus. We will describe some of the characteristics of these activities. We will finish by arguing that more work needs to be undertaken to identify a range of strategies that deal with adult numeracy by focusing on aspects of language.

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18Halliday defines a “register” as a set of meanings that is appropriate to a particular function of language, together with the words and structures which express those meanings (see Fullerton 1995 page 42)
The ‘Market Stall’

The descriptions of activities that are included in this paper come from an assessment that forms part of the teacher training programme at LLU+/London South Bank University which implements the 2007 standards described above. The assignment is described as follows:

Assessment Task (one of three for the Unit)

NTL2. Prepare a short presentation, with appropriate resources, on how one may develop language skills in the numeracy classroom and associated issues. (Each class member will prepare a short presentation and these presentations will be set out on ‘market stalls’ around the room so that trainees can go from stall to stall, and find out about a range of approaches to language development in the numeracy classroom)

Provide own presentation in electronic / hard copy form and own notes made on two other approaches to developing language skills in the numeracy classroom. (500 words)

These ‘short presentations’ form the ‘market stall’ that trainees use to share their ideas. (The opening title comes from a 1940s song ‘I’ve got a lovely bunch of coconuts’ which describes a type of stall.)

The assessment guidance describes some further aspects and adds some support.

You need to identify an aspect of language and communication that you wish to address while studying some aspect of numeracy. This might involve (but is not limited to)

(h) practice in reading text (eg an activity that involves some aspect of comprehension before undertaking the mathematical activity),

(i) a speaking task (eg asking each other questions)

(j) a task that discusses the difference between mathematics use of certain words separate from everyday use (eg mode or range).

You should choose a mathematical topic that involves dealing with place value and how this is addressed by the activity. This might be (although is not restricted to):

(vii) using the four standard operations (eg division and keeping track of place value);

(viii) some aspect of measurement (eg how we deal with imperial measurements or time differently to decimals); or

(ix) handling data (eg reading charts and diagrams that involve using a key such as when 3.3 actually means 3300).

The guidance then suggests that the work should: be appropriately referenced; clearly describe how the activities are intended to work; describe how these activities fit into a larger programme and, more significantly for this paper;
discuss the kind of communication you expect from the activity outlining any learner-learner communication and learner-teacher communication expected.

Criteria for Analysis

As has been noted, there is no obvious criteria for analysis of the activities in relation to language. For the purposes of this paper we will identify two aspects.

(vii) We will identify aspects of terminology that are raised. This will follow our discussions of mathematics register (see Fullerton 1995 page 42) that we discussed with the group and related issues.

(viii) We will look at the ways in which trainees encourage reinforcement or practice of the issues that they raise.

The authors do not wish to suggest that these are the only categories that could be of interest and are sure that other aspects could be looked at. Nevertheless these two categories do raise some interesting issues that can be discussed and raise some further questions.

Examples of stalls

We will now describe a number of the activities presented as stalls. The four discussed are not intended to be representative of the whole cohort. Rather we are trying to show a range of activities and discuss some interesting aspects of these. We will comment on how representative these examples are in the discussion.

Trainee A

Activity title: Take Away Pizza

Description: Copies of a real menu from a local shop were provided for learners. Learners were asked to work in pairs to calculate answers to questions provided on a sheet. As an example

2a) Choose a starter, a Personal pizza with two extra toppings and a drink from the menu
b) how much does it cost

6a) You have £10 to spend on your meal. What would you buy?

b) How much does it cost?

c) How much change would you get?

Terminology/register: Spending words such as ‘cost’, ‘change’ and also the register of Pizza menus including offers such as ‘Buy One Pizza get one half price’, price of additional toppings, pizza and drinks descriptions.

Reinforcement/practice: Learners must be able to understand the questions but more importantly find their way around the menu. Using such an activity in pairs or small groups should enable discussion and practice of the words and sharing the meanings.

Trainee B

Activity title: How far from London?

Description: Learners are given cards with facts about the distance of various cities from London. Some are straightforward (Los Angeles is 5,444 miles from London), some are more complex (Rome is 9,382 miles less than Sydney). They are also given cards with comparative words on them (Near, further etc) and a large grid. Learners work together to order the cards on the grid and use appropriate descriptors for cities' distance from London. The learners work in small groups to order the places and identify the comparators. These answers are shared with the whole group and learners practice speaking the phrases.

Terminology/register: Words describing distance both absolutely and comparatively

Reinforcement/practice: Using the information about the distances to choose the comparative words. In pairs or groups the practice is through discussion and followed up with explicit speaking and listening practice.
Trainee C

Activity title: What it’s worth
Description: This is a game played in small groups. Each group are given colour coded cards with place value column headings (billions, units, hundreds etc). Having discussed the way place value works to tell us how large a number is the tutor writes a number on the board and indicates one of the digits. Each group decides which place value has been underlined and holds up the appropriate card. The class as a whole decides if this is correct and then learners are asked to say the heading being held up. The game continues introducing larger values and decimal values (tenths, hundredths etc.). The tutor can vary the rules or how the game is played as appropriate.

Terminology/register: place value words

Reinforcement/practice: group discussion and saying the words out loud to whole class.

Trainee D

Activity title: Words for groups of things

Description: The resource contains several items: some cards with group pictures and the collective noun on the back (e.g. Flowers – bunch); a grid containing collective nouns on which to match & place pictures; a work sheet with calculations on which gaps are to be filled with the collective nouns (e.g. There are 12 bottles of wine in a ___. How many are there in 2 cases?); a grid on which to write the number of items on each card; a final work sheet on which learners are encouraged to create sentences using the collective nouns learned.
Discussion

Our first observation was that the assignment task was taken seriously by all trainees with the best examples producing a range of effective activities. In our previous training courses we had encouraged trainees to plan language related numeracy sessions with limited success. The planning activity we tended to set involved taking a choice of concepts from the Adult Numeracy Core Curriculum (eg “HD1/E3.2: make numerical comparisons from bar charts and pictograms”) and planning a session that takes into account at least one language issue. This activity was not assessed. Most trainees were easily distracted by ways of addressing the numeracy curriculum element and seemed to forget any aspect of language development.

The new assessment requirement to produce an activity appears to have produced the correct encouragement. The assessment task is a little more focused than our previous activity, requiring only one or two activities rather than a larger plan. Of course, the requirement to complete as a part of the summative assessment was also an important incentive.

While we have noted a range of activities from among the trainee submissions what was less developed in the work were methods to clearly develop and practice the language issues raised. Many activities, such as ‘TakeawayPizza’ above, develop learners' understanding and ability to interpret the appropriate language, although the reinforcement and practice aspect was less explicit using standard worksheets rather than focused activities. The 'Words for groups of things' activity was interesting in that it also gave learners opportunities to use the language by asking for written sentences that involve the language being learned. With many of the resources presented language development would be enhanced by discussion amongst the learners although this was not always suggested. Interestingly a number of activities and resources, while expecting discussion, did not provide more explicit expectations for spoken language. The activities in ‘how far from London?’ did expect learners to work in pairs to express phrases involving the comparators (eg “Manchester is further from London than Birmingham”).

We suggest that teachers could do with thinking much more about activities that reinforce and practice the language issues that they raise. This could involve activities that practice reading, writing, speaking and listening, making clear what is expected of learners.

Conclusion

The assessment activity has encouraged our trainee teachers to develop numeracy activities with some form of language focus. Among the examples produced by the trainees we see a range of activities that include: gap filling work sheets; matching activities; sorting; group discussions; encouragement for using the terminology in speech and writing.

Nevertheless, for some teachers some more work will be required to develop activities beyond those which simply raise the terminology.
To aid this process, the authors feel that the development of a framework for language focused numeracy activities would be of assistance.

References


