

Learning Mathematics in context

Liverpool Community College

Case study – measuring for a purpose

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Liverpool Community College offers a very wide range of courses and programmes at several centres, most of which are in or near the city centre. Each centre has a particular specialism. One of the many courses on offer is a BTEC National Award in Performing Arts (Theatre Technology). The course focuses on planning a production, including designing and building a stage set. An essential skill for building the set is the ability to understand measurement of length and to measure materials accurately.

Denise, a teacher* on the course, worked with Cassie, the Subject Learning Coach for Mathematics, to identify an activity from Thinking Through Mathematics (TTM) that would meet her needs. They chose session 14 Estimating length. However, Denise realised that she needed to refine it and make it directly relevant to her learners. She therefore developed a series of sessions.

We use 'teaching and learning' and 'teacher' as generic terms to include:

- teaching, training and learning teachers, tutors, trainers, lecturers and instructors in the further education (FE) system.

In the first session, learners were immediately involved in active learning. They went to the performance space and made a number of measurements that they needed in order to produce a scale drawing of the area and its furnishings.

For the second session, Denise revised the card-matching activity from the TTM session Estimating length and made new cards based on measurements taken from the performance space. In the first version she made, all the measurements were in metres. Later, Denise realised that learners would also need to use centimetres and millimetres, so she changed some of the measurements on the cards.

Learners were given two card sets. One set described the items that had been measured. The other set showed the measurements in a range of metric formats, including millimetres, centimetres and metres, and in both whole numbers and decimals. Learners worked in small groups to match the items to the measurements. There was a lot of discussion as learners compared measurements before matching them to the items. When all items and measurements had been matched, Denise asked the groups to put the measurements in order by size. Again, this generated much discussion, including comparing measurements and the relative sizes of the items.

Not all the groups matched the measurements and items correctly, or put them in the right order. However, whole class discussion revealed where groups had made different matchings and helped them to understand, in a supportive environment, where and how they needed to review their thinking.

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Once learners were secure with the card-matching activity, they made a scale drawing of the performance area on a scale of 1:25. They were told that this would be used to produce a model of the performance area in which a model of the set would be designed and built. A further session was designed to help learners understand and use scales.

In subsequent sessions, learners made model flats, rostra and other items to furnish the scale model in preparation for making the actual set. The model and its furnishings were then used to provide the information needed to order the materials to build the actual set.

When the materials arrived, learners began to make the flats for the set. This session was filmed for the Learning Mathematics in context project.

First, learners measured and sawed the wood to make the rails that would be used to build the framework for the flats. They then screwed these rails together so that sheets of hardboard could be pinned onto the framework.

While one of these frameworks was being built, confusion in the use of metric and imperial units meant that one of the frames was the wrong size. This illustrated the practical consequences of such an error and highlighted a point that Denise could use in another session.

Two members of the group explored the idea of minimising waste. They worked out how to cut rails in a particular order so as to minimise the number of lengths of wood needed. Denise realised that she could use this approach to develop further mathematical skills in subsequent sessions.

Denise recorded her experience of the sessions in her reflective journal, which is attached to this case study. She decided that she would differentiate the level of challenge in future sessions by encouraging some learners to identify the units of measurement appropriate to the task. They would then share this information with other learners.

Lessons learned

- It is always possible to adapt the activities in TTM and in Learning Mathematics in context to make them directly relevant to learners and the context in which they are working.
- It is important to plan a series of sessions so that they encourage progression in learning, with the activities planned in a logical sequence.
- Reflecting on and reviewing an activity prompts ideas for changes and improvements to try out with future groups, and highlights further mathematical topics to explore, possibly in extension activities.

See Denise's reflective journal, which includes an example of an image annotated by learners.