What can you buy in 50 p? Exploring mathematics with primary school children and their families, one penny at a time

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This paper forms part of an Action Research (AR) project conducted in the East Midlands region of England, involving women from low-income and under-served communities. The research aimed to explore the challenges women face in returning to education, and to support their engagement in adult learning through carefully crafted interventions such as interactive mathematics workshops. Whilst in the wider study, we collected data through two sets of focus group interviews with 34 participants, here we focus on workshop activities only.

Collaborating with a local adult education college and two primary schools, we organised five workshops inviting children and their families to participate in playful mathematics learning using everyday objects such as coins, dry pasta, stationery items etc. The workshops were designed to present mathematics as fun, accessible, and inclusive, with the goal of breaking down barriers to education and promoting awareness of intergenerational and lifelong learning.

Keywords: Action research; bridging the gap; playful learning approach

Introduction

In this paper, we share our experience of delivering interactive mathematics workshops for primary school children and their families, focussing on the pedagogical aspect and offering a critical evaluation of the outcomes achieved. These workshops were part of an Action Research (AR) project based in a multicultural city in the East Midlands region of England. The purpose of the research was two-fold: first to understand the reasons for non-participation of women, particularly from minority ethnic and disadvantaged communities, in mathematics learning; and second to raise awareness of available mathematics courses and support potential learners in enrolling. The research is structured around a three-stage AR framework comprising planning, intervention, and evaluation (for details please see Syyeda et al., 2025). The first two stages of the research have been completed, and the third is currently underway. This paper reports on the 'intervention' phase of the AR.

Previous research (such as Kelly, 2016; Syyeda, 2019) suggests that many migrant women are motivated to re-engage in adult learning because they perceive it as a means of supporting their children's education. Building on this insight, we organised interactive mathematics workshops for children and their families in selected primary schools (see figure 1). The workshops were meticulously planned to serve multiple purposes. They offered fun activities which families could enjoy together; highlighted the benefits of mathematical competency in terms of opening doors to further/higher education, improved employment opportunities and helping children with homework; and provided information on mathematics courses available for adult learners. During the workshops, we also invited potential learners to participate in the follow up focus group interviews for the research.

Mathematics Workshops

The mathematics workshops were designed following a playful learning approach. This is a thoughtful and intentional pedagogical method fostering creativity and problem-solving skills by encouraging the learners to explore and experiment. A playful learning approach is 'characterised by joyful, meaningful, iterative, socially interactive, and actively engaging experiences (Li and Kangas, 2024, p. 2). Although this approach draws on play-inspired modes of activity such as imagination, inquiry, and discovery, playful learning remains deliberately structured and aligned with clearly defined learning goals (Zosh et al., 2018). Play is not a diversion from learning, but a meaningful vehicle through which understanding is constructed. The learner is recognised as an active and curious agent, or player, who engages with ideas, materials, and co-learners in ways that support deep and intrinsically motivated learning (Csikszentmihalyi, 2014).

The workshop activities were carefully planned so that people from all age groups could participate regardless of prior mathematical knowledge. Challenging common misconceptions that mathematics is difficult or exclusive, we presented it as a fun, accessible and inclusive skill that anyone could learn and enjoy. We introduced tangible objects including coins and pasta pieces of different shapes, as playful learning tools, to explore a variety of topics and to solve mathematical problems. The workshops included a range of activities suitable for different levels of mathematical understanding. Some activities involved simple tasks focused on counting, times tables (figure 2) and basic addition using coins (figure 3 & 4). Others used pasta shapes as manipulatives to create arrays and continuing sequences (figure 5 & 6). The workshops also included a practical budgeting activity that introduced children to the concept of money management. Each child received an allowance of 50p, made up of thirty 1p coins, two 5p coins, and one 10p coin. A mock shop was set up with food and stationery items labelled with hypothetical prices (figure 7). Children, with help from parents, were tasked to use their allocation of 50p to plan how they would spend their budget. This activity integrated mathematical skills with real-life decision-making, highlighting the significance of mathematics in everyday situations. The workshops provided practical ideas to parents for incorporating mathematical thinking into everyday life such as shopping, cooking, or playtime; making mathematics learning more relevant and manageable at home. By involving participants of all age groups, the workshops encouraged intergenerational learning, allowing family members to learn from and with each other. This approach can be useful to break down age-related barriers to education and foster shared curiosity and collaboration. At the end of each workshop, all learning resources and stationery items were distributed among the children so that they continue playing and learning at home.

Insights and reflections

The workshops employed creative approaches to promote both cognitive and social learning by actively involving all family members. Participants were immersed in tactile, hands-on learning experiences, using tangible objects to solve mathematical problems related to counting, addition, multiplication, logical thinking and the construction of arrays and sequences. These activities naturally supported differentiation and could be easily adapted to meet diverse learning needs by simplifying tasks or extending them for greater challenge.

Overall, we conducted five workshops across three primary schools, all located in low-income and underserved communities. At times, it was challenging to motivate people to join the workshops, and we employed different strategies to encourage participation. Nevertheless, all those you attended the sessions expressed high levels of enjoyment, and feedback was overwhelmingly positive. One mother, for example, shared her happiness at seeing her daughter fully engaged in the hands-on activities, and thinking through the mathematical problems. “I loved it! My daughter was very happy. She played with the pasta for a long time [later at home as well]. She was sitting and thinking, and touching [the pasta pieces] and thinking. I loved it, it was amazing”.

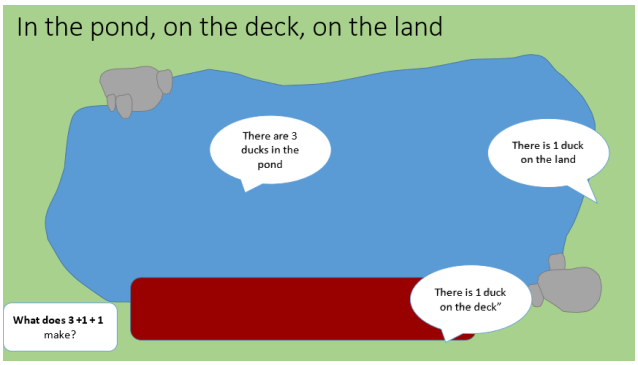
Figure 1

Poster to invite parents/families to attend the mathematics workshops

Figure 2

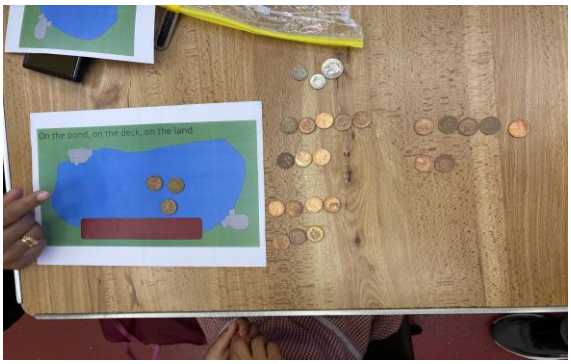
Practising times table

Figure 3



Activity for simple addition

Figure 4



A child counting the coins for the activity

Figure 5

Children making arrays with pasta shells

Figure 6

Continuing the sequence

Figure 7

Mock shop with food, drinks and stationery

Figure 8

Planning the budget

Conclusion

Although attendance varied considerably between workshops, the activities were consistently well received by both children and families. The workshops showed that playful, hands-on mathematics activities can help bridge the gap between women and mathematics learning, while also giving children enjoyable opportunities to build confidence, practise key skills, and see mathematics as part of everyday life. By

creating welcoming, intergenerational spaces, this AR project supported women in re-connecting with learning and strengthened family engagement with mathematics. Moreover, most of the participants expressed interest in enrolling on adult mathematics course and many signed up to receive further information from the local adult education college.

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