“YES! WE ARE PLAYING A GAME, AND IT’S GOING TO BE FUN!”
Kelly Barrett puts games in the mathematics classroom through the test of ‘efficacy’

Background. There is a long held association between games and fun. Many teachers have tried to recreate this enjoyment within the classroom by using games as a teaching and learning approach, in the hope of engaging pupils in activities, to try to motivate them towards doing mathematics. Having used games in some lessons, I began to question whether, or not, the games were having any impact on learning. Previous research (Ernst 1986, Ainley 1988, Hatch 1998) showed that games could provide desired learning opportunities such as discussion, cognitive conflict, and scaffolding. Furthermore, games were said to improve motivation towards mathematics (Ernst 1986). Therefore, I decided to carry out a research project as part of my Master of Research into Mathematics Education to assess the impact of games on pupils’ learning, and whether they could be used to improve pupils’ motivation towards, and understanding of, mathematics.

I began to delve more deeply into how effective learning opportunities arise and it became clear that discussion, either between pupil and teacher or between peers, supports effective learning, and games seemed to be a good way for pupils to engage in discussion. However, as my investigation progressed, it became clear to me that not all games provided these opportunities. It became important for me to design effective games. As a result, I spent time identifying criteria needed for games to be successful in creating effective learning conditions, which I then used to select games for my study, see Table 1 overleaf.

The Study
I carried out the study with two parallel year seven classes, one of which was taught using games. The games replaced the use of normal timetabled activities such as worksheets and textbook exercises once a week. The study ran for two cycles, each running for six weeks. I used pre and post testing to measure the impact on the students’ learning as well as collecting qualitative data through teacher observations, interviews, and questionnaires.

The Games
During the first cycle of teaching I used games that I had already acquired, but it became evident early on that many of these games failed to provide the type of learning opportunities that I had expected, or were needed, for pupils to gain a better understanding of the concepts being taught.

The type of games I used in this cycle were mainly played in pairs and relied on the quality of results rather than the quality of answers. For example, *four-in-a-row decimals*, which practised the use of the four operations with decimals, *equations snakes and ladders*, and *powers of ten match up*. I began to realise that after the first few lessons that students were focussed on winning and completing the game quickly, rather than discussing their answers and learning from their peers. Furthermore, rather than encouraging students to talk to one another about their solutions, the competitive nature and the speed at which the game was played meant that the games could technically be played in silence! As a result, I designed new games for the second cycle that were intended to encourage students to talk. These games included problem based questions which involved challenge cards to encourage students to conflict with one another about their ideas. For example, a shapes discussion game which involved descriptions of shapes that were either incorrect, or could have more than one answer, was designed to encourage pupils to challenge each other’s ideas.

What did the pupils think?
During the first cycle when the games were quick and competitive, students were full of enthusiasm in lessons. One said “More games? Yes! Your lessons are the best!” and another “Yes, we are playing a game! It’s going to be fun!” In addition to this, students began to come and see me during lunchtimes to ask for games to play during their break.

Students were keen to participate in the games and appeared to be far more focussed in lessons. In particular, two normally disruptive boys clearly enjoyed the competitiveness of the games and remained on task when playing. I also noticed a marked improvement in their motivation towards mathematics in other lessons that didn’t involve games. However, this became short lived when the games changed format, and it was clear to me that although students’ motivation had improved, it was only extrinsic and purely based on their enjoyment of paired quick competitive games. When they began to play more thought provoking discussion games their motivation soon wavered. I think this was due to the realisation that the games weren’t just for fun, and were to help them learn. Similarly, the second phase games were less repetitive and, although competitive, could not be played quickly or in silence. Students had to talk to gain points to win, and it was evident that although I spent time discussing and trying to teach students how to talk about mathematics, that initially at least, it is a very hard skill for a middle-ability class to fully grasp.

The Results
My observations showed changes in student attitudes towards mathematics in particular lessons, but I was not convinced that the games had aided learning. The initial games had been played at such speed that I didn’t think they had impacted on student understanding of concepts, and the second set of games, were not played to their full potential as many students seemed unable, and unwilling, to fully access the discussion based problems to the level needed to improve their learning. However, the quantitative post-test results showed no significant difference between the intervention and non-intervention classes following the intervention showing that, although the games hadn’t improved their learning, they did not have a detrimental effect either.

I also used questionnaires to try and find out more about what the students thought about the games and the lessons. Their answers highlighted the fact that the research class responded more positively.
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References


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