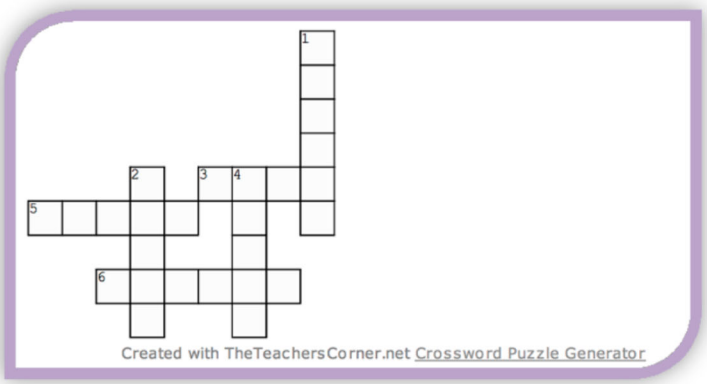
Appendices

Appendix 1. Example game worksheets

Multiplication

Name and Surname_____ **Date:** _____

Work in pairs to complete the following crossword



Across

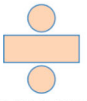
3. 1794!×!4
5. 2594!×!12
6. 7844!×!17

down

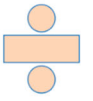
1. 3555!×!83
2. 3755!×!6
4. 2029!×!5

Division

Name and Surname_____ **Date:** _____



Rules of the game:



- Work in pairs to compete against one another.
- Each learner will receive a card with all the answers on it, the order will be jumbled.
- There are also incorrect answers added to make things interesting
- After each answer has been calculated, colour it in before you move onto the next sum
- To win the game you need to have 4 blocks in a row coloured in (horizontal, vertical or diagonal)
- The first one with 4 correct answers in a row wins the game!

Calculate the following sums:	Paste your answer card here
1. !"#!÷!" 2. !"#!÷!" 3. !!"!÷!" 4. !""!÷!"	

Appendix 2. Observation schedules

Topic: Multiplication
Date: 2017-04-21 Time: 08:30 Class: 6S
Participants: Experimental group
OBSERVATIONS

NR	Main observation	Poor	Average	Excellent	Comments during observation
1	Learner's focus when the content is being taught			´x	Active learning; learners ask questions about content; engaging with teacher, no indication of distraction
2	Game influence on learners' attitude towards working with peers		´x		Learners seem to listen to each others' comments, but were not always willing to implement them. Not always committed to solving game problem together.
3	Learners' motivation to start with the *game-based worksheet*			´x	Learners yell 'yes' when they hear that they will complete the worksheet. They seem very enthusiastic and animated – even jumping up and down.
4	Learners' level of fun while completing the *game-based worksheet*			´x	Laughter and clear sounds of enjoyment. Learners even joking with each other.
5	Learners' engagement with peers (collaboration)		´x		Comfortable to talk and ask for help and did not hesitate to reach out to each other when experiencing a problem. They reached out infrequently, however.
6	Learners' enjoyment of the *game-based worksheet*			´x	Learners are focused on completing games. After the activity ended, they asked the teacher for another round of play.
7	Learners' enjoyment of *collaborating*		´x		Learners expressed their enjoyment at the end of the game, several saying that they wanted to work with their friends again and could they do another game.
8	Learners' development of a love for mathematics			´x	Learners were excited and said they were looking forward to the next session.
9	Learners' completion of the *game-based worksheet*			´x	Learners are engaged until the end of the game. No learners are disengaged during the activity.
10	Learners' learning from peers			´x	At times learners were working quietly, but still helping each other. They used each other as support, without constantly relying on one another

Topic: Division
Date: 2017-05-19 Time: 12:30 Class: 6U
Participants: Experimental group
OBSERVATIONS

NR	Main observation	Poor	Average	Excellent	Comments during observation
1	Learner's focus when the content is being taught			´x	Active learning; Use their own whiteboards to practice examples given by the teacher.
2	Game influence on learners' attitude towards working with peers			´x	Even though it is a competition, I noticed learners are motivated in helping each other finish
3	Learners' motivation to start with the *game-based worksheet*			´x	Learners say '1, 2, 3, start!' together, looking at each other excitedly and sitting forward on their seats.
4	Learners' level of fun while completing the *game-based worksheet*			´x	Learners seem to like the idea of competing against each other. They laugh and look excited for the game to begin.
5	Learners' engagement with peers (collaboration)			´x	Good competition – the learners' competitive instinct is activated and the collaborate eagerly in order to win.
6	Learners' enjoyment of the *game-based worksheet*			´x	Learners made groups of two against two which means two on a team, therefore supporting each other, but still engaging in healthy competition.
7	Learners' enjoyment of *collaborating*			´x	Learners seem to enjoy collaborating, particularly if the partners are equally enthusiastic.
8	Learners' development of a love for mathematics			´x	Learners try and anticipate what mathematics they will do in class on the next day. Learners ask the teacher to play with 'sums' again.
9	Learners' completion of the *game-based worksheet*			´x	Learners work well together and follow the instructions; discipline is not a problem as they work quickly to win.
10	Learners' learning from peers			´x	Learners who made teams of two against other pairs, helped each other by coming up with ways of completing the game in order to be able to win, learning what worked best from each other.

Topic: Multiplication
Date: 2017-04-21 Time: 10:30 Class: 6L
Participants: Comparison group
OBSERVATIONS

NR	Main observation	Poor	Average	Excellent	Comments during observation
1	Learner's focus when the content is being taught			´x	Active learning; Engagement with the teacher by passively listening. All eyes are on the teacher.
2	Game influence on learners' attitude towards working with peers				N/A
3	Learners' motivation to start with the *textbook activity*		´x		It is routine for learners to work from their textbook. The learners expect and anticipate the start of the lesson, taking out their own textbook when period starts.
4	Learners' level of fun while completing the *textbook activity*	´x			No element of fun in the textbook activity, only a list of sums. No laughing or enjoyment on the faces of the learners.
5	Learners' engagement with peers (collaboration)				N/A
6	Learners' enjoyment of the *textbook activity*		´x		There is some motivation to engage with the activities. Some learners have smiles and check on each other when they complete individual sums. Others are disengaged.
7	Learners' enjoyment of *working individually*		´x		Learners seem to enjoy working individually on procedural work such as multiplication because they seemed to understand the methods to be employed.
8	Learners' development of a love for mathematics			´x	The teacher tries to stir up a love for mathematics in her learners by commenting on how well a sum worked out and she asks whether they see how cleverly the method works. They seem to agree.
9	Learners' completion of the *textbook activity*			´x	Routine behaviour. Everyone is engaged.
10	Learners' learning from peers				N/A

Topic: Division
Date: 2017-05-19 Time: 10:30 Class: 6L
Participants: Comparison group
OBSERVATIONS

NR	Main observation	Poor	Average	Excellent	Comments during observation
1	Learner's focus when the content is being taught			´x	All learners are listening actively while their teacher is in front of the whiteboard, discussing examples. They put up their hands in response to questions.
2	Game influence on learners' attitude towards working with peers				N/A
3	Learners' motivation to start with the *textbook activity*		´x		Learners automatically take out their workbooks. Some learners take longer than others to do this. The teacher encourages learners to do this at a faster pace.
4	Learners' level of fun while completing the *textbook activity*		´x		Learners follow routine procedures to complete the work
5	Learners' engagement with peers (collaboration)				N/A
6	Learners' enjoyment of the *textbook activity*		´x		No element of fun in the textbook activity, only a list of sums. The learners do not work consistently and are easily distracted by sounds in the classroom, as well as the sound of a distant siren.
7	Learners' enjoyment of *working individually*		´x		Some learners do enjoy doing division procedures on their own because the exercises involve routine procedures and steps to follow which might be easier for learners to concentrate on individually.
8	Learners' development of a love for mathematics		´x		No particular evidence to be seen.
9	Learners' completion of the *textbook activity*		´x		While learners are supposed to complete the work, some are chatting in between. This could be due to the difficulty or lengthy operations of division – they were slowed down by the need to check with the teacher whether they were on the right track.
10	Learners' learning from peers				N/A