Providing parents with support on fractions through use of a Podcast

The STeP Journal
Student Teacher Perspectives

University of Cumbria
Vol 4 (2) pages 56-78

Orla McSorley
St Mary's University College, Belfast

Abstract
Research has shown that positive effect parental engagement has with children's academic achievement. The main aim of this study was to create a resource (Appendices 1 and 2) which would enable parents to help their children with mathematics. It is based on the teaching of fractions at KS3, a topic which literature has shown to be very problematic for both children and adults. The research questions considered in this project were to measure the effectiveness of a podcast for teaching fractions to parents and to explore if parents would use this resource to help their children. The podcast lasting approximately 8-10 minutes guides busy parents through a step to step guide of fraction equivalence whilst incorporating some activities so that parent can test their knowledge. The feedback received from parents was very positive with all parents agreeing that the use of podcasts was an enjoyable, interactive method of learning which would provide them with more confidence when helping their children with Mathematics.

Introduction
Maths- a word that may strike panic to many children today. However, it is not just children who have this fear, reports show that parents also share anxiety when it comes to their children asking for help related to Mathematics. A study of more than 2,000 parents showed that over half lacked the confidence to help children with simple sums in the home. (Pearson, 2014)

Researchers have evidence for the positive effects of parent involvement on children, families, and school when schools and parents continuously support and encourage the children's learning and development (Eccles & Harold, 1993). This suggests that parental involvement can raise pupils' Mathematical achievement.

The Welsh Government has recently released a new initiative to help parents get more involved with Mathematics. According to ITV (2016), "The new learning materials, including online videos, aim to make it less stressful for parents when helping out with other things, like Maths homework." This initiative has encouraged further development on my project. The aim of this research project is to encourage this parental involvement within the area of Fractions through suitable support.

Research on fraction instruction and learning confirms that learning about fractions is a serious problem. (Behr, et al, 1992, p.160). Not only are fractions problematic for children to learn, but also for their parents. From my own experience of schooling and teaching, parental involvement is essential for successful learning. DFES (2002) states, "Children have two main educators in their lives – their parents and their teachers." Supporting parents to become more involved in their children's' learning can only help to enhance learning. I have recognised, the learning of fractions always seems problematic, I hope that the support material that I devise for parents can enhance pupils' mathematical ability in relation to fractions.

Podcasts are becoming more prevalent within our education system and a use of a portable device could stimulate the learning of fractions. "Podcasts are making the classroom a truly collaborative

Citation
McSorley, O. (2017) 'Providing parents with support on fractions through use of a podcast', *The STeP Journal*, 4(2), pp. 56-78.

and dynamic teaching environment." (Macinstruct, 2007) The support of parents will take the form of a podcast. A podcast could provide parents with a step-to-step guide and break the mathematics down into small manageable chunks that can be easily understood. The podcasts aim to improve mathematical confidence of both the child and parent.

Furthermore, it is hoped that a podcast can encourage parents to have a more positive attitude towards mathematics and change perceptions of mathematics as being "too difficult". It is anticipated that the use of the resource (Appendices 1 and 2) will be trialled by parents of first year pupils to test its effectiveness as a teaching tool and its ability to break down the Mathematics in as simple terms as possible for parents in order to raise mathematical achievement.

Literature review

This literature will combine the teaching of fractions with underlying pedagogy including concepts of Pedagogy Content Knowledge and Vygotsky and Gardner's theories of learning. The research will result in the creation of a podcast that supports parents in the teaching of equivalent fractions.

Mathematical Theories

According to Neal (2013), in teaching and learning there are four main contributors to mathematical education consisting of theories by Piaget, Bruner, Dienes and Skemp. In the teaching of fractions directed to parents, it is essential to research and implement appropriate mathematical theories into the creation of an effective resource. Neal states that Piaget's theory is the most popular among maths teachers. Piaget believes that intellectual development passes through five different stages and teachers must provide suitable work to build on the experiences from earlier ages. Bruner's stages of intellectual development are similar to that of Piaget. Bruner's theory has three distinctive stages; enactive, iconic and symbolic. He believes these are different systems of representing reality that may all be used by adult and older children while they are learning some piece of mathematics. This influence should be given particular attention when creating a podcast for both parents.

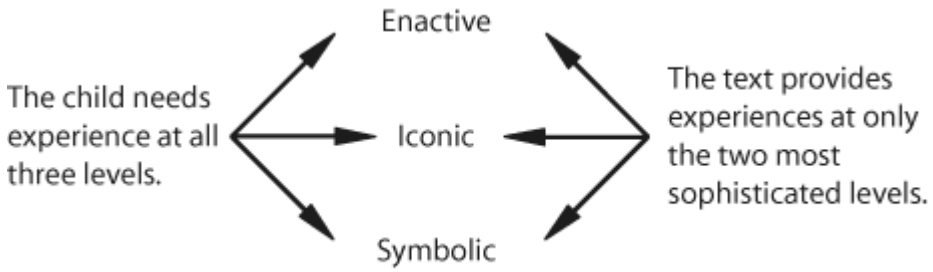


Figure 1.- Bruner's model representation of thought.

Dienes (1971) describes Mathematical learning as *'*being pre-eminently one of construction of bases followed only afterwards by a critical i.e. logical examination of what has been constructed.' Dienes considers learning should start with applications, which pupils actually experience, and progress to a formal mathematical summary.

Skemp (1976) a mathematician and philosopher, believed that fitting together concepts to integrate existing knowledge and assimilate new knowledge forms schemas. Reflective intelligence enables a learner to reflect on current schemas in order to set up new schemas. He believed that there were two types of Mathematical understanding- instrumental understanding known as Mathematical skill, rules without reason.

In development of a resource to support parents with Mathematics, it is important to consider these Mathematical Theories in conjunction with Education Theories.

Educational Theories

Relevant to this research project is Gardner's Theory of Multiple intelligence. Proposed in 1983 Gardner believed that Traditional notion of intelligence based on IQ is far too limited This theory has emerged from recent cognitive research and *"documents the extent to which students possess different kinds of minds and therefore learn, remember, perform, and understand in different ways"* Gardner (1991). Gardner encourages teachers to move away from traditional teaching methods and puts a focus on unique learning styles of pupils, learning through experiences and interactions. Through creating a resource through Gardner's influence, individual learning styles will be considered to suit these needs.

Vygotsky's 'Zone of Proximal development' describes the building on previous knowledge through teacher modeling, "*teacher modelling and scaffolding, learners are able to gain, in a structured manner, knowledge that they are able to retain and apply appropriately in the future, and they may hence be termed as 'learning."* (Taylor &Francis, 2013). Through using a podcast as a method of support for parents, I plan to incorporate Vygotsky's idea of 'teacher modelling' whilst combining Gardner's theory of multiple intelligence to create an effective support resource for parents.

Pedagogical Content Knowledge

Bringing together learning theories, mathematics and resources requires a special type of knowledge. Pedagogical Content knowledge (PCK) is a type of knowledge that is unique to teachers. It is based on the way in which teachers link their pedagogical knowledge, what they know about teaching to their subject knowledge, what they know about what they teach. According to Shulman (1986, p.9) it also includes an understanding of what makes the learning of specific concepts easy or difficult, *"the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning."* It is therefore imperative that teachers are aware of the difficulties and misconceptions learners may experience when planning and devising suitable lessons to cater for the needs of all the children. Gudmundstdottir (1987) describes PCK as a form of knowledge, which makes "*science teachers rather than scientists*." This view of PCK is also evident within the Northern Ireland Curriculum that encourage teachers to create "*stimulating, enriching, challenging and focused*" learning by implementing new teaching methods and challenging their pupils' learning (CCEA, 2007). The podcast will embody the concept of PCK as shown in the diagram below:

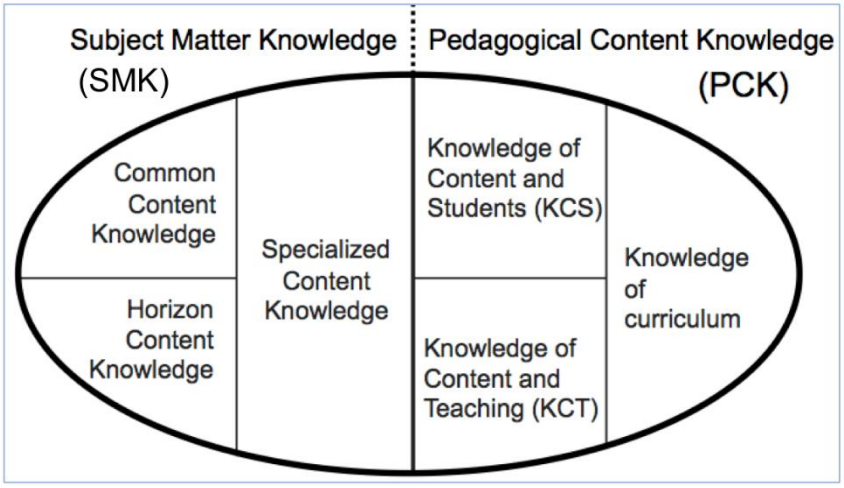


Figure 2. Dimensions of mathematical knowledge for teaching (MKT) from Hill, Ball, and Schilling (2008).

Parental Involvement

In a recent study by US academics (Paton, G., 2013) it was found that parental support was key in driving up standards among children, with Mothers and Fathers having a greater impact than schools themselves. This suggests that pupils' academic achievement could in fact be improved if the parents were also educated to help their children with specific mathematical concepts that may be causing them difficulty. Jesynes (2005, p.245) describes parental involvement as "*parental participation in the educational processes and experiences of their child.*" The importance of parents' attitudes and actions towards their children's education is a major factor concerning achievement within education.

Extensive research supports the potential of parental involvement in improving academic achievements and social outcomes for their children. This is supported by Every Child Matters, which states:

> Parenting appears to be the most important factor associated with educational achievement at age 10, which in turn is strongly associated with achievement in later life. Parental involvement in education seems to be a more important influence than poverty, school environment and the influence of peers
>
> (HM Treasury, 2003 p.18.)

Furthermore, emphasis has been put on by the Department of Education to encourage and improve parental involvement, enabling children to reach maximum academic ability. In 1997, the DofE published the schools White Paper "Excellence in Schools" which highlighted the need for parents to get involved and support their children in order for them to reach their full potential, this encouraged a number of initiatives to be released within schools. These ideas include giving parents an effective voice, increasing the number of elected parent governors and making it a necessity for all schools to give parents a report on their child' s progress at least once a year.

The DfE commissioned surveys in 2001 and 2004 regarding the environment in which pupils where taught and pupils with a disability. In 2007, they released an additional survey with the main objective being to investigate the extent of parental involvement. This survey found 51% of parents felt very involved in their child's school life. This was an increase from 29% in 2001 and 35% in 2004. Another discovery was that parents were now more likely to see a child's education as mainly their responsibility (28%) which is a great increase from the previous years. The results showed ¾ of parents agreed that it was important to help their children with their homework with the same proportion being confident with giving support to their child. A key finding relevant to this project was that 2 in 3 parents would like to be more involved with their child's education.

Since then the DfE in 2010 released a Schools White Paper 'Review of Best Practice in Parental Engagement' describing how the Government will improve outcomes and life chances of all children. It states that Schools will be increasingly accountable to parents for progress and achievement of pupils. Related to this document was the Field Review (2010) 'Poverty and Life Chances' which identifies parents as a central role in creating a good home learning environment:

> There is a weight of evidence which shows that a combination of positive parenting, a good home learning environment and parents' qualifications can transform children's life chances, and are more important to outcomes than class background and parental income

At a national level, the Government's Strategy "Every Parent Matters" (2007) acknowledges the key role of parents in helping their children achieve full potential and the need for government to take a proactive role in ensuring that opportunities are provided to engage in their children's education.

Barriers for parental involvement

Despite parental involvement having a profound positive effect on children's education:

> *There are several major barriers to family/parent involvement in schools. Often, teachers deal with students and families challenged by* poverty*, single parenthood, low literacy, and lack of English language proficiency, and many other social demands*
>
> (Carrasquillo,A., Kucer,S.B. & Abrams.R. p.136)

Research shows poverty, pressure on parental times, pressure on teacher's time, lack of personalised communications, ineffective home-school communications, family structures, home environment and parental experience of education (Teacher support network, 2009) all to be key factors contributing to parental involvement.

Bastiani & Wolfendale (2012), comment that one barrier towards parental involvement is a lack of confidence on the parent's part. Work commitments are also highlighted as a significant barrier for parents when it comes to being involved in their child's education. The Department for Children, Schools and Families reported that, 'Work commitments are the most commonly cited barrier by parents (44%) from getting more involved in their child's school life.' (DfCSF, 2008, pg. 8). Supporting this BBC Report Pro Sue Hallam comments:

> *You have to put it into a social context – a lot of parents are working and the last thing they want to do after the stress if a day's work us supervise homework…want time with children to be quality 'nice' time*

In the creation of a support material for parents, although it may be difficult to address all barriers for parental involvement, consideration will be given as to how the podcast can be adapted to breakdown the significant obstacles in involving parents specifically in Mathematics.

Parents and Maths anxiety

Richard and Suinn (1972) describe Maths anxiety *"as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of ordinary life and academic situations."* Many parents may suffer from Maths anxiety affecting their ability to help with Mathematic homework. Sackstein (2016) highlights the struggle parents have with helping their children with homework, "*It isn't just students tossing their pencils down…Moms and dads also have homework anxiety, dreading the feeling of not knowing how to help their child with history or math."* However according to Spicer (2014), parents with Maths anxiety should not avoid supporting their kids as they work on Maths assignments, though. Instead, she says, *"they should look for ways to have fun with Maths."* If parents are provided with suitable support this should empower them to help their children effectively.

Fractions

Fractions play a key role in mathematics, since they are involved in probabilistic, proportional and algebraic reasoning. However, they are also commonly used outside the classroom. Moeller (2015) states:"*The processing of fractions is part of our everyday life and is used in situations such as the estimation of rebates, following a recipe or reading a map."* However, according to Longman (1991) "*It has been said that 'fractions' have been responsible for putting more people off mathematics than any other single topic. In fact, the very word fraction has been known to make strong men wince!*"

Due to the 'fear' of fractions, a suitable support for parents is needed to help their children with homework relating to this topic and to encourage parental involvement within mathematics.

Fractions in the Curriculum

Fractions are introduced to pupils in the Northern Ireland Curriculum at primary level. At key stage one where pupils recognise and use everyday fractions. This progresses to understanding and using vulgar fractions, decimal fractions and percentages and exploring the relationship between them at Key Stage 2.

At Key Stage 3 level i.e. Years 8-10, the teacher revises these ideas in preparation for the GCSE Maths content. The CCEA (2012) GCSE specification states that pupils should be competent in the following areas in relation to Fractions; understanding equivalent fractions, simplifying a fraction by concealing all common factors, adding and subtracting fractions, using decimal notation and recognising that each terminating decimal is a fraction. This study aims to concentrate on the equivalence of fractions.

Fraction representations

Research has shown that it is important to represent mathematical ideas in multiple ways. For fractions, this means learners need to explore a range of context, representations and task types, "*manipulating physical representations of fractions can support the development of strategies for processes such as comparing, finding equivalence and performing operations*." (Harries, T. et al., 2013) Shulman (1986) identified representations as being part of teachers' pedagogical knowledge. "*The ways of representing and formulating the subject that make it comprehendible to others*." In relation to fractions, there are a wide variety of different representations. Lamon (1999) noted, "*it's unlikely that any other embodiment can come close to the power of the number line for conveying the measurement interpretation of rational numbers."* Additionally, PDST (2016) states that "*the habitual use of circular models to teach fractions has certain shortcomings and a square unit model can often be more versatile*." Wu (2016) discourages circular representations of fractions as there is "*very little flexibility in dividing the area of a circle into equal parts, except my using circular sectors, unlike rectangles, can't be used to model fraction multiplication."*

The importance of fraction equivalence

Many teachers find fractions difficult to understand and teach (Ma et al, 1993), and many students find fractions difficult to learn (Clarke, et al, 1991). Fraction equivalence must be in place before progression is possible. It is therefore important that the learner has an in-depth understanding of fraction equivalence to carry out any further operations. *"Fraction equivalence ideas are fundamentally important concepts. They form the framework for understanding fractions as quantities that can be operated on in meaningful ways." (*Post, et al., 1993 p.15) Equivalent fractions are fractions that have the same value, even though they may look different as shown below.

Without recognising or understanding the relationship between fractions it is difficult to even order or compare them.
To enable the teaching and learning of fraction equivalence it is important to consider the areas that learners may struggle with, "*understanding difficulties in learning fractions seems absolutely crucial as they can lead to mathematics anxiety, and affect opportunities for further engagement in Mathematics and Science."* (Gabriel, F. et al, 2013). It is vital to identify these misconceptions in relation to fraction equivalence so that they can be addressed when creating a suitable support material.

Bezuk and Bieck (1992) state that fraction concepts, order and equivalence often receive very little attention, but instead are brushed upon and taught in a meaningless manner. They emphasise that "*it is crucial to strengthen students' understandings before progressing to operations of fractions, rather than assuming that students already understand these topics."* (Bezuk and Bieck, 1992, p.119). This statement highlights the importance of identifying the misconceptions involved within fraction equivalence in order to create an effective support material, as many parents will face the same difficulties that children do in the learning of fractions.

Fraction equivalence misconceptions
There are many misconceptions in relation to fraction equivalence. This research project will identify seven main misconceptions involved in fraction equivalence. McLeod and Newmarch (2006) suggest that 'being influenced by appearances' is a misconception, they state that "*seeing the numbers in a fraction as two unrelated whole numbers separated by a line," and "Thinking that it is only the denominator that determines the size of a fraction*" i.e. $\frac{1}{2}+\frac{1}{2}=\frac{2}{4}$. This is reinforced by research carried out by Teaching and Learning (2006) who comment on the understanding of rational and natural numbers that involve different ideas e.g. ⅓ of a cake is smaller than ⅕ of a cake because 3 is less than 5. Yet most children readily recognised that a cake shared among three gives bigger portions than the same cake shared among 5.

Linked to the visual representation of a fraction, Campmail et al state the importance of having an a **"***firm understanding of what a denominator and numerator represent through the use of visual (kinaesthetic) resources."* They also relate to the importance of understanding why a rule is applied to solve a certain calculation as opposed to just learning the rule. This helps in altering fractions and finding a common denominator. Some pupils see a fraction as two whole numbers as opposed to one rational number. Huinker (2002), as cited in Petit et al., (2010) states that *"students who can translate between various fraction representations are more likely to reason with fraction symbols as quantities and not as two whole numbers when solving problems"* (p. 146). In addition Suggate, J. et al (2006) highlight pupils difficulty with generalising more complicated fractions i.e. *"they may write* $\frac{3}{7}=\frac{6}{14}$ *but then say that* $\frac{6}{14}$ *is bigger because the bigger numbers are bigger."* It is important that the learner recognises that a larger number of smaller pieces can be equivalent to a smaller number of larger pieces.

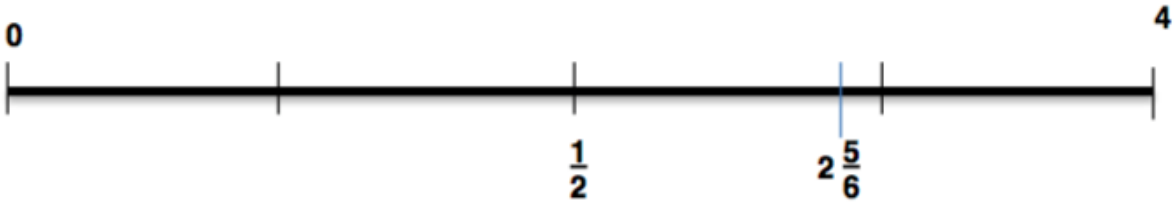
In one case study *Fractions Misconceptions and Thinking-in-Change: Samuel and the Equivalent Fractions (2014)* Sammuel announces that $\frac{2}{6}=\frac{1}{12}$ because 'two sixes equals 12'. This misconception is so strong that Samuel goes on to try out $\frac{2}{4}$ and $\frac{1}{8}$ because he 'knows that $\frac{2}{4}=\frac{1}{8}$ (because 2 x4 = 1 x 8). Here the pupil fails to understand what the numerator and denominator represent and how they are operated on to find equivalent fractions.

Furthermore, a misconception the pupils have is their understanding of the size of a fraction and where it would be represented on a number line**.** Clarker & Roche carried out research in Australia where they discovered further misconceptions in relation to fraction equivalence. They stated,

"*some students argued that* $\frac{5}{6}$ *and* $\frac{7}{8}$ *are equivalent, since they both require one 'bit' to make a whole.*" (2011) In this case, the students are focusing on the gap between 7 and 8, but not considering the actual size of the pieces.

A study conducted in Ontario Canada 2011 on students in grades 4 through to 7 identified significant struggles with fractions including recognizing the importance of defining the whole. When asked to place a number of fractions on the number line, students would place $\frac{1}{2}$ at the halfway point relative to the length of the line and then place other numbers, such as $2\frac{5}{6}$ at the appropriate position between 2 and 3. Frequently the pupils did not revisit the placement of $\frac{1}{2}$ to revise their thinking as shown below.

In 1995, for example, a representative national US study found that only one third of the sample of 13- year-old students were able to correctly place a simple fraction on a number line – a learning objective for 11-year-olds (Kamii & Clark, 1995). In addition, there appears to be little progress when twenty years later, on the 2004 National Assessment of Educational Progress (NAEP), 50% of 8th graders were not able to order three fractions from least to greatest with accuracy (Siegler et al.,



2010). In order for the learner to commute and recognize equivalent fractions, it is imperative that they clearly can identify where a fraction would be on a number line.

Podcasts

What is a podcast?

A podcast can be a video or an audio show, usually spread across a series of episodes, which can be downloaded from the Internet and listened to on a computer or an MP3. (Naughton, 2016). In our modern society the IPod, a portable digital player, is a very popular gadget that allows us to listen to music and watch videos on the go. Ben Hammersley created the term 'podcast' in 2005 to describe the unique marriage of an iPod with broadcasting (Ovadia, 2007). For this project it was decided that a video podcast would be more beneficial than an audio as in mathematics demonstration is extremely important. A video podcast would also cater for the needs of both visual and auditory learners.

Suitable length of a podcast

The length of a podcast is an essential element to consider when creating and planning a podcast. Length should be determined by the podcasts' purpose and content; however, general recommendations suggest short podcasts.

Concentration span is important in relation to podcasts. According to Hattie, Gregory and Yates (2014 p.114) *"Most of us have a natural concentration span of 15- 20 mins. If you need to teach anyone some new information, you need to do it within 15 minutes or you will lose them."* However, in creating this podcast for parents it is also important to consider external barriers that may inhibit their concentration span such as the environment which parents are watching the podcast, sleep deprivation, stress and medical, emotional and psychological problems (Schwartzbard, 2014)

Podcasts should not be made too long, although there is no definitive length for podcasts and different academics that have been using podcasts in their teaching recommend different recording lengths. Podcasts should not be more that 20 minutes according to the research by Edirisingha and Salmon (2007)

Although consensus regarding student preferences of podcasts length varies (Hew, 2008), Rossell-Augilar (2007) noted that, on average students listened to 5-20 minutes of downloaded podcast. Based on student feedback and data collected from our survey short podcasts (approximately five minutes in length) resulted in the highest listening rate. If the topic is complex and requires more time to cover, divide it into two or more podcasts. (Facer and Abdous, 2011) While authors propose a diversity of acceptable podcasts' length they all agree that long podcasts generally result in loss of attention in listening and subsequent decrease in comprehension.

Benefits of podcasting to parents
The Belfast Education and Library Board (2010) released a document highlighting and promoting the use of podcasts. It states *"Podcasting has the potential to support and promote a wide range of alternative teaching and learning approaches across all stages of the curriculum in a wide range of contexts and in different locations both within and away from the school."* Podcasting is suited to parents, as just like children they too will have a wide range of learning styles and abilities. Podcasting caters for this need enabling parents to learn at a time and location convenient to them.

Podcasts provide a range of multisensory approaches to learning, as they can be an audio recording or visual recording with audio. This method of learning supports Gardner's learning theory as the audio podcasts helps stimulate the linguistic learner. This intelligence includes the ability to manipulate the practical uses of language including explanation (using language to inform) rhetoric, mnemonics (using language to remember information), and metalanguage (using language to take about itself). (Armstrong, 2009) The video podcast would cater for the needs of the spatial learner as this intelligence involves sensitivity to colour, line shape, form, space and the relationship that exist among these elements. (Armstrong, 2009) It is important to acknowledge that just like children, there are many different types of learners amongst parents.

Furthermore, podcasts benefit parents as they can be downloaded and watched anywhere free considering that parents have a suitable device to display the podcast. Windham (2007) identified the ease of access to podcasts, *"podcasts can be easily downloaded from the internet for free*." As previously identified, one of the barriers for parental involvement was lack of time. Due to podcasts being portable, this would allow parents on the go to learn wherever and whenever is most convenient to them. This is important to consider in creating a suitable support material for parents. Matthews (2006) comments how podcasts can be listened to at the learner's own time and as much as necessary. Additionally, a podcast can be replayed at any time; Griffey (2007) offers the example of non-native English speakers that could rewind to hear content as many times as possible for clarification. He notes that man learners could benefit from this ability to review information. Not only is this useful to a non-native English speaker but the ability for any learner to replay a podcast could clarify or reinforce a learning point.

Methodology
This methodology will outline how the research for the literature review has been used to inform the planning and production of a podcast suitable for parents. It describes how the podcast was trialled by parents and explains how feedback on the resource was collated and analysed.

What will be created

This project aims to create a podcast for parents in the teaching of equivalent fractions. There are many misconceptions as mentioned in the literature review surrounded this topic, however due to time restraints three common misconceptions will be focused on namely:

- Seeing a fraction as two whole numbers as opposed to one rational number
- Failing to understand what the numerator and denominator represent and how they are operated on to find equivalent fractions
- Failing to understand the size of a fraction and where it should be represented on a number line
- It is intended that the podcast will be used for parents to support their children in their understanding of fraction equivalence, the podcast will be kept basic and simple to highlight to parents how easy and accessible podcasts can be. An additional worksheet activity will be provided to support learning from the podcast. This resource will be trailed among five parents who have children in Year 8.
-

Planning and creating the resource

The aim of this podcast therefore is to teach parents fraction equivalence in an encouraging, friendly and fun way to overcome this 'maths anxiety'. This meant that within the podcast the mathematics needed to be explained clearly and effectively combining pedagogy content knowledge with Vygotsky and Gardner's learning theories.

Breaking down the mathematics within fraction equivalence into small manageable chunks was extremely important so that the learning taking place could be easily followed. It was imperative that these 'chunks' were scaffolded on previous learning from the podcast to ensure that this resource was a competent and an effective method of support, encouraging the eradication of 'maths anxiety.'

As stated in the literature review fractions appeared as a topic that struck both children and parents with panicDue this fear, it was decided that fractions would be the topic that the podcast would be based on with a focus on fraction equivalence and an aim to remove parents' fear of fractions. The illustrations of fractions to be included in the podcast were decided. These visuals chosen were based on which were mostly easily understood by the learner. It was decided that an external link consisting of a fraction game would also be linked to the podcast to consolidate the viewers' learning on fractions.

Length of podcast

From viewing six podcasts, all of which were related to the teaching of fractions, it was established that the average length of each podcast was approximately 10 minutes. Research showed concentration span was extremely important in relation to podcasts as mentioned in the literature review. This meant that it was important to keep the podcast sharp and concise. Halls (2016) states the importance of 'The Short Principle' "keep content as short as possible without compromising the integrity of the message," he describes learners as "generally impatient when seeking information." (p.34-36. It was decided that the podcast should be made to last between approximately 10 to 15 minutes.

Recording the podcast

From research on creating and producing a podcast, the equipment required was a video recorder, a computer and video editing software. To make the podcast available for download online a website can be used to publish the feed. (Cochrane, 2005) Prior to creating the resource, a few trial runs were completed through recording with a video recorder. After reviewing the podcast back, it was decided that using a voiceover feature from PowerPoint would be more effective as it would ensure

complete focus on the content of the PowerPoint. Using the recording facility on Microsoft PowerPoint I recorded a voiceover for each slide that described the key learning points, and enabled the PowerPoint to progress similar to a video. After viewing the completed PowerPoint with the voice-over recorded, it was much more suitable for parents as a teaching resource. The explanation was much more confident and succinct as opposed to the explanation in the video.

Using Interviews

Due to the nature of this resource and time-restraints, a semi-structured interview was used to collect the opinions and recommendations based on the resource created. The nature of the data collected and analysed is qualitative. This type of qualitative data collection enables the interviewer to have the opportunity for follow-up questions when appropriate and enables them to interpret meaning from the participant's body language, tone and enthusiasm (Wilkinson and Birmingham, 2003).

Collecting Results

Prior to interviewing these parents, I piloted the interview with one parent so that improvements could be made if necessary to the questioning and follow-up questions involved. After a few adjustments, I interviewed the five additional parents of Year 8 pupils individually using this final semi-structured interview.

To find out parents' opinion on this podcast as a method of support for fractions the parents of five Year 8 pupils namely 'Parent A' "Parent B' 'Parent C' 'Parent D' and Parent E' agreed to take part in an interview after viewing the podcast and completing the follow-up activity worksheet provided. Ideally, if there was more time available, this resource could have been trialed among all parents of a year 8 group class and their opinions recorded using questionnaire and/or interviews.

The interview, expected to last approximately 10 minutes for each individual parent included twelve questions, designed to address all of the main objectives of this project. The first section was related to the parents' view on involvement with children's education. This section focused on parents' understanding of the importance of parental involvement with their children's education and factors that may prevent parental involvement in the home. Sections two and three consisted of two main points. Section two briefly questioned parents' opinion on their mathematical ability and if parents utilise support available for mathematics. Section three examined parents' view of the mathematics within the podcast and determined how effective and clear the teaching of fraction equivalence was. Finally, section four consisted of four main questions, all relating to the podcast itself. The questioning in this section should determine how successful the podcast was in teaching fraction equivalence and improvements that could be made to improve this support material. Improvements will be considered and results will be analysed and discussed in the next chapter.

Results and analysis

The aim of this evaluation is to explore the resource's limitations, areas for improvement and the benefits of this resource to parents. Five parents of Year 8 pupils from five different schools were interviewed after trialling the podcast and completing the follow-up activity. this has been the basis for this evaluation that aims to explore the resource's effectiveness as a mathematical teaching tool for parents. It then considers to what extent the resource promotes successful teaching and learning.

Parental Involvement

All of the parents interviewed agreed that parental involvement could have a positive influence on their child's academic achievement with Parent B stating, "praise and acknowledgment by parents is extremely important to boost your child's confidence and encourage them to excel in school." This

was no surprise as a study by the US academics (Paton, G., 2013) found that parental support was key in driving up standards among children, with Mothers and Fathers having a greater impact than school themselves.
The parents interviewed stated the common methods used by schools to keep parents involved included homework diaries, parent teacher meetings, and letters from the school. Parent B mentioned how 'welcoming and inviting' the school was, even during informal meetings to discuss their child's academic achievement. Despite this, parents interviewed also agreed that they would like to become more involved in their child's education. This links closely with a survey carried out by DfE (2007) who discovered that 2 in 3 parents would like to be more involved with their child's education.
This podcast resource was created with the intention of being suitable for parents with a busy schedule. Research as carried out in the literature review states that work commitments are the most commonly cited barrier by parents (44%) from getting more involved in their child's school life.' (DfCSF, 2008, pg. 8). This is strongly supported by the parents interviewed with all them mentioning work being a factor inhibiting helping their child with homework due to time constraints and their working hours. Other factors that the parents mentioned included balancing the time among all their children in their family and parents ability to help with homework. The podcast would enable parents to learn about fractions in a short period of time suitable to them.

Parents and Mathematics
This podcast aimed to help parents who may struggle with Mathematics. Research showed many parents suffered from Maths anxiety and their ability to help with Mathematic homework. Sackstein (2016) believed that it was not just students who were anxious when it came to Maths, "Moms and dads also have homework anxiety, dreading the feeling of not knowing how to help their child with math." The interviews by parents supported this research with three out of the five parents stating that they would not be confident helping their child with Maths homework as they felt they were quite weak in the subject of Mathematics and "wouldn't want to be giving them the wrong support and advice." Two of the parents who felt that they were stronger in Mathematics said they would not be confident to help their child in a post-primary setting as 'there are new ways and methods of doing different things in Maths and they didn't want to be confusing the child with a method they may have used.'

When interviewed the most common method of support which parents used for Mathematics was the Internet. However, most of the parents believed that the Internet was difficult to find exactly what you were looking for with Parent D stating ''the Internet can show the information in a complicated way and it can be hard and time-consuming to find exactly what you are looking for.'' Additionally, another method that this parent mentioned for mathematical support was books. However, this parent also stated how they were "rarely used." Providing parents with a resource that is specific to a certain topic should increase parental involvement with their child's education as stated in previous research 'effective resources, including specific, detailed and direct advice and guidance, motivate parents to become involved.' (DofE, 2010)

Mathematics within the Podcast
The parents unanimously agreed that the podcast was pitched at a suitable level for parents. Parent C appreciated how the podcast ''took you through the basics of fractions before gradually progressing on to fraction equivalence'' which for two of the parents enabled 'aspects of fractions to come back' to them. The parents all appreciated that the mathematics was broken down into suitable chunks. Parent A stated 'it was easy to understand the material because it was made simple and it wasn't too over-whelming for me, fractions is a topic which I would have previously dreaded.' The mathematics in the podcast was planned to be broken down into suitable chunks for the parents to ensure that it was user friendly as addressed in the literature review. Parent E valued the way in

which the podcast 'assumed you knew very little about fraction equivalence, bringing you through the process in small, simple but effective steps so that you wouldn't get lost too easily.'

Podcast

This podcast was designed to be approximately 10-15 minutes depending on how long parents would take to carry out the interactive game and short questions. The parents interviewed agreed that the podcast length was very appropriate especially as time was an issue which inhibited parents to support their child. Parent B noted how within the time ''content was demonstrated well and to the point…concentration was sustained throughout the podcast as it was very interactive and concise.'' Keeping within this time frame of 10-15 minutes ensured that the learner was kept focused supporting the view of Hattie, et al (2014) as mentioned in the literature review. "Most of us have a natural concentration span of 15- 20 minutes. If you need to teach anyone some new information, you need to do it within 15 minutes or you will lose them." Parent A stated that ''a longer version should be made available with more detail on fractions, for those parents with more time.'' In the future perhaps podcasts teaching fractions could be developed further in depth and made available to parents. However, it would be difficult to sustain the parents' concentration over a longer period of time and deliver the material effectively. Research shows long podcasts generally result in loss of attention in listening and subsequent decrease in comprehension (Facer, B.R., and Abdous, M. 2011).

This nature of a podcast enabled this resource to appeal to a variety of different types of learners. The podcast provides a range of multisensory approaches to learning, supporting Gardner's learning theory as it appealed to both visual and auditory learners. As stated in the literature review, 'it is important to acknowledge that just like children there are many different types of learners amongst parents.' (Armstrong, 2009). The parents interviewed thought that the 'commentary alongside the visuals was very effective' (Parent E) compared to retrieving information from 'a book or website. Which can be quite over-whelming as there is too much information given and you don't know where to start.' The podcast included many visuals relating to fraction equivalence. Placing fractions on a number line was one of the common misconceptions previously identified in the literature review. Parent A commented how 'the fraction line at the end displaying fractions really summed up fraction equivalence and made it much easier to understand.' Additionally, Parent D appreciated the feature of the podcast that enabled you to pause or rewind if you wanted to clarify an aspect of fraction equivalence.

The response from the parents suggested that some changes could be made to enhance this resource. All the parents agreed that this resource was extremely effective, as most of the parents had previously 'struggled with fractions.' Parent B suggested 'a summary sheet would be great concluding what was learned so that if you needed to refresh your memory you could take a glance at the summary sheet as opposed to watching the podcast over again.' Parent E who suggested something similar supported this view. Due to time constraints, a summary sheet was not created for this resource, however in hindsight this is something that could benefit parents and make the teaching of fractions more effective.

Additionally, Parent C suggested markers could already be in place on the fraction line so that parents would know exactly where to place the fractions. Although fractions are quite complex perhaps something like this would be too easy for the majority of the parent audience, however markers could be in place as an option for those parents struggling to gauge exactly where fractions lie on the fraction line.

All parents agreed that they would most definitely use podcasts in the future for support in Maths this coincides with Salmon (2008) who believed podcasts ''*can improve learner cognition of complex*

information through integration of instructional media.'' Parent E thought 'fraction equivalence was made easy… a topic which I would have dreaded was made fun and enjoyable.'
Using podcasting as a tool of mathematical support caters for a wide range of learning styles and abilities. Belfast Education Library board (2010) describes the use of podcasts as a learning tool as 'supporting and promoting a wide range of alternative teaching and learning approaches.' Parent D believed that learning from a podcast is 'much easier than learning from a book.' Reinforcing the idea that podcasts appeals to a variety of different learners. Furthermore this parent also appreciated that podcasts could be paused or replayed if need be supporting Griffey (2007) who highlighted the importance of this feature to rewind content to hear as many times as necessary for clarification.

Finally, the main aim of this podcast was to support parents so that they would be encouraged to become more involved in their children's education. All parents agreed that this resource would definitely encourage parental involvement as they felt 'a lot more confident' with fraction equivalence after using this resource. Parent E described how prior to the podcast they 'dreaded the topic... it always confused me.' However, from using this resource 'fraction equivalence became so easy... I would be more than delighted, in fact excited to help my child with this topic.' The positive feedback from the parents highlights how a podcast would be an effective resource to support parents in maths.

Conclusion
In conclusion, I thoroughly enjoyed this capstone project and believe that it was a very worthwhile experience. Using a podcast to support parents or even children in mathematics was something that I may never considered possible if it had not been for this project. As well as gaining a better knowledge of teaching fraction equivalence, I have learned the how to create a resource which would support parents to promote further involvement in their children's education. This is something that will aid my own professional development. The production of this project was very time-consuming and a considerable amount of time was spent working on it. In particular, a lot of time was spent in planning, creating trailing the resource among parents. Despite this, discovering that the final resource can be used effectively by parents to support the teaching of fraction equivalence has been very rewarding.

In general, the feedback was very positive with all the parents being impressed by the resource itself. This proved to me that the resource deemed useful for teaching and supporting parents in fraction equivalence. This resource, whilst effective in teaching could have included additional material such as a summary sheet as recommended by two of the parents to consolidate learning which was taking place within the podcast. If more time was available to develop this resource, additional support questions, summaries and activities could be added to enhance this fraction equivalence resource. The feedback from parents has been very valuable and allowed me to realise the limitations of the resource and how it could be improved.

Moreover, whilst the parents appeared to enjoy viewing and learning from this podcast consideration would need to be given to information for parents about podcasts and how they can be used. None of the parents interviewed had used a podcast as a method of support for mathematics before and many of the parents did not know what a podcast was. If completing this project again, an instructional or brief overview of podcast should be included within this resource. Additionally, this podcast was given to parents by a DVD. It would be questionable to whether this would be affordable within the school's budget. Again, if I were to complete this project again I would investigate methods of publishing tis podcast online on the school's intranet so that parents would have access to viewing he podcast at any time making the podcast more portable and efficient to view.

In conclusion, this resource has provided a starting point for an area I hope to develop through my own teaching career. It improved my ICT skills whilst highlighting the importance of encouraging methods of parental involvement within children's education. This project has made it clear that although parents want to help their children with mathematics, sufficient resources or support are not available for them to do so. The use of a podcast for teaching mathematics to parents enables them to become more confident in aiding their children with mathematics in a fun and enjoyable approach. As teachers it is imperative that we are aware of recent developments and ensure that, we are always striving to learning and achievement for children by all methods possible to enhance both teaching and learning. The creation of the resource merged a range of different teaching and learning theories alongside raising awareness of the importance of parental involvement.

Reference

Armstrong, T. 2009. 3rd ed. *Multiple Intelligences in the Classroom*. USA:ASCD

Bezuk, N. S., & Bieck, M. (1992). Current research on rational numbers and common fractions: Summary implications for teachers. In D. T. Owens (Ed.), Research ideas for the classroom: Middle grade mathematics (pp. 118-136). New York: Macmillan.

Carrasquillo,A., Kucer,S.B. and Abrams,R (2004) *Beyond the beginnings* , United Kingdom: Wordworks.

Clarke,D. and Roche,A. (2008) *Some advice for making the teaching of fractions a research-based, practical, effective and enjoyable experience in the middle years* , Austrailia: Australian Catholic University.

Dienes, Z.P. (1971) *Building up mathematics*, 4th edn., London: Hutchinson Educational.

Edirisingha, P., Salmon, G. (2007) *Pedagogical models for podcasts in higher education*, Leicester : Beyond distance research alliance.

Facer, B.R., and Abdous,M. (2011) *Academic podcasting and mobile assisted language learning: applications and outcomes* , New York : Information Science Reference

Gabriel, F., Coche, F., Szucs,D., Carette, V., Rey,B., and Content, A. (2013) 'A componential view of children's difficulties in learning fractions', *Front Psychol,* 4(820),

Griffey, J. 2007. Podcast 1-2-3. Library Journal 132: 32-34

Harries, T. Bolden, D. and Barmy, P. (2013) *Tony Harries, David Bolden, Patrick Barmby,*, United Kingdom: Durham University.

HM Treasury (2003) *Every child matters* , Norwich : TSO.

italk2learn (2014) *Fractions Misconceptions and Thinking-in-change: Samuel and the Equivalent Fractions,* Available at: *http://www.italk2learn.eu* (Accessed: 2nd November 2016).

Macinstruct (2007) *Pocasts in education,* Available at: *http://www.macinstruct.com* (Accessed: 24th October 2016).

Matthews, K. (2006) *Research into podcasting technology including current and possible future uses* , Southampton : University of Southampton .

McLeod,R. and Newmarch,B. (2006) Fractions , London: NRDC

Moeller,K.,Klein,E.,Kucian,K. and Wilmes,K. (2015) *Numerical development- from cognitive functions to neural underpinnings*, Lausanne Switzerland : Frontiers.

Naughty,P. (2016) 'What is a podcast and where can I find the best ones to listen to?', The

Paton, G. (2013) 'Parents 'struggling with primary school maths homework'', *Belfast Telegraph ,* 24th Jan

Post, T., Cramer, K., Behr, M., Lesh, R., & Harel, G. (1993). Curriculum implications of Research on the Learning, Teaching, and Assessing of Rational Number Concepts. In T. Carpenter, E. F& Harel, G. (In press). Designing instructionally relevant assessment reports. In T. Carpenter & E. Fennema (Eds.), *Research on the Learning, Teaching, and Assessing of Rational Number Concepts*

Salmon, G. (2008) *Podcasting for learning in Universities* , Glasgow : Bell and Bain LTD .

Sackstein, S. (2016) *Helping parents support children at the kitchen table ,* Available at: *http://blogs.edweek.org/teachers* (Accessed: 31st October 2016).

Schwartzbard, J. (2014) *Factors that affect focus and concentration,* Available at: *www.bettermind.com* (Accessed: 2nd November 2016).

Suggate, J., Davis,A. and Goulding,M., (2006) *Mathematical knowledge for primary teachers*, 3rd edn., London: David Fulton Publishers .

Taylor and Francis (2013) sing the theory to enhance the use of ICT in your teaching, Oxford: Routledge. Distance learning technology resource guide, Available at: http://www.tecweb.org/styles/gardner.html (Accessed: 23rd October 2016).

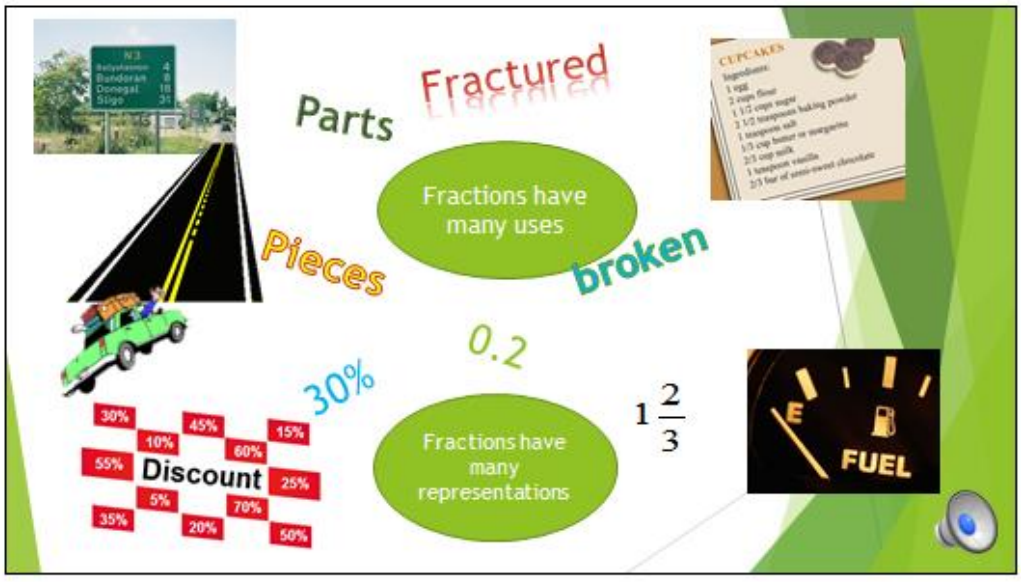
Teacher support network (2009) Beyond the school gate: How schools and families can work together better, London: Education support partnership.

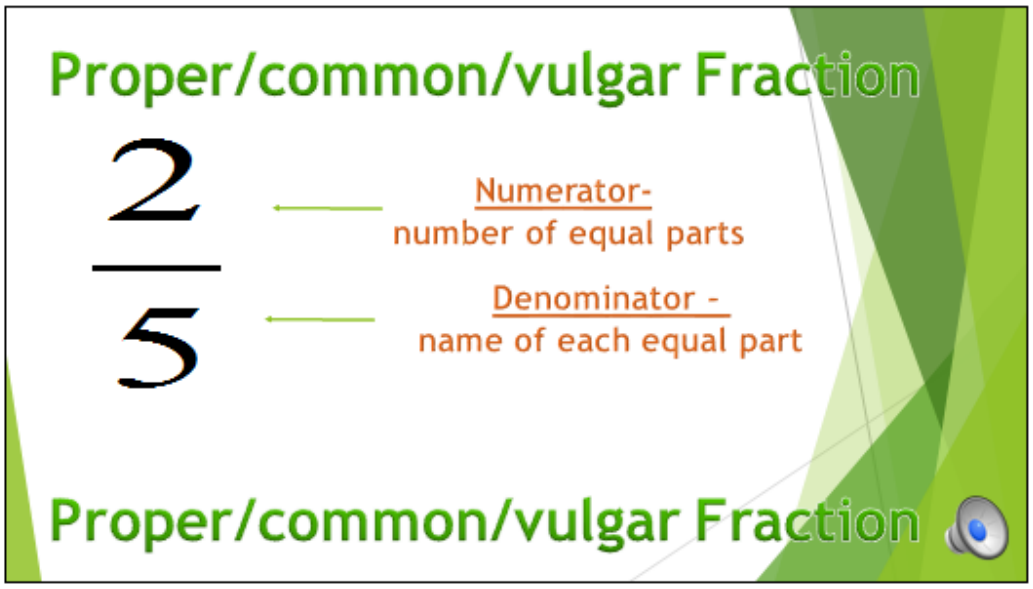
Teaching and Learning Research Programme (2006) *fractions: difficult but crucial in mathematics learning,* Oxford: TLRP.

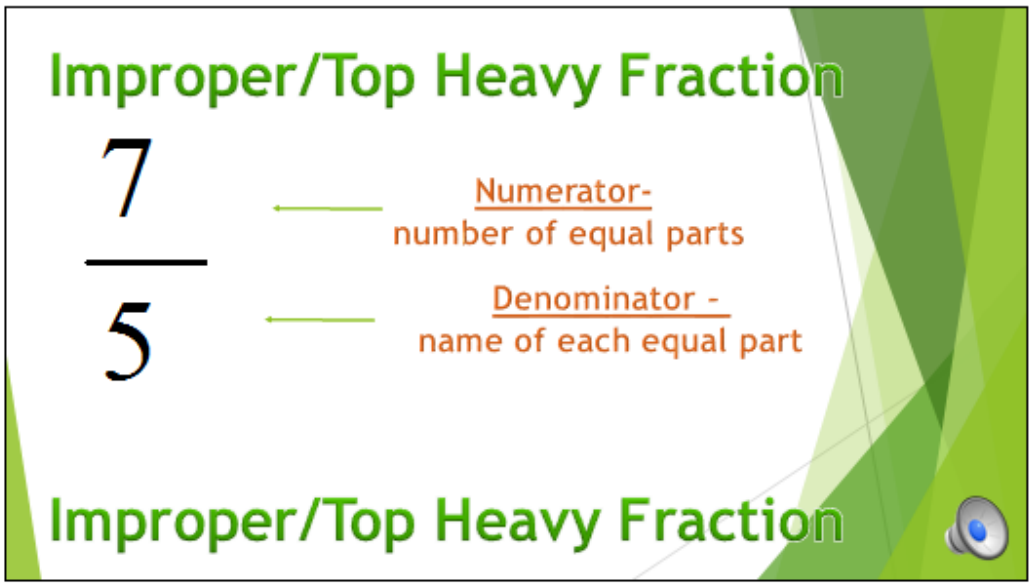
Windham, C. 2007. *Confessions of a Podcast Junkie. EDUCAUSE Review,* vol. 42, no. 3 (May/ June 2007): 50-65

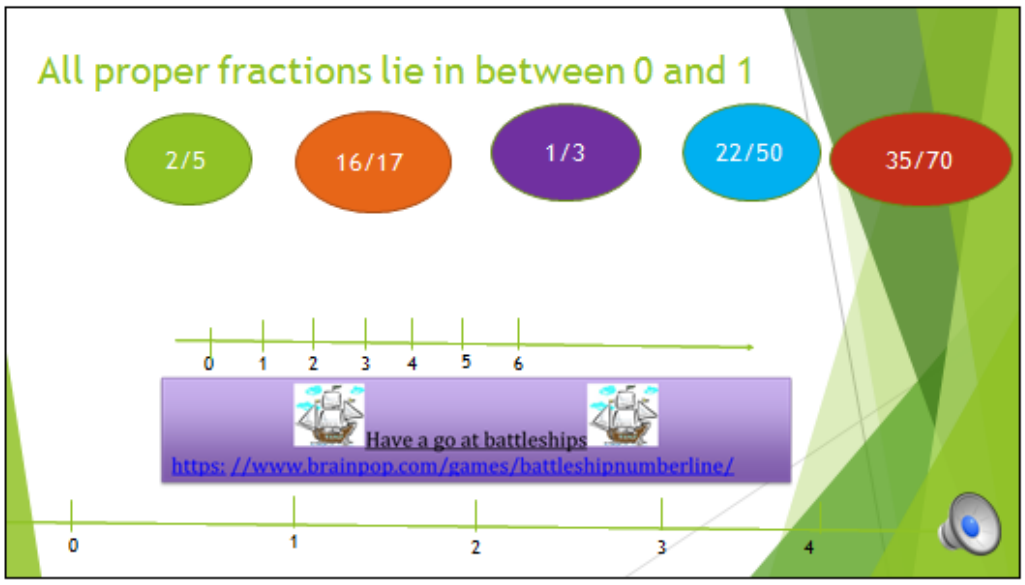
Wu, H. (2011) *Teaching fractions according to the common core standards*, USA: American Mathematical society.

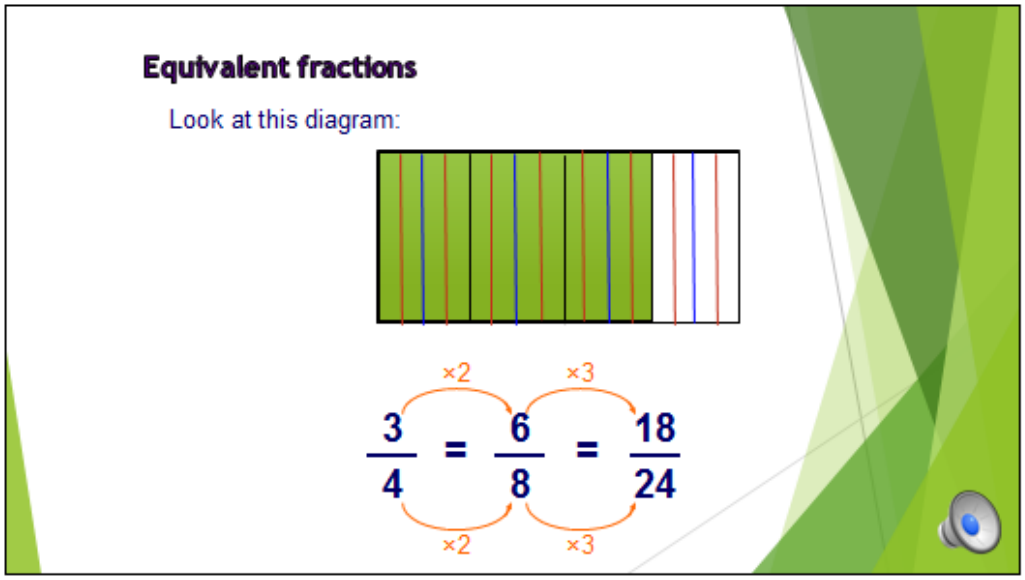
Appendix 1- The Resource

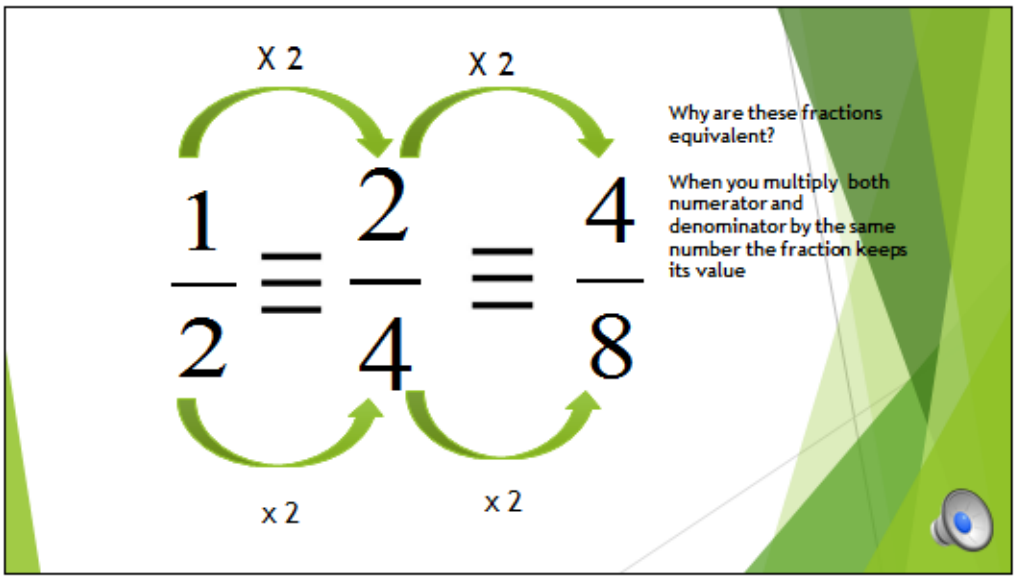


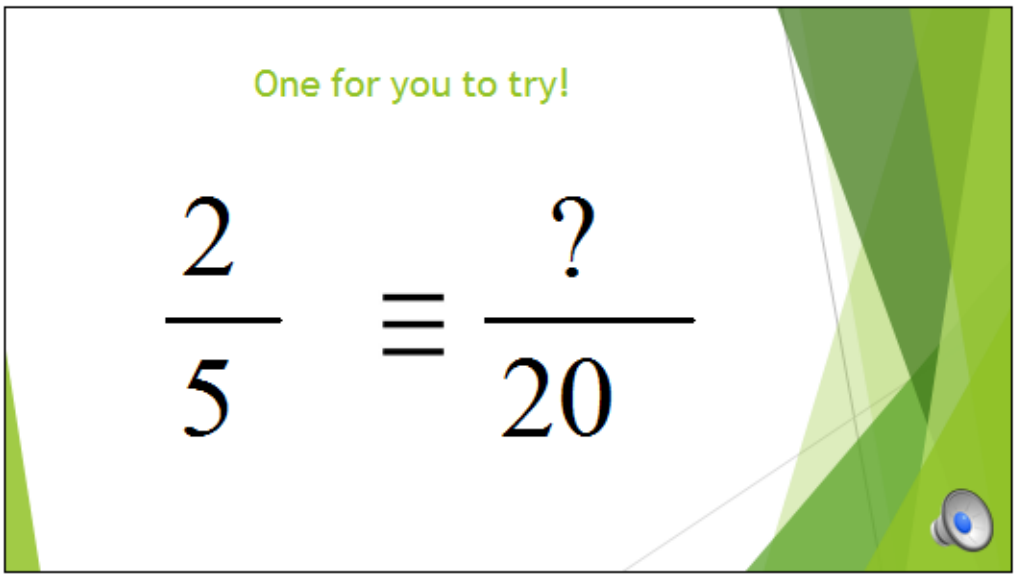

Proper/common/vulgar Fraction
2
5
Numerator-
number of equal parts
Denominator -
name of each equal part
Proper/common/vulgar Fraction

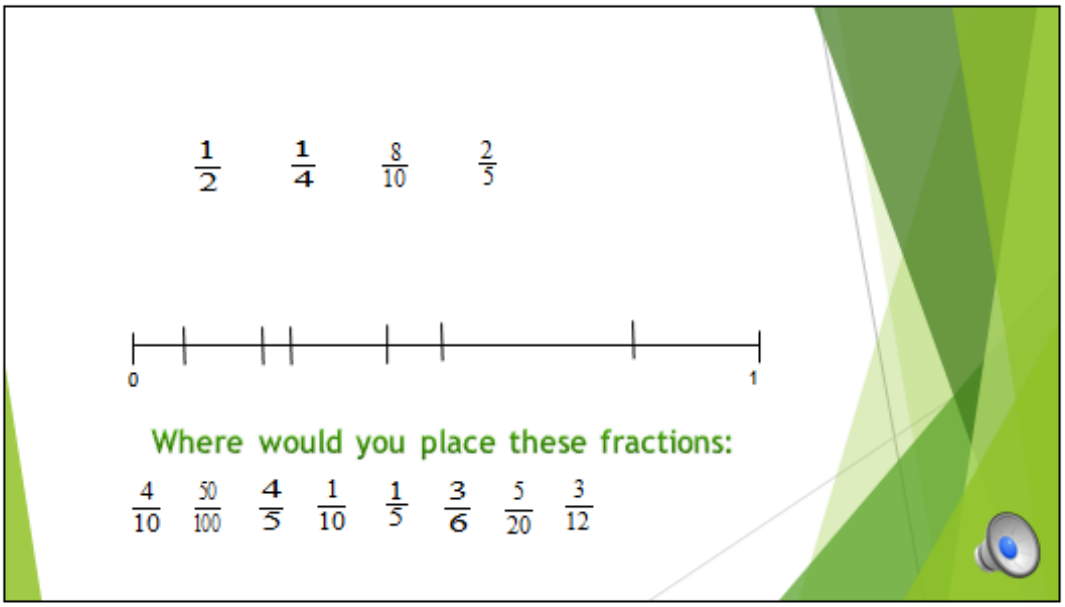

Improper/Top Heavy Fraction
7
5
Numerator-
number of equal parts
Denominator -
name of each equal part
Improper/Top Heavy Fraction

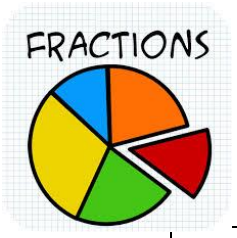

All proper fractions lie in between 0 and 1
2/5
16/17
1/3
22/50
35/70
0 1 2 3 4 5 6
Have a go at battleships
https: //www.brainpop.com/games/battleshipnumberline/
0 1 2 3 4


Equivalent fractions
Look at this diagram:
×2
×3
3/4 = 6/8 = 18/24
×2
×3


X 2
X 2
1/2 = 2/4 = 4/8
x 2
x 2
Why are these fractions equivalent?
When you multiply both numerator and denominator by the same number the fraction keeps its value

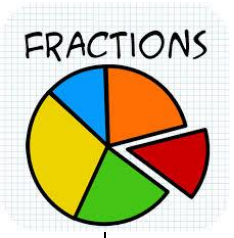

One for you to try!
2/5 = ?/20


$\frac{1}{2}$ $\frac{1}{4}$ $\frac{8}{10}$ $\frac{2}{5}$
0
1
Where would you place these fractions:
$\frac{4}{10}$ $\frac{50}{100}$ $\frac{4}{5}$ $\frac{1}{10}$ $\frac{1}{5}$ $\frac{3}{6}$ $\frac{5}{20}$ $\frac{3}{12}$



Appendix 2-Follow-up activity

Fraction equivalence activity



1a) Copy and complete the fraction table below. An example has been provided for you.

	Name of parts	Denominator	Number of parts	Numerator
$\frac{3}{4}$	quarters	4	3	3
$\frac{4}{7}$				
$\frac{2}{10}$				
$\frac{8}{9}$				

1b) Put a cross through the proper fractions

2/3 17/16 7/3 9/8 5/10 3/5

Fraction Equivalence: Two fractions that represent the same value

2a) Which of the following fractions has a numerator of 8 and is equivalent to a $\frac{1}{2}$.

$\frac{4}{8}$ $\frac{8}{12}$ $\frac{8}{9}$ $\frac{8}{16}$

b) Which of these fractions has a denominator of 18 and is equivalent to $\frac{2}{3}$.

$\frac{8}{18}$ $\frac{12}{18}$ $\frac{4}{6}$ $\frac{17}{18}$

3a) Circle the fraction that is the odd one out

$\frac{2}{5}$ $\frac{4}{10}$ $\frac{6}{15}$ $\frac{9}{20}$ $\frac{10}{25}$ $\frac{32}{80}$

b) Match each fraction to their equivalence

$\frac{2}{5}$ $\frac{14}{20}$

4a)Place the following fractions on the fraction line:

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{8}{10}$ $\frac{2}{5}$

b) Where would you place these fractions?

$\frac{1}{10}$ $\frac{4}{5}$ $\frac{50}{100}$ $\frac{3}{6}$ $\frac{2}{8}$ $\frac{1}{5}$ $\frac{5}{20}$ $\frac{3}{12}$