Running head: MATH, FUN AND GAMES? YES WAY!

Math, Fun and Games? Yes Way!: Teachers’ Perceptions of the Role of Games in the Mathematics Classroom in Grades 4 and 5

Sarah DeLeeeuw

George Mason University

Math, Fun and Games? Yes Way!: Teachers’ Perceptions of the Role of Games in the Mathematics Classroom in Grades 4 and 5

*There are many ways to organize curricula. The challenge, now rarely met, is to avoid those that distort mathematics and turn off students.*

— Steen, 2007

Students are living and learning in an age of new media – where they give constant attention to the latest scoop on TV, the hottest music for their iPods, newest games for their game systems, instantaneous updates in their online communities and social networks, and they have mobile apps that manage all of these interests simultaneously. Students are constantly (an average of 7.5 hours a day!) interacting with media – more than ANY other activity besides (maybe) sleeping – according to a popular report, compiled by the Kaiser Family Foundation.

I contend that this age of new media also implies an implication to teaching and learning. Traditional methods of teaching may not be engaging today’s learners who are used to these dynamic and interactive platforms. Since these new media forms have altered how youth socialize and learn, how are we altering how we teach?

In the following qualitative study, I explore one particular instructional medium that may be considered to be more interactive - using games to teach and learn mathematical concepts. I investigate the idea through the lens of the teacher, the one that ultimately makes the decision about *how* teaching and learning take place in the classroom.

Conceptual Framework

My assumptions about using games in the mathematics classroom are shaped by personal experiences related to the topic. First and foremost, I formed opinions about using math games while using them myself - both as a former classroom teacher and currently as a volunteer at a local elementary school.

At professional conferences, I found myself showcasing existing math games when leading various workshops on resources that engage students. In interacting with attendees, I began to develop ideas about how other teachers felt about using them in their classrooms.

In addition to exchanging ideas with teachers sporadically in workshop settings, I have also been consistently collaborating with various other people who are interested in the topic. I am working with a local group of elementary teachers, peers in my Mathematics Education Leadership PhD cohort, coworkers at the National Council of Teachers of Mathematics (NCTM), and developers of instructional software and products. Together we are exploring ways to modify and create effective math games for classroom use. These interactions continuously influence my beliefs and perceptions about different aspects of using games within instruction. Negotiating meaning with others prompts me to incrementally modify my existing contentions on the topic while also exposing new considerations that stimulate further thought.

Last but not least, my beliefs are influenced as I learn more about the topic. I am currently enrolled in an instructional technology class titled “Design Issues in Educational Gaming and Media” that has inspired me to situate my interest in math games in the context of the digital divide, as a possible way to engage the current interaction-craving generation.

Although I do not have experience as a classroom teacher at elementary or middle school levels, I have worked with elementary and middle school teachers on various occasions – as a graduate student researcher, as the leader of professional development, and as part of a collaboration for a tutoring program, to name a few. I also have experience with math games, and these experiences have been diverse. I have worked with developing math games, evaluating math games, writing lessons that incorporate math games, playing math games with students of all ages, and teaching teachers about math games at various conferences or in-services.

Based on my experiences and interactions, I have developed several assumptions about the role of math games in the classroom. First and foremost, I believe that there is not only a place for games in the mathematics classroom; there is a need for them. We have a responsibility to respond to the changing society where our students are constantly engaging in forms of new media - such as the social platforms, dynamic and interactive videogames, and apps on their cell phones, as I mentioned earlier. I believe that media mediates relationships. As the technology changes the media, the media in turn changes relationships. And so the relationships in the classroom must also change to keep up with the pace of technology. The new media allow the user (students in this case) to participate more and more. Traditional methods of teaching math, such as lecture and rote learning of algorithms, rely on individual practice.

I purport that games can offer a more dynamic and interactive mode of learning, while practicing skills and deepening problem-solving ability. I believe that there are many other benefits to using games, such as, they: increase curiosity and motivation, create a student-centered learning environment, reduce anxiety, allow for cooperative learning opportunities, build strategy and reasoning skills, reinforce mathematical objectives, inherently differentiate instruction, actively engage multiple students at once, and appeal to students who demand constant interaction.

Games may reduce anxiety (since it is often student interacting with another student or the computer instead of the teacher judging student) while also increasing engagement (since each student has more opportunities to take turns and “do” the math than he/she would in a whole class setting where the teacher can only question one student at a time). Games can be motivational because there is a predefined goal, and students hopefully want to figure out the best way to get there. Games often give immediate feedback whereas worksheets and textbook assignments do not. Games allow students to construct meaning with peers, especially when they play in partners/teams and reason through the options of the game through discourse.

All of these benefits of game-playing lead into my second assumption - that not ALL math games are good for teaching and learning. The best math games are those that combine mathematical content (particular objectives such as multiplying decimals or adding fractions, for example) with the processes (reasoning, making connections, using multiple representations, and communicating) that are necessary for conceptual understanding and strategic competence. I also believe that games that incorporate this combination of procedural skill with critical thinking and problem solving skills are those that are comprised of a combination of chance and choice. In such games, the student cannot plan their next step in the game until their turn prompts them with an opportunity. By chance, the player might roll dice or might be dealt a card. This chance then prompts him or her with a choice, where it is necessary to implement some sort of decision-making in order to complete their turn. This may include choosing the card in the discard pile versus the card in the draw pile or combining the faces on the roll of dice with an operation. For example, a game entirely based on chance, such as Bingo or Candyland, prompts the player to complete a procedure (advance or regress based on the roll of the dice and the rules associated with the location on the gameboard) but not to make decisions and develop an optimal strategy. On the other hand, a game based solely on choice, such as Checkers or Chess, gives the player full-control of their ‘moves’ throughout the game – not limited by the uncertainty in the roll of dice, for example. Games that combine chance and choice promote the development of both mathematical skills and strategic competence.

Math games that provide a balance of chance and choice cater both to weaker students who need to practice procedural skills and also challenge those at higher levels of conceptual understanding to seek out an optimal strategy. In this way, math games are designed to differentiate instruction.

When using games in classrooms, I believe that teachers have to integrate the games into regular instruction and allow students ample time to play the games and develop strategies before facilitating a rich follow-up discussion to maximize effectiveness. In the debriefing, it is important for teachers to make the math explicit to the students and encourages them to connect the concepts by communicating and extending their strategies.

My last assumption is that many teachers do believe in the benefits of using games in their classrooms yet still don’t regularly include them in instruction. This may be attributed to their limited experience learning from games themselves, pressures from parents and/or administration, a focus on teaching to the test, or the extra time and effort it takes to incorporate games into the curriculum. Teachers may resist using games in their classrooms because change is often uncomfortable and difficult. Some teachers are used to teaching mathematics in a more traditional way, and it may be uncomfortable for them to try something new. They may be also concerned about maintaining classroom management, about choosing games that are relevant and meet the goals of their class, or about evaluating student progress. Incorporating games requires extra time and effort from teachers initially. They have to find games that they deem ‘good’ games that also fit into the curriculum, and even after they find a ‘good’ game, teachers must facilitate its use effectively in the classroom to maximize learning.

Teachers may have trouble understanding how games can be effectively used for learning because they didn’t learn math concepts in this way, so it is hard for them to transition and use games for this purpose. Since they didn’t grow up in this age of new media, it is hard for them to understand the needs of their students – specifically to be constantly engaged in interaction. In my opinion, it is important to engage teachers in learning through game-playing firsthand before anticipating that they will consider using math games in their own classrooms.

Besides feeling uncomfortable carrying out instruction that incorporates math games, teachers may feel uncomfortable justifying their decision to other stakeholders, such as parents or administrators. Parents may not see or buy into the benefits of game-playing in mathematics classrooms, and administrators may not see the direct link of the mathematics and problem-solving skills to the standards tested on SOLs. Teachers have to be prepared to defend their use of games in their classrooms by first believing in the benefits and connections themselves, and then by communicating them to their students, parents, administrators, and other stakeholders.

My understanding of teachers’ perceptions of the role of using games in their classrooms is limited to my own interpretation of the conversations I have had with those at work, school, in the community, or at conferences. I hope that by conducting an analysis aimed at uncovering themes from interviews, I will gain a better understanding of the beliefs and opinions of teachers on using math games in their classrooms today.

Research Questions and Hypotheses

When choosing a research question, I was careful not to be too specific. I didn’t want to assume that teachers shared beliefs similar to my own. I also didn’t want to phrase any of my interview questions in a way that inferred that I expected them to respond in a particular way.

My broad research question is: What are the perceptions and beliefs of upper elementary teachers about the role of game-playing in their mathematics classrooms?

My goal was to construct a clear picture of how and why teachers started using math games in their classrooms, what purpose they use the games for, the extent of their comfort level facilitating teaching and learning with games (and how their comfort level may have changed over time), how they find, evaluate, and even modify games, and what tensions from others influence their use of games.

Although I tried not to have any expectations at all, it was inevitable for me to connect my own general assumptions to these teachers. I admit that I expected the teachers’ responses would be a subset of the ideas that I considered when revealing my own beliefs and perceptions, but I expected their responses to vary. I was interested in hearing about the specific games and experiences that these three teachers had. I anticipated that not all teachers would share all of the same views I did, but I had no idea where their views would differ. Further, I was interested in finding out if they all differed in the same aspects of using games in their classrooms.

However, I did realize that my expectation may be skewed - that the sample of teachers that I had worked with (when forming my assumptions) were probably not a comparable sample to these three teachers - since often my interactions took place at NCTM conferences, meetings, and online workshops. The teachers I have previous experience working with had showed concern for their improvement in teaching by taking part in such workshops, and I wasn’t sure if the three teachers that I was interviewing showed dedication to professional development by taking part in such opportunities themselves.

Setting, Participants, and Relationships – Prior Connections

Upon taking a job at NCTM in August of 2008, when I also started this PhD program, I was asked if I wanted to volunteer at a local elementary school as a Lunch Bunch math tutor. I was excited about the opportunity since I was used to being in a classroom as an instructor and I knew that I would miss having my own students. I had to transition into balancing an office job and a being a student myself again, but it seemed like a good idea to continue to have a presence in a classroom – if I could fit it in my schedule. To me, it was important to continue teaching mathematical concepts while learning about the teaching of mathematics (in my PhD program) and also developing and presenting instructional techniques to teachers (at NCTM) – exemplifying how research informs practice and practice drives research.

By agreeing to volunteer in the Lunch Bunch program, I got to know both Mrs. Malloy and Miss Young, the liaisons and math specialists at this particular local elementary school. Mrs. Malloy teaches Kindergarten and Miss Young teaches Special Education. They provided some paper-based math games that we (the volunteers) were to play with our two assigned students after eating lunch and conversing with them.

Each week, I greeted my students at their classroom, where their teacher released them to me early for lunch. There was little interaction between their teacher and me; although sometimes she would send along a test that she wanted me to review with the students.

I was constantly asking questions that I wasn’t sure if I should ask the teacher directly: Did the teacher know what kind of games I was instructed to play with the students during Lunch Bunch? What instructional tools did my students’ teacher use to teach these mathematical concepts? Did she value the idea of using games in her classroom? If she used games herself, what was her purpose - to kill time, as a reward for good behavior, as a true instructional tool? I wondered if the teachers were encouraged to use games, or if they ever really thought about how to judge whether or not a game was ‘good’ or not. I wondered where Mrs. Malloy and Miss Young found the games they offered me and the other volunteers to use for our Lunch Bunch meetings.

I decided to continue feel out the program and help the students I was assigned the best way I knew how, but I didn’t ask any of my questions explicitly. In addition to being a Lunch Bunch Buddy for the past two years at this elementary school, last year I volunteered to lead a workshop for all of the math teachers. My purpose was two-fold: to share some of the games that we were playing at Lunch Bunch and also make them aware of all of the ready-to-use resources that NCTM has to offer them. The highlighted resources included Illuminations (a website with thousands of free math lessons), applets (online interactive tools for demonstration and exploration), and Calculation Nation (an online site of math games aimed at developing math conceptual knowledge while building problem solving strategy). We briefly discussed what characteristics make a good game, and how to use games effectively as part of instruction.

Although NCTM is always invited to be a part of a Family Math Night at their school, where the entire computer lab was set-up for students and parents to challenge each other to the math games on Calculation Nation, I went away still a bit dissatisfied. I thought to myself, “Sure, folks are ‘sold’ on these games being attractive and fun, but do they (teachers, parents, policymakers) see that the games are realizing educational aims?”

Through my experience as a volunteer at this school and my experiences outside of the classroom (talking to colleagues about game-playing, leading workshops on using games), I personally have developed an appreciation for the role of game-playing in a mathematics classroom. I have also formed my own beliefs and perceptions about the topic. What was missing were the voices of the actual teachers, those that ultimately made the decision about *how* teaching and learning take place in the classroom.

To approach this void in my understanding, for this class, I planned to conduct an investigation. To better understand the beliefs and perceptions of teachers, I would ask them questions about why and how they are using games in their classrooms. Although I developed assumptions as I outlined above, I was never an elementary or middle school teacher myself. I didn’t know firsthand what it was like, and so the next best thing was to ask those that do.

Setting, Participants, and Relationships – as Part of This Study

I chose to use the school that I had already established a relationship with – both because it was convenient for me and because my research question organically developed as a part of our relationship. As described earlier, my employer NCTM (National Council of Teachers of Mathematics) has supported staff members to volunteer as math tutors for this local elementary school. I have volunteered as a tutor for the past two years and have expanded the partnership to include quarterly Professional Development breakouts for teachers. Because of this partnership, I have gotten to know the math specialists and the teacher I was partnered with for the Lunch Buddy program. I have also gotten to know the other math teachers at professional development sessions, but have not had extensive conversations with them.

I considered the implications of choosing this particular elementary school to do this research. I identified advantages and disadvantages to having preexisting relationships with the potential teachers that I interviewed for this study, and I made the decision to go ahead and interview three teachers from this local elementary school. Although I was slightly concerned about teachers ‘knowing’ my own beliefs and manufacturing their responses, I came up with ways of dealing with this potential disadvantage – as I will describe later.

I started by asking the lead math specialist to check with her principal to see if it was acceptable to conduct research with the teachers for the purpose of this class. Then, I asked her to send an email to the fourth and fifth grade teachers, giving a short introduction to my research and asking who would be willing to volunteer an hour of their time. There are only four teachers who fall into this category and I was aware of that, so it was extremely optimistic to think that three of the four would volunteer after one email. The lead math specialist responded a day later telling me that she sent out my email and two were interested in helping with my study. She also communicated that a third teacher was interested and wanted to know if she could participate. This particular teacher was the other math specialist and a special education teacher. She worked primarily with the upper elementary grades, including fourth and fifth grade, the target grade band for this research. I was excited to have her as my third participant, and I felt bad for not thinking of including her in the first place. Her voice would be just as valuable in my effort to uncover themes among the upper elementary teachers’ beliefs and perceptions at this school.

The three teachers that have agreed to participate in my study are: Mrs. Morton, Mrs. Seneca, and Miss Young. (These are aliases created to protect the identities of the participants so that the risk of being judged for their beliefs and perceptions is minimized.) I will briefly describe each of the participants and the extent of my relationship with them:

*Mrs. Morton*

Mrs. Morton is a fifth grade teacher. She has experience teaching sixth grade, but has been assigned to teach fifth grade this year. She stated that she has used games in her mathematics classrooms and prefers to meet with me in the morning before classes begin. I have met her briefly on two occasions. Last year, she took part in an all-school session that I co-presented at about the resources NCTM has to offer. This year, I led a breakout professional development session for fourth and fifth grade teachers. This was the first of four presentations for this school year aiming to support teachers in selecting and facilitating engaging lessons and activities that target identified weakness areas. I learned at my interview with her that she had a degree in marketing and worked in hotels before falling into a Master’s degree in education and then subbing for a while before settling in as a full-time teacher six years ago.

*Mrs. Seneca*

Mrs. Seneca is a fourth grade teacher and has been teaching fourth grade at this school for several years. I have developed a relationship with her over the past two years I have been working with her. We were matched for the Lunch Buddy program in 2008, where she identified two students that would eat lunch with me and play math enrichment games weekly. Often, we didn’t exchange conversation. When I arrived, she would acknowledge me and motion to the two students that they were able to leave for lunch a few minutes early. Every once in a while, we would chat informally about the specific topic the students were learning in math class, about standardized test scores, and about the two students’ progress. In 2009, we were matched again as part of the Lunch Buddy program. She became more comfortable asking me for suggestions on teaching particular topics in her whole classroom. And I was eager to have these conversations, especially because they seemed to be mutually beneficial. I learned more about the needs of teachers at this level (which would inform my work at NCTM) and of the students (who I worked directly with at lunch bunch) while she learned more about the resources at NCTM and my own developing ideas and opinions. Now, in 2010, we were matched yet again for the Lunch Buddy program, and she also took part in the professional development (first of four) breakout that I led earlier in the year. I actually found out at the interview that Mrs. Seneca has been teaching for forty years, and has been at this particular school and grade level the past twenty-five! In her earlier years, she was part of a teachers’ strike in the Bronx and was one of the first white teachers in an all-black school in Las Vegas.

*Miss Young*

Miss Young is a special education teacher and mathematics specialist. She has been teaching at this school for several years and advocates more for the mathematics teaching and learning of upper elementary grades than for early childhood (since there is another mathematics specialist for the early elementary grades). She is one of the two facilitators at the school for the partnership with NCTM, but I have noticed that the other specialist takes most of the responsibility organizing and communicating the Lunch Bunch and Professional Development activities. I met Miss Dawson in 2008 at the orientation for Lunch Bunch, but our relationship really never graduated beyond introductions until this year. This year, 2010, I became the facilitator for NCTM for the partnership with the school. I met with both math specialists for lunch before the school year began to discuss ideas to strengthen the partnership and make positive changes. I introduced ideas of beginning a professional development series for teachers, as well as targeting the Lunch Bunch to fit the specific needs of the school. We met again a few weeks later to discuss the school’s past test scores and pacing guides. Here is where I felt like I started to get to know Miss Dawson beyond introductions. She seemed dedicated to finding the trends in past scores and also proficient in the mathematics. Since then, I have interacted with her again at the Lunch Bunch orientation and later at the first professional development session, where she was part of my breakout group. We did not have any one-on-one conversations at either of these meetings. I learned with my interview with Miss Young that she just finished both her Masters degree in education and her twentieth year teaching at this particular school.

Considerations before Data Collection

I struggled with the potential advantages and disadvantaged rooted in the fact that the teachers taking part in my study were those that I had previous relationships with – some more than others.

My own beliefs and experiences were potential advantages for me in that I had already established working relationships with the teachers that were going to be interviewing as a part of my study. I didn’t feel like I’d have to work really hard to first build the relationship with them, because we had already been building this for the past two years. For this reason, I thought that they would be comfortable talking to me.

In contrast, having a pre-existing relationship with these teachers was also a potential disadvantage. They were aware that I value game-playing, and some were also aware of my more specific assumptions. I was concerned that they might respond in their interview in a way that they knew would align with my beliefs, even if it was not necessarily true. Consequently, this would give me a false picture of the teachers’ perceptions and beliefs. I dealt with this issue by communicating that the interview responses would be disguised (not be able to be traced back to them as individuals), that I or no one else would be able to judge them based on their responses. I emphasized I truly valued that they tell me about their true beliefs, perceptions, and experiences. I planned on reminding each of them of this in-person before our scheduled interviews, even though it was outlined in the consent forms.

I also struggled with developing interview questions that were open-ended enough to get a good picture of the teachers’ own ideas, yet were specific enough to understand their beliefs on many different aspects of using games. I wanted to avoid ‘scaffolding’ them into telling me what I want to hear, but I wanted to prompt them to talk about particular aspects of the topic.

As a researcher, it was extremely important for me to become self-aware before conducting the interviews. I have my own opinions, as I mentioned above, and it is hard for me to hide my opinions. I knew that it would be a challenge for me to ask the leading questions and just wait and listen, instead of asking the questions and discussing, while revealing my own opinions. I planned to control for this by asking them to describe specific examples in their responses - for example, by describing the last time that they used a game in their classroom. Instead of asking all general conceptual and methodological questions, I made an effort to ask some personal and practical questions to get a clearer picture of how they ‘practice what they preach.’ This was important because I didn’t plan on interviewing any of their students or observing them using games as instructional tools.

I was aware that my own beliefs and experiences would be a challenge to overcome when it came time to interview the teachers. To address this personal challenge, I knew that I would have to be continually reflecting on my own strategies of questioning throughout the interview. I was worried that I would ask prompts that made sense to me – what would come next in a conversation with myself – rather than staying present in the conversation as a listener, and responding accordingly. I knew that I would have to pay attention to my process of interviewing and constantly remind myself that I am interviewing them because I have never been an elementary teacher before and that I don’t know what they perceive and believe. Since I’m used to doing presentations on this topic and almost acting as a cheerleader or marketer to get teachers to believe in the advantages of games, I knew it was important for me to pilot this study. In the pilot, I was able to gain practice allowing the ‘other’ to lead the direction of the conversation, instead of myself.

Besides being cognizant and practicing with a pilot interview, I planned to be explicit and tell the teachers outright that although they are used to me doing a lot of talking, I was purposely allowing them time to respond. Since I already had established relationships with these teachers, it made sense to me to alert them that I didn’t plan on agreeing or disagreeing with their responses. Rather, I’d inform that that I would often be responding by asking more questions to get them to thoroughly explain their ideas. I planned on telling them that silence shouldn’t be uncomfortable. This was necessary because they know that I always speak when it seems that there is awkward silence. Experiencing me acting out of character would most likely make the interview uncomfortable. To avoid this, I explicitly told them that I was going to wait for them to process their thoughts in order to respond, and if they didn’t have a response, they were more than welcome to ask a question back of me.

Last, I wanted to thank the teachers that volunteered to be a part of my study. I wanted to offer them something that was useful to them, without seemingly ‘paying them’ for their participation. Compensation for participation in studies can sometimes be seen as coercive, and I wanted to make sure I avoided that. I decided to offer the teachers an hour of *my* time in return for taking an hour of their time – the length of the interview. In the past, several teachers at the school had communicated that their students expressed interest in having guest speakers to lead lessons, and so it seemed they would be interested in this kind of compensation.

Data Collection

*Mrs. Morton*

The first interview I conducted was with Mrs. Morton. I met her early in the morning before the students arrive at school. As we walked informally before the recorded interview began, she asked a lot of questions and seemed to be very interested in the study. I answered all of her questions, but I was cautious not to give away too much detail. I didn’t to give her the opportunity to brainstorm kinds of ideas and perceptions that I would want to hear, and in turn, end up with “canned” responses. Neither did I want to have a rich conversation with her before I could get set up to capture her ideas on the recorder. However, I did want her to feel comfortable so it was important to answer all of her questions.

When I first greeted her, she made a comment that alluded to being worried about demonstrating her own knowledge of the content. I was able to appease her quickly by telling her that I was actually asking her opinion questions and that I sought to understand how she felt about using math games in her classroom. Again, she demonstrated that she was excited to get started by wanting to start responding before I got the tape recorder set up. In turn, I think her excitement spurred me to also rush because later I was discouraged to realize that I must have ended up pushing the record button twice. My resulting audio file was only a short segment of the beginning of our conversation.

After returning to my office and having realized that I didn’t capture our conversation, I wasn’t sure what the next best step was. I could remember a lot of what she said but knew it wouldn’t be the same to try to type out the transcript of an interview from memory. On the other hand, I also knew it wouldn’t be the same if I interviewed her again either. I was faced with a critical decision. Should I throw out her data entirely because of my mishap? That would require looking for another teacher to volunteer, and this might be difficult as well.

I decided to approach Mrs. Morton and be honest about what happened. After a discussion, she agreed that it would be better quality and more time-efficient if we redid the interview. This was most realistic than allowing her to correct and add in ideas that were left out of a transcript that I would construct from memory. We joked about the technology, and we agreed that I would have the friend who lent the recorder join us for round two of the interview. She also suggested that, although I would ask the guiding questions like in the first interview attempt, she would respond to the technical assistant. This would serve the purpose of making her feel like she was describing her ideas for the first time.

I rescheduled the interview and it ended up working out great! The interview was a bit shorter than the first time, but it seemed only the “fluff” was left out. And, beyond collecting the data, I was also able to appreciate that she didn’t change any of her responses – after having the time to think about ideal responses.

*Mrs. Seneca*

The second interview that I conducted was with Mrs. Seneca. This was the one I was most worried about getting biased responses from because I knew her the best of the three teachers that I was interviewing. As the interview was underway, I realized that I didn’t have to be as worried about getting biased responses. Before officially beginning the interview, as planned, I told her that I was going to be doing much less talking than she is used to, even if it meant some awkward silence. We chuckled together as she acknowledged that I definitely do like to be the one talking. Although we sort of reversed roles in a way, the conversation was natural. It flowed nicely. I was confident that she wasn’t responding to my questions with the intention of impressing me with her responses. I learned a lot about her experiences as a teacher and think that I got a clear picture of her ideas and perceptions of using games in her fourth grade classroom.

*Miss Young*

The last interview was that of Miss Young. I also had a pretty strong pre-existing relationship with her; so again, I was a bit concerned that she knew me well enough to be able to craft her responses accordingly if she wanted to please me. I also wondered how her responses would be different because they were from the lens of a special education teacher instead of a regular classroom teacher like the other two teachers. I was excited about being able to include her ideas and perceptions, but I struggled with the decision of modifying my interview guide at all. After some thought, I decided not to change it. Immediately after the interview began, I realized that I made the right decision. She, even more than the other two, seemed not to hold back any of her opinions. Although she wasn’t negative, she was realistic. She didn’t sugarcoat comments about the particular problems that her students had. It was especially evident that she really trusted me when she whispered something to me about a program that the county had given her to use, and she admitted to not once even considering it.

After each interview, I was thrilled because I felt like each one already added to my understanding on the topic. Each talked about ideas that I hadn’t expected at all. Even more interesting was that all three brought up issues that I hadn’t even considered beforehand. I wasn’t sure if I should be embarrassed to admit this finding or ecstatic that the interviews really were creating a clear picture of the issues in using games in their particular school for that particular grade level.

In a way, some of my realizations seemed obvious after-the-fact. And this was even before I transcribed all of their words. I couldn’t wait to “dig in deeper” with my highlighter in hopes to uncover other common themes among the three teachers’ ideas.

Immediately after the interviews, I started making connections about what each one said about the particular topics I had intended to ask about. With more thought, I also started coming up with other themes, bigger ideas, that all of them addressed that I hadn’t anticipated. This was sort-of a personal revelation for me. I “felt” the purpose of qualitative research by experiencing it firsthand.

I was used to devising a question that lent itself to quantitative methods, where I was always able to answer the question using statistical methods. I was satisfied even when the conclusion was that there was not sufficient evidence to show a difference in groups, for example. I used to appreciate qualitative research only in that it may be able to explain the differences or lack of differences in a study. But now, I saw the light. ☺ I realized that if I investigated this particular question using quantitative methods, I would have never been able to “uncover” these ideas of teachers that I hadn’t considered at the onset of my study.

Data Analysis

After transcribing the interviews, my first step in analyzing my data was separating the data by designated themes. I started by finding examples within the transcripts of the themes that I had purposefully asked the teachers about. I asked them about what turned them on to using games, their purposes for using games in their classrooms, the benefits to students, the criteria that define a “good” game, how they find games, examples of modifying or inventing games, and the kinds of pressure/support the experience from stakeholders. I assigned each of these themes a different color. Then, I read through each of the three transcripts, switching off between several highlighters, and I highlighted segments that exemplified each theme. For example, I highlighted all instances that any of the teachers spoke about the pressures and support from others in pink.

I realized quickly that it was difficult to differentiate between the benefits of using games and the purposes that teachers chose to use games in their classrooms. Often the teachers would say that their purpose for using the games was to benefit the students in some way. I also realized that there were several subcategories within this broad theme of purpose and benefit.

I decided to single out the theme of ‘life skills.’ It was one of the benefits to students the teachers spoke in depth about. I also decided to go back and highlight all of the references teachers made about the ‘way’ students are. Although I didn’t ask any questions specifically about this, all teachers made generalizations about their students.

After refining my selection of themes, I created a matrix with those that I thought I might include in the write-up of my findings. The matrix had eight columns, one for each of the following themes: references to students, life skills, characteristics of a ‘good’ game, support and pressure, purpose, role of teacher, management, and finding games. I transferred all of the passages highlighted by the respective colors from each teacher into the fitting cells. I observed which topics teachers talked a lot about and which they didn’t say as much about. In particular, I noted that Mrs. Seneca had significantly more information in the columns for references to students, life skills, and purpose.

I printed out the matrix. I considered separating the etic from the emic by making a place (splitting the columns, for example) for my own interpretations of what the teachers said, but I decided that I liked the simplicity of the matrix the way it was. Rather, I made notes on my printouts – that consisted mostly of arrows connecting ideas across the themes and a few ‘buzz words’ that I was familiar with from reading mathematics education research. I also went back with a highlighter and I highlighted the quotes that I really thought demonstrated particular ideas, so that they would be convenient to grab when describing my findings.

I picked up this document sporadically several times over the course of a couple weeks, and I often dug in my bag to grab a pen to jot down a note or to highlight another quote that resonated with a particular theme in my head.

See the file named “Themes\_Qual\_DeLeeuw” to have a look at the matrix.

Findings

I conclude six major findings: (1) Games engage today’s learner. (2) Games teach life skills. (3) Games inherently differentiate. (4) Stakeholders support the use of games. (5) Classroom management is the role of the teacher. (6) ‘Good’ math games have a hook, simple rules, non-threatening competition, instructional value, and an appropriate length of play.

Together the six findings form a coherent picture of the teachers’ perceptions of the role of math games in the classroom. Although they are all inter-related, I will demonstrate how my data attends to each of them separately.

*Games engage today’s learner.*

Although I didn’t have a question in my interview guide targeted at learning about specifically how teachers perceive this generation of learners, all three made references to students and how they are nowadays. They made references throughout the interview, but often in response to why they use games in their classrooms or how they facilitate the learning.

Mrs. Morton talked about it as “an age thing.” She said that kids are more intuitive and that, “kids have a game orientation these days. They are just more engaged.” She talked about an experience she had with teaching games on the computer, and noted, “Sometimes…I just step away and go, ‘You do it.’ And they click, click, click, OK.”

Mrs. Seneca also talked a great deal about her students. Like Mrs. Morton, she spoke about games as a way of engaging the students of this new generation. She claimed that playing games is “in their nature” and “almost instinctual to them.” She said that students “are willing to devote more time to it and more attention to it.” And she described the generation of students in her classroom as “just different than children before that didn’t have video games (or) the computer.” She went on to say that this generation is “accustomed to (playing games) and enjoy doing it.”

Like Mrs. Morton, Mrs. Seneca reinforced the idea that this generation of students don’t require specific directions. “Instead of telling them how it’s played, they beg, ‘No no, no. We’ll figure it out.’ Their autonomy amazes me.” Mrs. Seneca reflected on her own choice to use games in the classroom, and expressed that “this is the medium that people are dealing with now, so why would you not use it?”

Although Mrs. Seneca shared similar ideas as Mrs. Damon, she explained her ideas   
  
further. She went on to say,

“The evolution is more than just the students. Games used to be a fun and extra thing to do, but you would never do it as part of your lesson to help someone learn something new or better understand it. Students used to be expected to be in their seats and quiet, and now talking and moving about is what signifies engaged students. So it’s a change in times in a lot of ways.”

Mrs. Seneca recognizes that as technology changes, the way that children learn also changes.

Miss Young, the special education teacher, held the same perception about providing a more engaging form of learning. She said that games are “what kids like” because they are “not humdrum.” When talking about her special education students, she concurred that “they have no fear, (and) they just do it” – directions or not. She noted that students can “sit in front of a Wii or Xbox and pay attention,” and although you “can’t make everything a video game, you can use games to be more interactive.”  *Games teach life skills.*

All three teachers spent time talking about how games are interactive. Although they weren’t prompted to talk about the needs and preferences of today’s youth, they all alluded to the idea that their students are part of a new era focused on constant engagement. Further, they felt that games could provide this engagement in a classroom setting. This idea is one that I share with them. I wasn’t surprised by this connection.

However, I was surprised by was one of their major perceived benefits in using games in the classroom. All three teachers spoke about games as a means for teaching the students life skills, more particularly, how to act socially. This was an idea that I hadn’t previously considered. I had a laundry list of benefits of incorporating games into instruction. Although the teachers touched on some of the ideas in my list, they perceived life skills to be one of the greatest benefits. Mrs. Morton purported that games “teach a lot of social rules of life – how to get along with each other, to take turns, (and) to be polite when someone makes a mistake.” She also shared that the students “don’t play a lot of games at home” because they come from “single-parent low-income families” where time and resources are limited.

Mrs. Seneca also spoke about the demographic of students in her classroom. Besides coming from single-parent low-income households, students in this particular school often spoke another language at home as well. Even those parents that wanted to try to help had trouble because they didn’t graduate from school themselves and weren’t confident in explaining the mathematics. Mrs. Seneca added that “math is a universal language,” and so even those students that don’t speak English well could participate in the games. She stated that “some children have so much trouble writing (or) doing division on graph paper,” but “games free you of all that (and) you can focus on thinking.” In addition to teaching the life skills that Mrs. Morton brought up (taking turns, for example), Mrs. Stevens talks about communication as a part of playing games. She expressed that “having to explain increases oral communication skills and also develops empathy when you see someone else struggling.” Further, she talks about how “when you explain it, it makes you feel good about sharing something, sharing knowledge” and, “it fosters a love of learning and a good self-concept when you become proud of something you struggled with.” Consequently, the students become more “willing to take more of a risk next time after overcoming a struggle.”

Again, Miss Young’s beliefs about games as a means for teaching life skills were hardly different from the other two teachers. This was interesting to me, because although I hadn’t considered this as a benefit to game playing before the interviews, I would have probably predicted the special education teacher to value the games for their potential to teach social skills more than the teachers of the general classrooms. She shared the general idea that “It’s a social thing. It’s beyond math.” She, too, spoke about getting along, taking turns, and modifying the rules to Miss Young’s rules to “make it somewhat fair for everybody.” She shared an example that demonstrates a mathematical concept in a social context:

Just getting along, just understanding that taking turns…I had a child, who is no longer with us. She moved last year, but, I told her parents, ‘Please, get games for Christmas. Don’t get those video games. Get games like Sorry or Candyland because, she would – we called it dancing – she’d go all (motioning with her hand moving a game piece around in no order whatsoever) ‘doo-doo-doo-doo-doo’ and she was not getting that correspondence. And I was like, ‘We’re not going to move on in math, but, if you’re playing with those things at home like Sorry or Candyland, she has to do this (motions for progression around a board in a logical order). She’s not ‘doo-doo-doo,’ dancing all across the board.” The parents bought into what was so important and I said, “and then you’ll be able to talk to her too.” She was a child who had terrible speech issues. I mean, you can hit so many areas, and so many kids, nowadays, still need that. I mean, they don’t get that at home.

Although Miss Young talks to parents about a past student she had in her special education classroom, the ideas are parallel to the other teachers. The example is rich in that it includes how the game can provide a means for learning how to take turns, how it can teach one-to-one correspondence, and how it can foster development of communication skills.  *Games inherently differentiate.*

When the teachers were describing the purpose for using games, they talked about creating an engaging environment for students and teaching life skills – how to act in an acceptable social manner. They also mentioned several other benefits or purposes for incorporating games in the classroom. The teachers all expressed that the games were conducive to differentiating instruction. Mrs. Morton noted that games “can attend to different levels.” She said she was still able to use games in situations, for example, when “maybe half the class needed review and practice, and the other half had the concept down cold.” Games could serve both as practice or reinforcement math objectives, but could also serve as extensions that required critical thinking.

Mrs. Seneca talked about the games as “a combination of learning” where “some are learning how to do it, some are reinforcing it, and some are figuring out a faster way to do it.” She affirmed that games “can be taken in by many different levels.” And, although Miss Young worked primarily with special education students, there was still variety in her classroom. She too talked about how games could be used both as an extension or to kick-off something brand new.

Besides the fact that games inherently differentiate instruction, teachers expressed that they liked games for other reasons as well. For example, Mrs. Morton talked about games as a means of formative assessment. She communicated that games allow teachers to “listen to the kids and give (them) insight into where (students) are mathematically.”

Mrs. Seneca talked about games as a way to engage everyone at once, and acknowledged that “you learn so much more by doing it yourself.” It was interesting how she mentioned another popular form of technology, and made a comparison, saying, “Children don’t get a chance to ‘get up there’ even when a teacher is using a SMART Board, and when someone does get up there, it’s only one person and the rest are just sitting watching.” I loved how she described the level of excitement in her classroom that she witnesses when using games for instruction, “(Games) are really fun (for the students). It’s like roping a calf. They throw their arms up, ‘I’m done! I’m done!’”

She also stressed the fact that games are more “about the thinking process and not just the answer.” She went on to say that, as a teacher, “you can be trying to teach this, or teach that, and all of a sudden, another student speaks to them (the confused students) and they totally understand how to do it.” This connects back to the social skill of communicating – how students are negotiating meaning when playing games in order to gain a deeper understanding for themselves.

Miss Young talked about the decision-making that students take part in when playing games. She said, that compared to more traditional methods of teaching, games offer a learning environment that is “more like real life” and the students have to “make decisions.” *Stakeholders support the use of games.*

I was pleased to learn all stakeholders supported the use of games in the classrooms. Mrs. Morton went as far as to claim that the “principal would actually be upset if we weren’t playing games in math class.” Mrs. Seneca also noted that administration is present when the teachers get together to discuss the games at weekly PLCs (Professional Learning Communities). Mrs. Morton described how both the math committee provides games for general use, and the instructional coaches bring games specifically relevant to timely content to weekly PLC meetings. At the meetings, teachers of similar grades work together to plan how the games will be used as part of instruction.

Miss Young described that the “math people high-up promote it and it’s pushed down through the county and the school board” – like a ladder until it is implemented in the classrooms by the teachers. She pointed out that “nobody would have a problem (with using games in the classroom) unless that was all (she) was doing.”

Before interviewing the teachers, I thought that there may be some form of resistance to the games – whether it be from administration or parents. I asked Mrs. Seneca during the interview if she felt pressure to prepare students for high-stakes testing, and how that played into her choice to use games in the classroom. Her response was that games teach students problem solving, and that problem solving is more valuable than teaching to the test - because students learn not to be “scared or open-ended problems” and “sit down and figure it out.” *Classroom management is the role of the teacher.*

It had been established that both stakeholders and teachers themselves supported the use of the games and that students liked them. Following then, was the question of what were the challenges for teachers. All three teachers did express that they were, at least when they started using games in their classroom, concerned about keeping order. Miss Young felt like she might not “have control over what is happening” in her classroom. Mrs. Morton also said that at one point she “felt that she would lose control” of her classroom by letting (students) play math games. Mrs. Seneca expressed that using games can be “disastrous unless (the teacher) is really organized and understands how to manage a classroom.” She added that students get loud when they are excited, but that noise is OK.

Next, I looked for ways that teachers were able to overcome their fear of losing control in their classrooms. What was the role of the teacher in using math games in their classrooms? Perceptions of the three teachers varied, but all talked about the details of managing a classroom that was conducive to learning. To “create a good classroom climate,” Mrs. Morton focused on communicating the details, such as “making sure (students) are talking low enough and staying on task.” Mrs. Seneca also said that she makes an appoint to “explain all of the rules and how (she) is going to do it, how big (students’) voices can be…ground rules.”

They also talked about their roles in introducing a game and facilitating learning throughout play. Mrs. Morton “introduces games by being a part of a small group at the center of the room while the others are doing paper and pencil math.” She swaps every ten minutes or so until everyone has a chance to learn the games. Once learned, she said the role of the teacher is to “go around and visit with students playing games, spending more time with lower students to give support.” Mrs. Seneca talked about how she facilitates learning on the computers, using online games. She “puts five on at a time that have different abilities.” She considered that not everyone wants to help all the time. She also is careful to select games and partners that “do not foster bad competition” where “one student may feel threatened and shut down.”

Although all teachers spoke about modifying the games to fit the needs of their particular students, Miss Young talked in depth about doing this. She said she adjusts the games and changes the rules. Often this means that she plays the games first herself before reflecting on how she can modify it. She offered an example of one game, saying that in “the place value game, they’ll have things in the millions” and since they were not “ready for the millions,” she would “take those cards out and adjust the games that way.”

Besides changing the game itself, Miss Young also spoke about exactly how to facilitate the learning. She said that it was important in her classroom to “go around with the assistant and talk through issues in the moment because if you waited, the message would be gone.” In particular, she said she saw the teacher’s role as “making examples of mistakes” by talking to the whole group playing the game about what and why a particular strategy didn’t work. *‘Good’ math games have a hook, simple rules, non-threatening competition, instructional value, and an appropriate length of play.*

The last piece that I was really interested in was hearing from teachers what they considered to be a ‘good’ math game. I asked them for characteristics that all good math games should have. This was interesting. Upon later reflection, I realized that the teachers mentioned both tangible and intangible characteristics. Although I had considered the design and appeal of games, I personally found myself evaluating the games for their content and strategy.

The teachers’ responses were varied. All three spoke about the game having some kind of hook – a way to capture the attention of the students. Mrs. Seneca went so far as to say that “you can just tell. It’s like looking at a trailer for a movie.” She noted that ‘good’ games are often colorful and bright. Miss Young also said that colorful games make them look more fun. She also said that games “with a little gimmick” people like.

They also shared the idea that the rules of the game were very important. Mrs. Morton voiced that the “directions can’t be complex” because “you need to understand that game yourself” before even considering to use it in your classroom. Mrs. Seneca also talked about “having to understand it (herself)” and that the way to keep score isn’t too complicated. Miss Young agreed that ‘good’ games “can’t have too many components (rules/directions)” and went on to say that game must include readable directions, and if online, even a help button.

Mrs. Seneca talked about the fact that her students were attracted to competition, whether it be against the computer or a clock or against a live opponent. She also cautioned that competition can sometimes have adverse results, and that teachers have to determine if a game is promoting non-threatening competition.

All teachers talked about a game’s instructional value. Mrs. Morton said that she preferred games that were “sorted by topic so it was easy to fit it into instruction” and “ready to go.” Miss Young added that ‘good’ games are games “without a lot of pieces” that are already “put-together” and “don’t make a lot of noise.” She said it was necessary that the games gave the students “feedback – some way they can check themselves.”

The teachers also talked about the instructional value of the content itself. I was excited that finally the teachers said something about the mathematics in the games. Mrs. Morton said that an “ideal game would be open-ended where (students) could figure out different ways to play it – finding different paths to the same answer.” Mrs. Seneca also spoke on this topic. She added that ‘good’ games are “open-ended and focus on the thinking process rather than on the answer.” Miss Young didn’t talk about the strategy building explicitly, she said ‘good’ games “hit on a lot of skills at once.” She also said that ‘good’ games had both “rules and extensions.” She valued games that listed how a student that mastered the game could be challenged on a new level.

The last defining characteristic of ‘good’ games was realistic. Miss Young expressed that it wasn’t practical to leave games lying out at the end of a class period, so unless it was a computer game that saved the student’s progress, it was necessary that games “have a beginning and an end” and “don’t last ‘forever and a day’ like Monopoly.”

Limitations and Validity

I pinpointed threats to validity and tried to control for them early-on by using methods that seemed to ‘make sense’ given the conditions. It was critical to consider my existing relationship with my participants and my own biases. After identifying some of these though reflections in memos, I found it important to tell my participants explicitly that may goal was to understand their true perceptions. It was also important that I practice my own tactics of facilitating an interview – being a mindful listener.

By becoming self-aware of my own assumptions on the topic, I was able to consciously make an effort to maintain integrity. In order to minimize researcher bias, during the interviews, I had to make sure I wasn’t scaffolding the teachers to talk about aspects that would satisfy my own assumptions. And after the interview, I was careful not to focus on only these themes when choosing passages to be included in my matrix.

In a way, I can defend that I was successful in controlling for researcher bias in that I was able to uncover themes that I hadn’t even considered before the study. In addition, I had informal conversations with my technical support guy – who, just from observing the interviews, picked up on some of the final themes.

Further, there was minimal threat from the issue of reactivity. In this case, I’m confident that the teachers were not answering accordingly to what they believed I would want to hear. I make this statement because teachers were often able to share very specific examples from their classrooms when responding. They also had evidence, such as the game itself, in their classrooms. They seemed to be comfortable with me. Miss Young went so far as to whisper her opinion to me, knowing some others wouldn’t agree with her stance.

Now that the study is complete, I wonder still if the three teachers that I interviewed can be considered typical teachers. I realize that this isn’t an issue of validity; it is an issue of generalizability. I acknowledge that my findings only represent the ideas and perceptions of these particular three fourth and fifth grade teachers in this particular school. Initially, I was concerned about how my assumptions would relate to these three teachers, since my assumptions were formed based on interactions with teachers at professional meetings. Now, I realize that the reason for identifying assumptions wasn’t to relate them to my prospective subjects at all. Rather, it was to help construct my conceptual framework, a useful exercise no matter who was to be included in my sample.

Reflection

Besides developing an appreciation of qualitative methods as I described earlier, I also gained more of an appreciation for elementary school teachers – at least these three. These three teachers, after getting to ‘hear their stories’ seemed to be exemplary elementary school teachers. I had formed a bias while working with elementary education majors during my Master’s degree. They not only lacked content knowledge, they lacked the dedication to learn about their students and create the best learning environment for them. Even though the three teachers in my study were veteran teachers (stereotypically the ones that don’t keep up with change), they seemed to be unconditionally vested in improving their own methods.

Last but not least, in addition to *uncovering* that teachers perceive ‘life lessons’ to be one of the major benefits of using games, I also *uncovered* a life lesson of my own – that being a good listener is not only beneficial but necessary in successfully understanding the perceptions of others. And unlike the findings from this study, I think that this personal realization is generalizable. Although I was able to see clearer through the teachers’ lens while interviewing by consciously devoting myself as a listener, this idea pertains to me outside of a qualitative interview as well. This study helped me reflect on my own weaknesses as a listener. Although I still prefer to be talking over listening, I value the opportunity to better understand another’s point of view. And I gained an appreciation for those that consistently do listen to me. ☺