My previous SSHRC funded research looked at mathematics teachers' professional growth and the centrality that beliefs play in this growth. From this research several outcomes emerged:

1. Mathematics teachers' beliefs about mathematics and the teaching and learning of mathematics can, and do, change. Further, beliefs change both in the face of direct intervention—such as inservice education and professional development—and through their daily participation in their professional life.

2. Mathematics teachers' practice can, and does, change. This change can happen for a number of different reasons—from direct intervention to natural evolution—and may take place slowly or quickly.

3. There is a strong link between mathematics teachers' beliefs and practice. Further, changes in beliefs can precipitate a change in practice, or be precipitated by a change in practice.

These three outcomes, although simply stated here, more than adequately answered the questions that the prior research pursued. However, with these answers came new questions, questions that more centrally consider the principal stakeholders in teacher change—the students! How do they experience such changes in their teacher's practice? My current SSHRC funded research is aiming to answer these questions. From this research several outcomes are beginning to emerge:

1. Students are quite flexible and adaptive to progressive teaching. However, they do not buy into these changes unless they see that it offers them something they were not getting out of more traditional classrooms.

2. Students recognize that their experiences in a progressive classroom will be specific to that classroom. That is, they see that once they leave the current class they will be back into a system that values and promotes more traditional teaching and learning.

3. Students are accepting of progressive assessment practices, but they extract from these practices information that is more in line with traditional feedback.

From time spent in classrooms working on these aforementioned projects an unanticipated, and more interesting, set of observations are emerging. There is, within every classroom I visited a hidden classroom – a classroom that the teacher is not aware of. This hidden classroom can best be described as a façade of compliance that students construct, behind which they are often subverting the intentions of the teacher.

**CONTEXT and OBJECTIVE**

In 1986, Gary Fenstermacher introduced the term studenting to describe the things that students do to help themselves learn; from paying attention to following instructions, from practicing to studying, from reviewing to seeking help, from trying to understand to ensuring they understand, etc. In 1994 Fenstermacher expanded this definition to also include the other things that students do while in learning situations – things that do not actually help them to learn.

[T]hings that students do such as ‘psyching out’ teachers, figuring out how to get certain grades, ‘beating the system’, dealing with boredom so that it is not obvious to teachers, negotiating the best deals on reading and writing assignments, threading the right line between curricular and extra-curricular activities, and determining what is likely to be on the test and what is not. (p. 1)
Taken together, the understanding of studenting as what students do while in a learning situation expands our ability to talk about student behaviour in classroom settings. More specifically, it gives us a name for the autonomous actions of students that may or may not be in alignment with the goals of the teacher. As such, studenting extends constructs such as the didactic contract (Brousseau, 1997) and classroom norms (Cobb, Wood, & Yackel, 1991; Yackel & Cobb, 1996) to encompass a broader spectrum of classroom behaviours – behaviours that are not predicated on an assumption of intended learning. Consider, for example, the following anecdote:

At the end of a lesson Ms. Teacher assigns some homework from the textbook to be completed by next class. At the same time she provides the students with the answers to the homework questions. Her reason for doing this, she explains to the class, is that she believes that in order for the students to better learn the day's concept they need immediate feedback on their efforts as they try out their new knowledge. One of her students, Stuart, goes home and copies the work from a friend who has already completed the homework assignment. Stuart's reason for doing this is that he wants full credit for having done the homework.

From the teacher's perspective Stuart is meeting all of the benchmarks for learning – he paid attention in class and he did his homework. From Stuart's perspective he is meeting all of the benchmarks for getting a good mark – he is getting full marks for attendance and homework. There is a rationality to Stuart's actions that is overlooked if we examine it through the oft used lens of learning. Stuart is not learning, at least not in the way that the teacher intended. But he is studenting. Specifically, he is studenting in a way that beats the system.

Studenting has appeared infrequently in the literature, and when it has been used it has been limited to only some aspects of studenting, and then only within particular learning situations. Goldin (2010) explores studenting from the teacher's perspective focusing on the historical and sociological aspects of studenting and limiting her study to the nature of student work, the politics of studenting, and what the student brings to the work. Aaron (2011), on the other hand, looks at studenting from the perspective of the student and focuses on the rationality of studenting behaviour within the context of high school geometry instruction. In particular, she looks at those behaviours relating to the work students do in instruction and the tacit knowledge they bring to it. Both of these studies neglect the subversive aspects of studenting that Fenstermacher introduced to the concept in 1994.

It is exactly these aspects of studenting that we are interested in. More specifically, we are interested in the studenting behaviours that are not in alignment with the teacher's goals and expected actions, yet are missed by the teacher during the activities of teaching. We have come to refer to this class of studenting behaviours as gaming behaviour, as in the students are gaming the system.

**METHODOLOGY**

The data for this study will come from a large number of mathematics classrooms and a large number of classroom contexts. The data will consist of classroom videos, observations and field notes, interviews with teachers, interviews with students, surveys, and questionnaires. In essence, one or two researchers will work in a classroom observing mathematics lessons and gathering data.

- Student work during lessons will be video-taped.
• The teacher will be interviewed before and after each lesson with specific focus on their plans for the lessons and what they expect students to be doing at various stages. The teacher will also be interviewed when we have preliminary observations of gaming behaviour in order to gauge their awareness of such behaviours. All these interviews will be audio recorded.

• Students will be interviewed for three reasons. The researchers will interview some students about how they engage in various aspects of mathematics lessons. Some students will also be interviewed if they are observed engaging in gaming behaviour. Finally, some students will be interviewed about the gaming behaviour among other students that they may be aware of.

• Based on the data emerging from observations and interviews, surveys and questionnaires will be designed and administered to all students to gather more data about the phenomenon of gaming.

Participants
All the students in ________’s class will be recruited to undertake the study. All students will be given parental consent forms and minor consent forms to take home and discuss with their parents. Students will return consent forms to the classroom teacher. Parents of students who do not return consent forms will be contacted to confirm receipt.

Analysis
Using a grounded theory approach these data will be analysed as it is gathered. From this analysis, it is hoped that a number of student gaming behaviours will emerge across a number of classroom contexts. As these behaviours emerge and clarity is gained, coding for the now known studenting behaviours in subsequent observations will become easier. Over time, it is hoped, a form of saturation will be reached as new observations of these contexts no longer reveal new studenting behaviours. When this occurs we will be able to say that a taxonomy of studenting behaviour in a certain context has been reached. Subsequent analysis of data will then be able to be done using a method of analytic induction wherein the aforementioned taxonomy will serve as the framework for analysis. “[A]nalytic induction, in contrast to grounded theory, begins with an analyst’s deduced propositions or theory-derived hypotheses and is a procedure for verifying theories and propositions based on qualitative data”.

APPROVAL OF PROTOCOLS FOR GENERIC SITES
The protocols I am asking to be approved here are to be used in a large number of schools and school districts across Western Canada. I understand that in order to receive specific approval to implement research in any one school I must seek ethical approval from that school’s school district. To do this, I must first demonstrate that I have conditional approval of the research methods and protocols from SFU.

As such, what I am asking for in this proposal is a priori conditional approval of the methods and protocols based on the documents provided at this time. As research sites are identified I will provide them with evidence of this conditional approval, complete whatever processes are necessary at the school district level (they are all different), and file a specific request with REB to be allowed to proceed with research at the specific site. When filing the specific request I will submit to REB a letter of approval from the selected site, revised consent forms detailing the district, the class, and naming any co-researchers.
COMMUNICATION OF RESULTS

Dissemination of results takes two forms and is aimed at three audiences. First, results will be disseminated through participation in international conferences and journal articles. Four annual or biennial international conferences give significant attention to student learning experiences: the Conference of the International Group for the Psychology of Mathematics Education (PME), the Conference of the International Group for the Psychology of Mathematics Education – North America Chapter (PME-NA), the Conference of the European Society for the Research of Mathematics Education (CERME), and the American Educational Research Association's annual meeting (AERA). Proposals will be submitted to each of these conferences. At the same time, articles will be submitted to journals such as: *Educational Studies in Mathematics*, *For the Learning of Mathematics*, the *Journal of Mathematical Thinking and Learning*, and the *Journal for Research in Mathematics Education*, each of which is concerned with topics pertaining to student learning experiences.

My audiences for disseminated work will be teachers, teacher educators, and educational researchers. The first of two of these groups needs to have access to my anticipated research results because it would help them to make better pedagogical decisions resulting in increased student learning in the mathematics classroom. The third audience needs to have access to my anticipated results because it would help them to make sense of data collected regarding student learning and achievement. Understanding subversive student behaviour would be valuable information in determining effective pedagogical practices.

Dissemination of results may include the use of video images from the data. If this is the case, only images of students who consented (and whose parents consented) to use their images will be used. If so specified by the students (or the parents) these images will have the faces distorted.

Confidentiality, Data Retention and Destruction:

The data of this study will maintain confidentiality of students’ names and contributions they make to the extent allowed by the law. This means that I guarantee students’ identity except in cases where child abuse is reported or a student threatens to harm himself/herself, whereby I then must report it, by law, to the appropriate authorities. Students’ identity will be kept confidential by the use of a pseudonym and all videotapes and audiotapes will be safely kept by me and only viewed by myself and any REB approved co-researchers (to be identified at future dates). All collected data will be stored in a locked filing cabinet my locked office at SFU and will be destroyed after a period of two years following the study.
Title: Researching Studenting in the Mathematics Classroom

Investigators: Peter Liljedahl and ______________

Investigator Department: Education and Mathematics

The University and those conducting this study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your child’s rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which your child was treated in this study, please contact the Associate Director, Office of Research Ethics by email at dshafey@sfu.ca or by phone at 778-782-9631.

Your child has been asked to participate in a research study (named above) conducted by Peter Liljedahl and ______________. All the students in (name class) will be recruited to undertake the study. Before you give your consent, it is important that you read the following information and ask as many questions as necessary to be sure you understand what your child will be asked to do.

The School District (School District #__) has approved this research project.

Purpose of the study:

The purpose of the study is two-fold: first to create a taxonomy of student behaviours in the mathematics classroom and secondly to ascertain the reasons and motivations that underlie these behaviours. The goal of the study is to better understand the types of behaviours students’ display in mathematics classroom and also the role that students’ motivations play in these behaviours and students’ mathematical learning.

Procedures:

There will be no difference in classroom activities for this research project. All students will be expected to participate in all classroom activities. Students who agree to participate in the study
agree to fill out a questionnaire and two surveys (attached) and will be videotaped during regular class activities.

Videotaping will take place for the duration of the class for a period of three weeks.

Following the videotaped class, some students may be asked to describe their thinking or reasons for particular behaviours during a particular segment of the class (sample interview questions attached).

It is anticipated that videotaping will take place in the period from _____ to _____.

**Risks:**

There are no risks associated with this study. Refusal to allow your child to participate, or your child’s refusal to participate, will have no adverse effects on your child’s grade or evaluation in their classroom or coursework.

**Benefits:**

A select group of students will have the opportunity to view their in-class behaviours and examine and explain their reasons for them. This reflective activity helps to make students aware of behaviours that may be hindering learning and possibly promote more productive classroom behaviours. This research will provide a better understanding of what students are actually doing throughout mathematics class and the motivations for these behaviours. The study will also provide myself as a teacher, as well as other teachers, with the opportunity to improve our practice and introduce curriculum to students in a manner that may enhance their learning, increase intrinsic motivation, and promote understanding. It may also encourage teachers to develop similar strategies to use with their students.

**Confidentiality:**

The data of this study will maintain confidentiality of your child’s name and the contributions he or she makes to the extent allowed by the law. This means that we guarantee the identity of your child except in cases where child abuse is reported or your child threatens to harm him/herself, whereby we then must report it, by law, to the appropriate authorities. Your child’s identity will be kept confidential by the use of a pseudonym and all videotapes and audiotapes will be safely kept by me and only viewed by myself and my supervisors. All collected data will be stored in a locked filing cabinet my locked office at SFU and will be destroyed after a period of two years following the study.
Voluntary Nature of Participation:

Your refusal to allow your child to participate or withdrawal of your child after agreeing to participate will have no adverse effect on his or her grade or evaluation in the class or coursework whatsoever.

Your child’s participation in this research study will be extremely helpful to us and other teachers who look towards improving instruction in secondary mathematics and we look forward to working with your child.

Agreement:

Your signature on this form will signify that you have read the information in this agreement which describes the purpose, procedures, possible risks and benefits of this research study, that you have received an adequate opportunity to consider the information in the document, and that you voluntarily agree to let your child named below to participate in the study.

Name of Parent or Guardian: (PRINT): _______________________________
Name of Minor Participant (PRINT): _______________________________
who is the (relationship to minor) (PRINT): ____________________________

I certify that I understand the procedures to be used and have fully explained them to my child:

Name of minor participant: _________________________________________

and both I and my child knows that myself, or he or she has the right to withdraw from the study at any time, and that any complaints about the study may be brought to:

Dr. Dina Shafey, Associate Director
Office of Research Ethics
Simon Fraser University
dshafey@sfu.ca
778-782-9631

I may obtain copies of the results of this study, upon its completion by contacting the researcher named below:

Peter Liljedahl
Faculty of Education
Simon Fraser University
liljedahl@sfu.ca
778-782-5643

Please clearly write YES or NO in response to each of the following questions:
1. Do you consent to your child being video recorded?  

2. If you consent to your child being video recorded, do you wish that your image/voice be distorted?  

3. Do you permit the use of the video images in future research studies?  

4. Do you permit the use of your child’s video image in public dissemination* (thesis, papers, conference presentations etc.) directly related to this research project?  

(*NOTE: Due to the nature of digital video images, once the video image is disseminated to the public, the researcher does not have any control over how the video images are distributed and/or used). 

Print Name Parent or Guardian: ____________________________

Signature of Parent or Guardian: ____________________________

Date: _____________________
SIMON FRASER UNIVERSITY
INFORMED CONSENT FOR PARTICIPANTS

Title: Researching Studenting in the Mathematics Classroom

Investigators: Peter Liljedahl and ________________

Investigator Department: Education and Mathematics

The University and those conducting this study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which you were treated in this study, please contact the Associate Director, Office of Research Ethics by email at dshafey@sfu.ca or by phone at 778-782-9631.

You have been asked to participate in a research study (named above) conducted by myself and ________________. The students in your (name classes) will be recruited to undertake the study. Before you give your consent, it is important that you read the following information and ask as many questions as necessary to be sure you understand what you will be asked to do.

The ______________ School District (School District #___) has approved this research project.

Purpose of the study:

The purpose of the study is two-fold: first to create a taxonomy of student behaviours in the mathematics classroom and secondly to ascertain the reasons and motivations that underlie these behaviours. The goal of the study is to better understand the types of behaviours students’ display in mathematics classroom and also the role that students’ motivations play in these behaviours and students’ mathematical learning.

Procedures:

There will be no difference in classroom activities for this research project. You will proceed with usual classroom activities.

Videotaping will take place for the duration of the class for a period of three weeks.

Prior to videotaping of a lesson you will be asked to explain their reasons and expectations for the coming lesson as well as their expectations for how the students will respond during the
lesson. After the delivery of the lesson you will be asked to reflect on how it went as well as respond to questions pertaining to some of the observed occurrences during the lesson.

It is anticipated that videotaping will take place in the period from ______ to ______.

**Risks:**

There are no risks associated with this study. Refusal to participate, or withdrawal from the study at any point will have no adverse effects on your employment or evaluation.

**Benefits:**

A select group of students will have the opportunity to view their in-class behaviours and examine and explain their reasons for them. This reflective activity helps to make students aware of behaviours that may be hindering learning and possibly promote more productive classroom behaviours. This research will provide a better understanding of what students are actually doing throughout mathematics class and the motivations for these behaviours. The study will also provide you, as a teacher, as well as other teachers, with the opportunity to improve our practice and introduce curriculum to students in a manner that may enhance their learning, increase intrinsic motivation, and promote understanding. It may also encourage teachers to develop similar strategies to use with their students.

**Confidentiality:**

The data of this study will maintain confidentiality of your name and the contributions you make to the extent allowed by the law. This means that we guarantee your identity except in cases where child abuse is reported or you threaten to harm yourself, whereby we then must report it, by law, to the appropriate authorities. Your identity will be kept confidential by the use of a pseudonym and all videotapes and audiotapes will be safely kept by us and only viewed by myself and my supervisors. All collected data will be stored in a locked filing cabinet in my locked office at SFU and will be destroyed after a period of two years following the study.

**Voluntary Nature of Participation:**

Your decision to participate or withdrawal after agreeing to participate will have no adverse affect on your employment or evaluation. Your participation in this research study will be extremely helpful to me and other teachers who look towards improving instruction in mathematics and we look forward to working with your child.

**Agreement:**

Your signature on this form will signify that you have read the information in this agreement which describes the purpose, procedures, possible risks and benefits of this research study, that you have received an adequate opportunity to consider the information in the document, and that you voluntarily agree to participate in the study.
Name of Participant: (PRINT): _______________________________

I certify that I understand the procedures to be used

Signature of participant: ________________________________

and I know that I have the right to withdraw from the study at any time, and that any complaints about the study may be brought to:

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4. Do you permit the use of your video image in public dissemination* (thesis, papers, conference presentations etc.) directly related to this research project?           ________

(*NOTE: Due to the nature of digital video images, once the video image is disseminated to the public, the researcher does not have any control over how the video images are distributed and/or used).

Print Name of Participant: ____________________________

Signature of Participant: ____________________________

Date: _____________________
SIMON FRASER UNIVERSITY
INFORMED CONSENT FOR MINORS (UNDER AGE OF 19)

Title: Researching Studenting in the Mathematics Classroom

Investigator: Peter Liljedahl and ____________________

Investigator Department: Education and Mathematics

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You have been asked to participate in a research study (named above) conducted by Peter Liljedahl. Your parent or guardian has already consented to you participating in this study. However, you also have a say regarding your participation. Before you give your consent, it is important that you read the following information and ask as many questions as necessary to be sure you understand what you will be asked to do.

The __________ School District (School District #__) has approved this research project.

Purpose of the study:

The purpose of the study is two-fold: first to create a taxonomy of student behaviours in the mathematics classroom and secondly to ascertain the reasons and motivations that underlie these behaviours. The goal of the study is to better understand the types of behaviours students’ display in mathematics classroom and also the role that students’ motivations play in these behaviours and students’ mathematical learning.

Procedures:
There will be no difference in classroom activities for this research project. All students will be expected to participate in all classroom activities. Students who agree to participate in the study agree to fill out a questionnaire and two surveys (attached) and will be videotaped during regular class activities.

Videotaping will take place for the duration of the class for a period of three weeks.

Following the videotaped class, you may be asked to describe your thinking or reasons for particular behaviours during a particular segment of the class.

It is anticipated that videotaping will take place in the period from to .

**Risks:**

There are no risks associated with this study. Your parents have given permission for you to participate, but this does not mean that you must participate. Your refusal to participate, or withdrawal from the study at any time will have no adverse effects on your grade or evaluation in the classroom or coursework.

**Benefits:**

A select group of students will have the opportunity to view their in-class behaviours and examine and explain their reasons for them. This reflective activity helps to make students aware of behaviours that may be hindering learning and possibly promote more productive classroom behaviours. This research will provide a better understanding of what students are actually doing throughout mathematics class and the motivations for these behaviours. The study will also provide myself as a teacher, as well as other teachers, with the opportunity to improve our practice and introduce curriculum to students in a manner that may enhance their learning, increase intrinsic motivation, and promote understanding. It may also encourage teachers to develop similar strategies to use with their students.

**Confidentiality:**

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Voluntary Nature of Participation:

Your refusal to participate or your withdrawal after agreeing to participate will have no adverse effect on your grade or evaluation in the class or coursework whatsoever.

Your participation in this research study will be extremely helpful to us and other teachers who look towards improving instruction in secondary mathematics and we look forward to working with you.

Agreement:

Your signature on this form will signify that you have read the information in this agreement which describes the purpose, procedures, possible risks and benefits of this research study, that you have received an adequate opportunity to consider the information in the document, and that you voluntarily agree to participate in the study.

Name of Minor Participant (PRINT): ____________________________

I certify that I understand the procedures to be used

Signature of Minor Participant: ____________________________

and I know that I have the right to withdraw from the study at any time, and that any complaints about the study may be brought to:

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4. Do you permit the use of your video image in public dissemination* (thesis, papers, conference presentations etc.) directly related to this research project?   

(*NOTE: Due to the nature of digital video images, once the video image is disseminated to the public, the researcher does not have any control over how the video images are distributed and/or used).

Print Name of Minor Participant: ________________________________

Signature of Minor Participant: ________________________________

Date: ______________________
Possible Student Interview Items

Interviews will be conducted with a select number of participants. These will be identified based on the preliminary analysis of survey and questionnaire responses as well as classroom observation. The purpose of the interviews will be to garner more details regarding the behaviours of individual participants in their mathematics classroom. As such the questions will be responsive to the individual participants’ prior data as well as their responses to the initial interview questions. Having said this, the a priori intended questions to ask are the same as those on the questionnaires.

1. Can you tell me what you are doing? Can you tell me why you are doing that?
2. Can you tell me what you do when your teacher asks you to try an example?
3. Can you tell me how you go about trying it?
4. Why don’t you try the example? Why don’t you get help?
5. Can you tell me why you aren’t trying the question on your own?
6. Can you tell me why you are taking notes/not taking notes?
7. What do you use your notes for? Do you find them helpful?
8. Why do you think your teacher wants you to take notes?
9. Do you do homework? Why or why not?
10. On average how much of your homework do you do? How do you do it?
11. Why types of questions do you do? Why?
12. Why do you think your teacher assigns homework? Do you find it useful? Why or why not?
13. What do you do on review days? Can you tell me why you do that?
14. Do you do anything at home to review? Why or why not? What do you do?
15. Do you find review days useful? What would be most useful for you to prepare for a test?
16. What does your teacher do on review days?
17. Do you feel you are learning well in your mathematics class? Why or why not?
18. Do you think you are performing well in mathematics?
19. What would you change in your mathematics class in order for you to learn better?
Mathematics Anxiety Rating Scale – revised

<table>
<thead>
<tr>
<th>When I am ... I feel ANXIOUS</th>
<th>Not at all</th>
<th>A little</th>
<th>A fair amount</th>
<th>Much</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Looking through the pages in a math text</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Walking into a math class</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Reading a formula in a science text</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Thinking about an upcoming math test one day before</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Watching a teacher explain a problem on the whiteboard</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Being told how to interpret algebraic statements</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Picking up a math textbook to begin working on a homework assignment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Taking an test in a math course</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Reading and interpreting graphs or charts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Starting a new math problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Being given a homework assignment of many difficult problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. Waiting to get a math test returned in which you expected to do well</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. Getting stuck in a math problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. Starting a new chapter in a math book</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. Listening to another student explain a math formula</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1 The revision of the revised scale is based upon the work of Derek R. Hopko Confirmatory Factor Analysis Of The Math Anxiety Rating Scale–Revised, Educational and Psychological Measurement 2003; 63; 336
Possible Student Questionnaire Items

There will be five questionnaires given out to students throughout the research. The language for the first one is firm. The language for the rest is not finalized yet. Below are the anticipated questions, but these will likely change to reflect the understandings that will be acquired in the preliminary analysis of the initial survey and questionnaire responses as well as the classroom observations.

Math Questionnaire #1

1. Do you do homework for mathematics class? If so, how do you do it, and why? If not, why not? Does your teacher check homework?
2. Do you try the examples during class? Why or why not? Are the examples like ones the teacher has just done? Why do you think the teacher asks you to do examples?

Math Questionnaire #2, #3, #4

1. What do you think is the purpose of writing notes? Is it worthwhile? Do you take notes? Why or why not?
2. How did you prepare for the last test? Were you happy with your result? What did you do during the review class? Is there anything you could do to do better?

Math Questionnaire #5

1. What is your favourite part of mathematics class? Why?
2. What is your least favourite part of mathematics class? Why?
3. Do you feel you are learning well in your mathematics class? Why or why not?
4. Do you think you are performing well in mathematics?
5. What would you change in your mathematics class in order for you to learn better?
Mathematics Student Survey

Please respond to each statement

1. When the teacher tells us to try an example I wait until she explains all the steps.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

2. Group work helps me learn mathematics.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

3. Mathematics learning is mainly memorizing.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

4. Writing notes helps me to learn the material.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

5. There are several ways to find the correct solution of a mathematical problem.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

6. I don’t like to try the problems in class because I don’t like to be wrong.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

7. If I follow all of the same steps as the example I should be able to solve a given problem.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

8. I write notes during class so that I can study from them later.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

9. I do my homework because it is worth marks.
   - [ ] Strongly agree
   - [ ] Somewhat agree
   - [ ] Neither agree nor disagree
   - [ ] Somewhat disagree
   - [ ] Strongly disagree

10. I like doing problem solving.
    - [ ] Strongly agree
    - [ ] Somewhat agree
    - [ ] Neither agree nor disagree
    - [ ] Somewhat disagree
    - [ ] Strongly disagree

11. Writing notes is a waste of time because I never look at them again.
    - [ ] Strongly agree
    - [ ] Somewhat agree
    - [ ] Neither agree nor disagree
    - [ ] Somewhat disagree
    - [ ] Strongly disagree

12. I prefer mathematics tasks for which I have to exert myself in order to find the solution.
    - [ ] Strongly agree
    - [ ] Somewhat agree
    - [ ] Neither agree nor disagree
    - [ ] Somewhat disagree
    - [ ] Strongly disagree

13. I do my homework because it helps me to learn.
    - [ ] Strongly agree
    - [ ] Somewhat agree
    - [ ] Neither agree nor disagree
    - [ ] Somewhat disagree
    - [ ] Strongly disagree

    - [ ] Strongly agree
    - [ ] Somewhat agree
    - [ ] Neither agree nor disagree
    - [ ] Somewhat disagree
    - [ ] Strongly disagree
<table>
<thead>
<tr>
<th></th>
<th>Please respond to each statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>Neither agree or disagree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Those who are good in mathematics can solve problems in a few minutes.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>16.</td>
<td>The teacher knows the right answer and will give it to us eventually.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17.</td>
<td>I take notes because the teacher tells me to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>18.</td>
<td>Mathematics is a mechanical and boring subject.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19.</td>
<td>I do my homework so that I don’t get into trouble with my parents.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>20.</td>
<td>My major concern when learning mathematics is to get a good grade.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>21.</td>
<td>I like mathematics because the teacher shows me how to do it and I do it.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>22.</td>
<td>Instead of doing the homework I just copy the answers from the back of the book or someone else.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>23.</td>
<td>In mathematics on a review day before a test I…</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>24.</td>
<td>… mostly just chat with my friends.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>25.</td>
<td>… try the easy problems because I know I can do them.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>26.</td>
<td>… just read over the notes because if I can follow them I think I can do the problems.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>27.</td>
<td>… try the problems I had difficulty with before.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>28.</td>
<td>My teacher is not teaching me mathematics the way …</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>29.</td>
<td>… I am used to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>30.</td>
<td>… I like to be taught.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>31.</td>
<td>… in a way that will allow me to be successful.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Possible Teacher Interview Items

Interviws will be conducted with every teacher in whose class research is conducted. The purpose of the interviews will be to garner more details regarding the teacher’s intentions for the coming lesson as well as their reflections on a just delivered lesson. As such the questions will be responsive to the individual teacher’s responses to the initial interview questions. Having said this, the a priori intended questions to ask are the same as those on the questionnaires.

Prior to lesson:

1. Can you tell me what you are planning for the lesson?
2. What are your intentions for doing ________?
3. How do you anticipate your students responding to ________?

After the lesson:

1. Did your lesson go as planned?
2. Did your students engage as planned? Which did? Which didn’t?
3. What would you say if we told you that there were a number of students who were not behaving as you thought they were?