

**LAKEHEAD UNIVERSITY
RESEARCH ETHICS BOARD
RESEARCHER'S AGREEMENT FORM**

Principal Investigator: Alex Lawson
(or Faculty member supervisor for student research)

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Student Investigator(s): Susan Girardin
(For graduate student research projects/theses)

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Department: Education

Address where correspondence should be directed:

Project Title: The role of co-construction of the clock model in the development of fractional understanding in a Grade # classroom.

Is this project funded?: Yes No [

If yes, provide Title of Funded Project:

Name of Granting Agency:

Granting Agency Project Number:

Proposed Start and End Dates of Research Involving Human Subjects:
February 14, 2011 – April 21, 2011

Project Key Words (up to five): fractions, clock model, mathematics teaching, mathematics learning, reform

Type of Participants: Adults [] Minors (under 18 yrs) [

Estimated Enrollment: 1 Adult 24 Minors

Lakehead University campus Local (outside of campus) [] Non-Local

Received approval, or seeking approval, from any other ethics committee? Yes [] No

Ethics Committee(s): Name of School Board Executive Leadership Team
(please attached approval letter if obtained)

Preliminary Checklist:

The *Tri-Council Policy Statement 2 (TCPS 2)* recommends a proportionate review process in which “*the level of review is determined by the level of risk presented by the research: the lower the level of risk, the lower the level of scrutiny (delegated review); the higher the level of risk, the higher the level of scrutiny*”

(full board review)". (see TCPS 2, Article 2.9). The following questions are designed to aid the Office of Research and the Research Ethics Board in determining which proposals qualify for full board review rather than delegated review, those that qualify as more than minimal risk, those that might require the appointment of *ad hoc* reviewers possessing specific expertise not available from the REB's regular members, and those that require the attention of a biomedical REB:

For each of the following questions, place a mark in the box to indicate "yes":

1. Will your study involve more than minimal physical risk to your participants?
2. Will your study involve the use of high-risk test instruments? i.e. surveys that may reveal that the participant intends to participate in dangerous activities such as self harm or harm to others.
3. Will your study involve more than minimal psychological risk to your participants?
4. Will your study likely lead to the discovery of your participants' involvement in illegal activities?
5. Will your study involve participants who are members of vulnerable populations? []
If yes, please elaborate briefly: This study will involve grade # children aged 9-11. Consent will be obtained from each child as well as each child's legal guardian.
6. Will your study involve clinical research, the collection of bodily tissues or fluids, or the administration of drugs or dietary supplements?
7. Will your study involve First Nations communities?

Research Ethics Review Criteria

Please check off each applicable box, and include a summary (either on this form or attached as a separate document) of how you will address each of these items:

[] **Summary of purpose of research**

Learning about fractions is a challenge for students (Lamon, 2007; Van de Walle, Folk, Karp & Bay-Williams, 2011). While there is a substantial body of research pertaining to the area of learning fractions, there is much more to be accomplished (Lamon, 2007). Although interest in the role of symbolizing and modeling is growing (Gravemeijer, 2002), there is a lack of classroom-based research on these topics. It may be that the choice, and method of introduction, of mathematical models can play an important role in the improvement and understanding of fractions, a particularly poorly understood area of mathematics. Some researchers believe that children will be better able to apply models in problem solving situations if the models have been co-constructed with the teacher, rather than directly provided as ready-made models by the teacher or from a textbook (van Dijk, van Oers & Terwel, 2003; van Dijk, van Oers, Terwel & van den Eeden, 2003).

This research is a case study of grade # students as they learn about fractions. The purpose of the study is to examine the process, and impact on student understanding, of a teacher and her students co-constructing the clock model for adding fractions. The study will contribute information that is relevant to mathematics teachers and educators. There is no published research on the effects of the co-construction of the clock model; thus the study addresses a current gap in the literature. A list of References (Appendix A) is attached.

[√] **Research methodology**

a) The potential subjects are Teacher's Name and the 24 students enrolled in Teacher's Name Grade # class at School Name in Thunder Bay, Ontario.

b) The School Board Name will be approached for approval of the research. I have had the opportunity to discuss the research with, and obtain permission, from the classroom teacher, Teacher's Name. Teacher's Name has discussed the research with the school principal.

Teacher's Name will teach the unit on fractions for 20 days over a period of 4 weeks. The math period will be the same length and at the same time of day as usual. There will be two main sources of data: a sequence of tests to provide written snapshots of the children's understanding, and videotape data. Some student work completed in class will also be collected, copied, and returned to the students. Only data from students who have given consent, and whose parents have given consent, will be used. Students whose parents have not given consent will still be engaged in the lessons; however data will not be gathered from them for use in the study.

The unit will begin with a pre-test (Appendix B) in order to collect baseline information about the children's understanding of fractions before instruction. The first part of the fractions unit will be taught. The mid-test (Appendix C) will be given prior to the co-construction of the clock model, in order to discern whether students have already developed the model for themselves. The second part of the unit will be taught. The unit will end with a post-test. Six weeks after the end of the unit, a 45-minute retention test will be given. The post- and retention tests will be amalgamations of the items from the pre- and mid-tests, with slightly different numbers and contexts. These items will be chosen after examining the results from the pre- and mid-tests to decide what will be the most fruitful areas to examine.

Lessons during the second half of the unit will be videotaped to capture a record of the instruction. The purpose of the videotaping is two-fold: first, to answer the research question and second, to have available for later professional development for in-service teachers. With parental permission, some students will be videotaped as they solve problems together in class to provide a record of the development of their thinking. Students will be made aware, and understand the purpose, of the video camera and microphones. To minimize disruption to the class, the video camera will be placed on a tripod at the side or back of the classroom. Wireless microphones will be placed on some student work tables so that students' discussions of their problem solving process can be recorded without being intrusive. The remote zoom feature will allow a close-up view of student work if required.

I will view the raw footage and code it using ATLAS.ti qualitative software. Video files will be stored on a secure external hard drive that will be kept in secure storage. The video data, test data, and written work will be coded using categories developed by C. T. Fosnot and M. Dolk (Fosnot & Dolk, 2002).

[√] **Recruitment procedures**

My supervisor, Dr. Alex Lawson, contacted Teacher's Name, a teacher at School Name, to inquire whether she would be willing to have a master's student carry out a study with her class. Teacher's Name, having earned a Master's Degree in Education at Lakehead University in 2006, also with Dr. Alex Lawson as supervisor, has agreed to participation in this study with her class. No advertisements will be used. The research project will be discussed with the potential participants. They will be provided with an introductory letter explaining the research (Appendix D) and a consent form (Appendix E). An introductory letter explaining the research (Appendix F) and a consent form (Appendix G) will be sent to parents/guardians, as their permission is

required. A letter and consent form (Appendices H and I) will be given to the teacher, Teacher's Name, and to the principal of School Name (Appendices J and K).

[✓] **Harm and/or potential risks to participants**

There is no foreseeable harm or risk to participants.

[✓] **Deception**

There will be no deception.

[✓] **Benefits to subjects and/or society**

The research will make a contribution to the community: after completion of the project, the classroom teacher and I will collaborate to prepare a workshop for in-service teachers in the School Board Name based on data gathered in the study. Furthermore, the use of edited lesson videotapes gathered as data in this study may contribute to in-service teachers' professional development and may lead to increased student success as a result.

[✓] **Informed consent**

A proposal regarding the research will be submitted to the School Board Name for approval. An introductory letter and consent form (Appendices J and K) will be given to the principal of School Name for approval of the research. Teacher's Name will also receive a letter and consent form (Appendices H and I).

The children in the Grade # class are under the age of consent. They will receive their own introductory letters and consent forms (Appendices D and E) and also be made aware of the research by discussion in class. Introductory letters and consent forms (Appendices F and G) will be sent to parents/guardians. The letter for parents/guardians includes contact information where I can be reached should they have any questions about the research at any time in the process. The parent/guardian letter and consent form also state that their child's participation is voluntary and permission may be withdrawn at any time, for any reason, without penalty.

The participation of children under 18, the Grade # students, is necessary to the study because the focus of the study is on the nature of children's learning. The potential participant letter and consent form also state that participation is voluntary and permission may be withdrawn at any time, for any reason, without penalty.

[✓] **Anonymity and confidentiality**

Regarding the hard data, each student will be assigned a number which will be used to identify his or her work. The students will not know their numbers. The pre-, mid-, post-, and retention tests will be labelled with the student number after the tests are handed in. Class work that is collected will also be labelled with the number after it has been photocopied. I will mark all sets of tests. The teacher will have access to test results for the purposes of student assessment. In the thesis and any ensuing publications, all participants will remain anonymous: the students, teacher, school, and school board will not be identified.

Regarding the videotape data, if consent is given, students will be identified only by first name. If the teacher gives consent for her surname to be revealed in video clips to be used for professional development, this will be explicitly noted on the consent form and witnessed by a third party.

[✓] **Storage of data**

Data will be stored in a secure environment at Lakehead University's Faculty of Education by Dr. Alex Lawson for 5 years following completion of the project. All soft data will be securely stored on a hard drive and password protected. The secure hard drive and hard data will be stored in a locked cabinet in the Multi-Data Convergence Lab BL 2040D in the Bora Laskin Building.

[✓] **Peer review**

This research is being completed to fulfill the requirements for a Master of Education degree. The proposal has been reviewed by my supervisor, Dr. Alex Lawson, my Thesis Committee member, Dr. Paul Berger, and is being reviewed by the Chair of Graduate Studies in Education, Dr. Connie Russell.

[✓] **Research partners and graduate students**

The research will not involve graduate students and/or researchers at another university or institution.

[✓] **Conflict of Interest**

There are no actual, perceived, or potential conflicts of interest in this research project.

[✓] **Dissemination of research results**

Research results will be disseminated in the form of a master's thesis. A copy will be available in the Lakehead University Library. If parents/guardians of participants wish to obtain a copy of the results, they may request one by phone, email, or in writing, as described in the introductory letter. A copy of the results will be made available to the teacher, principal, and school board, if desired. Presentations may be made and academic articles published following completion of this research. As mentioned, the classroom teacher and I will collaborate to prepare a workshop for in-service teachers based on the study.

[✓] **I have completed the *Introductory Tutorial for the Tri-Council Policy Statement* (<http://www.pre.ethics.gc.ca/eng/archives/tutorial-didacticiel/Default/>) and have attached a copy of my certificate of completion to this form.** *Please note that all investigators listed on this form must submit their certificates. THE TUTORIAL IS CURRENTLY BEING UPDATE (January 1, 2011 to February 28, 2011). PLEASE SUBMIT YOUR CERTIFICATE ONCE THE UPDATED VERSION IS AVAILABLE.

Tutorial Certificates (Appendix L)

I am familiar with the Lakehead University ***Ethics Procedures and Guidelines for Research Involving Humans***, the current ***Tri-Council MOU*** (http://www.nserc-crsng.gc.ca/NSERC-CRSNG/Policies-Politiques/MOURoles-ProtocolRoles/index_eng.asp), and the ***Tri-Council Policy Statement 2: Ethical Conduct for Research Involving Humans*** (http://www.pre.ethics.gc.ca/pdf/eng/tcps2/TCPS_2_FINAL_Web.pdf) and I agree to comply with these guidelines, and the procedures approved by the Research Ethics Board, in carrying out this proposed research.

I attest that all information submitted to the REB is complete and truthful. I understand the consequences, for myself and for the institution, of failure to comply with Tri-Council and MOU procedures.

Researchers are required to report to the REB any changes in research design, procedures, sample characteristics, and so forth that are contemplated after REB approval has been granted. Changes may not be implemented until approved by the REB. If any unforeseen incident occurs during the course of research that may indicate risk to participants, I will immediately cease research and inform the REB.

I understand that my protocol will be subject to random review for compliance by the Office of Research.

I will inform the REB when the research is complete by completing the Final Report Form found here: http://research.lakeheadu.ca/ethics_resources.html

SIGNATURES:

Principal Investigator <u>or</u> supervisor if graduate student project (please print): <u>Alex Lawson</u>	
Signature: _____	Date: _____

Co-Investigator(s) (please print): _____	
Signature(s): _____	Date: _____

Student Investigator(s) (please print): <u>Susan Girardin</u>	
Signature(s): _____	Date: <u>January 24, 2011</u>

Chair/Director (please print): _____	
Signature: _____	Date: _____

Please note that no one signature may be placed in two separate signature areas above.

To submit your application for ethical approval you must submit one (1) copy of this Form, along with one (1) copy of the information required to address the Research Ethics Review Criteria above (including cover letters, consent forms, and research instruments), and one (1) copy of the certificates of completion for the *Introductory Tutorial for the Tri-Council Policy Statement* to the Research Ethics Board, c/o Office of Research.

Informed Consent Checklist

General

- Cover letters and consent forms are presented on Lakehead University (or NOSM if appropriate) letterhead
- The language level is appropriate to the age and reading level of the subject population
- Contact information for the researcher(s), the supervisor (if it is a graduate student project), and the Research Ethics Board is always included in the cover letter that the participants will keep after they sign the consent form.

The Cover Letter/Introductory Information (including electronic letters and consent forms) should include:

- [√] The title of the study
- [√] An explanation of the purpose of the research
- [√] The identity of the researcher and their affiliation with Lakehead University
- [N/A] The sponsor of the research, if applicable
- [√] A warm, non-coercive invitation to participate, addressed to the “Potential Participant”
- [√] The reason why the potential participant is being invited to participate in the research
- [√] That the individual’s participation is voluntary, that they may refuse to participate in any part of the study, and that they may withdraw from the study at any time
- [√] That participants may decline to answer any question
- [√] A description of the procedures the participants will be involved in and how much of their time will be required
- [√] Information regarding any audio or videotaping and explicit consent to such recording
- [√] Information about any foreseeable risks, harms, or inconveniences
- [√] Potential benefits (including information that there is no direct benefit, if appropriate)
- [N/A] A mechanism for providing referrals, if appropriate (i.e. if there is the possibility of emotional distress, or physical harm)
- [√] Information regarding who will have access to the data
- [√] Information about the storage of data (during and after completion of the research)
- [√] The degree of confidentiality and/or anonymity that will be provided and how this will be maintained (e.g. individual participants will not be identified in published results without their explicit consent, data will be published in aggregate form). For research involving anonymous surveys, it should be stated that the survey instrument will not be labeled to identify who completed it.
- [√] Limits on confidentiality, if applicable (e.g. confidentiality disclaimer for focus groups)
- [√] A statement indicating the researcher’s intent to publish or make public presentations based on the research and whether or not the participant’s identity will remain confidential (e.g., will pseudonymous be used?)
- [√] Offer of a summary of the research results (and a mechanism to provide the summary)

The Consent Form must state each individual’s agreement that:

- [√] They have read and understood the cover/information letter for the study
- [√] They agree to participate
- [√] They understand the potential risks and/or benefits of the study, and what those are
- [√] That they are a volunteer and can withdraw from the study at any time, and may choose not to answer any question
- [√] The data they provide will be securely stored at Lakehead University for a period of five years
- [√] If applicable, that they understand that the research findings will be made available to them, and how this will be communicated
- [√] That they will remain anonymous in any publication/public presentation of research findings. Participants must explicitly agree to have their identities revealed.

Other Consent Information

[√] All participants must sign and date the consent form then return it to the researcher.

[√] Consent must also be obtained from all agencies, partners, schools, school boards etc. that provide access to the subject pools. Separate consent forms must be included for all of the above should this apply.

[N/A] If the study involves the use of high-risk test instruments which could potentially reveal that the subject intends to participate in a dangerous activity(s), the consent should contain a clause such that there is a limit to the level of confidentiality when the subject may be at risk for harm to self or others.

[√] While inclusive research is important, the researcher must ensure that consent is obtained from vulnerable populations in a sensitive manner. Vulnerable populations include children, and others not competent to give free and informed consent on their own behalf. In cases like this, parent/guardian (or the individual's representative) consent must be obtained. Please note every effort should be made to ensure that participants understand and consent to their own participation as well. In exceptional cases it may be possible to obtain consent from someone under the age of 18. The researcher must explicitly demonstrate why this is necessary and how the research results would be significantly altered if parental consent was required.

Appendix A

References

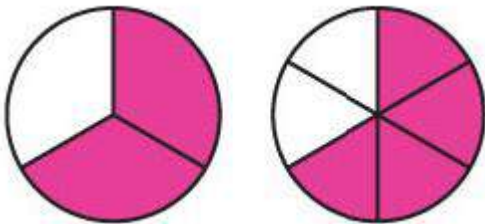
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Appendix B

Fractions Pre-Test

1. 4 children are sharing 10 brownies so that everyone gets the same amount. How much brownie can 1 person have? (Empson, 2002, pp. 29-30)
2. What does the bottom number in a fraction tell us?
What does the top number in a fraction tell us? (Van de Walle, 2007, p. 299)
3. If Linda ate one half of an apple pie and two thirds of a cherry pie, how much did she eat? (adapted from Sharp, Garofalo & Adams, 2002, p. 21)
4. Put these fractions in order from smallest to largest: $\frac{1}{5}$, $\frac{1}{3}$, and $\frac{1}{4}$
(Cramer & Henry, 2002, p. 43)
5. Joey and Robert each had the same size pizza. Joey cut his pizza into eight equal pieces and ate six of them. Robert cut his into five equal pieces and ate four of them. Who ate more pizza? (Burns, 2001, p. 138)
6. Is the following sum larger or smaller than 1? Explain how you know. Use estimation.
 $\frac{1}{2} + \frac{1}{3}$ (Reys, Kim & Bay, 1999, p. 530)
7. Are the following shaded circles equal? Compare and explain your answer.
(Jiguel & Afamasaga-Fuata'i, 2007, p. 21)



8. Add. $\frac{3}{4} + \frac{2}{12}$ (Imm, Fosnot & Uittenbogaard, 2007, p. 24)
9. Joel worked out at the Complex the other day. He ran for half of an hour and then walked for $\frac{1}{4}$ of an hour. How much of the hour did he spend exercising?
(adapted from Imm et al., 2007, p. 27)

Appendix C

Fractions Mid-Test

1. There are 4 kids at a party and there are 7 brownies for them to share. How can they share them? (Sharp et al., 2002 p. 20)
2. Does $\frac{4}{6} = \frac{2}{3}$? How do you know? (adapted from Van de Walle et al., 2011, p. 310)
3. Subtract: $4 - \frac{7}{8}$ (Mack, 1990, p. 24)
4. Which fraction is bigger, $\frac{1}{6}$ or $\frac{1}{8}$? Explain your answer. (Mack, 1990, p. 22)
5. Which is larger, $\frac{6}{8}$ or $\frac{4}{5}$? Explain your reasoning. (Burns, 2001, p. 137)
6. Is the following sum larger or smaller than 1? Explain how you know. Use estimation.
 $\frac{3}{8} + \frac{4}{9}$ (Reys et al., 1999, p. 530)
7. At her birthday party, Janie blew out $\frac{3}{4}$ of the candles on her cake. Draw a picture that shows the birthday cake and candles, also showing which candles were blown out. P.S. How old is Janie? Give two ages that Janie might be. Explain your reasoning. (adapted from Burns, 2001, p. 142)
8. Suppose you have four cookies and you eat $\frac{7}{8}$ of one cookie, how many cookies do you have left? (Mack, 1990, p. 24)
9. Suppose you have two pizzas of the same size, and you cut one of them into six equal-sized pieces and you cut the other one into eight equal-sized pieces. If you get one piece from each pizza, which one do you get more from? (Mack, 1990, p. 21)
10. Add. $\frac{2}{3} + \frac{1}{6}$ (Imm et al., 2007, p. 25)
11. Joel exercised at the Complex one day last week. He ran really fast for $\frac{1}{6}$ of an hour and then ran at his normal pace for $\frac{1}{2}$ an hour. How much of the hour did he spend running? (adapted from Imm et al., 2007, p. 24)

Appendix D

Potential Participant Introductory Letter

February 2011

Dear Potential Participant;

In February and March I will be coming to your classroom while Teacher's Name teaches fractions. I will be paying attention and writing things down during your math classes because I am curious about what helps people to learn fractions best. I am a student at Lakehead University in the Master of Education program and this is part of my school project, "The role of co-construction of the clock model in the development of fractional understanding in a Grade 4/5 classroom".

Teacher's Name will teach the lessons to you just like she usually does. A difference you will notice is that during some of lessons there will be a video camera in the classroom and a microphone on your work table. These tools will help me with my project by recording what you say and do while you are solving problems. I, Teacher's Name, or my supervisor Dr. Lawson, may also want to use some video clips from the classroom and samples of your work for helping other teachers learn more about how to teach about fractions. If you are in a video that will be seen by other teachers, your first name might be used. I will not use your name in anything I write about the project.

The unit will start with a pre-test so that I can see what you know about fractions before any of the lessons. Teacher's Name will teach the lessons and sometimes your work will be collected. I will photocopy some of the work that Teacher's Name collects and use it to help me understand your thinking. There will be a test in the middle of the unit to see how you are doing so far, and a test at the end to see what you have learned. Later in April there will be another test, called a retention test, to see what you remember.

Please ask me any questions you have about my project and I will be happy to answer them. You can decide whether or not to be part of my project. You will be doing the same work in math class whether you are in my project or not, the only difference is that I will not use your test results or your work or any video clips with you in them if you decide not to take part. Thank you for thinking about being part of my project.

Sincerely,

Mrs. Susan Girardin

Appendix E

Potential Participant Consent Form

I, _____, want to take part in the project with
(Student's Name/please print)

Mrs. Susan Girardin as described in the letter.

I understand that:

1. I will be videotaped in the classroom as part of the project.
2. I don't have to take part in the project, but I want to be part of it, and I know I can change my mind about that later and it wouldn't be a problem.
3. It is safe to be part of this project.
4. All of the information Mrs. Girardin collects for her project will be kept in a very safe place at Lakehead University for five years and then it will be destroyed.
5. My name will never be used in anything Mrs. Girardin writes about the project.
6. Mrs. Girardin, Teacher's Name, or Dr. Lawson might want to use some of the videos or copies of my work to help other teachers learn about teaching fractions. My first name might be used in video clips of the classroom. My name will not be on any copies of my work.

I put my initials in this box to show that it is alright for me to appear in video clips which may be used for helping other teachers learn about teaching fractions.

If you want to be part of my project, please fill in this page and give it to Teacher's Name.

Name of Student (please print)

Signature of Student

Date

Appendix F

Parent/Guardian Introductory Letter

February 2011

Dear Parent/Guardian of Potential Participant;

My name is Susan Girardin and I am working on my Master of Education degree at Lakehead University. My goal for my thesis is to investigate an area in mathematics where students have difficulty learning and to find ways to improve the teaching of this topic. The focus of my research is on learning fractions and the use of models to understand fractions concepts. The title of my study is “The role of co-construction of the clock model in the development of fractional understanding in a Grade 4/5 classroom.”

I will be observing mathematics lessons in your child’s classroom during the unit on fractions. The unit will be taught for 4 weeks during February and March 2011. The students will take a pre-test, mid-test, post-test, and retention test (in April) to determine what they have learned in the unit. Some samples of students’ work will be collected. During some of the lessons, Teacher’s Name’s teaching methods will be videotaped. Also, with permission, some groups of students will be videotaped so that I will be able to listen carefully to how they have solved the problems. Their conversations may be transcribed and quoted anonymously in my final project in order to illustrate their use of models. I, Teacher’s Name, or my supervisor Dr. Lawson, may also make use of some of the edited classroom footage and work samples for professional development for teachers. Upon completion of the project, you will be welcome to obtain a summary of the research by contacting me at the phone number or email address given below, or by giving your mailing address or email address on the consent form.

Your child will not be identified in any written publication, including my master’s thesis, possible journal articles or conference presentations. If video data is used for professional development, your child will be identified by first name only. The raw data that is collected will be securely stored at Lakehead University for five years and then destroyed. Participation in this study is voluntary and you may withdraw the use of your child’s data at any time, for any reason, without penalty. The research project has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 343-8283 or swright@lakeheadu.ca. The research has been approved by the School Board Name and the Principal of School Name.

Please note that this research does not affect classroom instruction time, with the exception of the 45-minute retention test. The lessons are being carried out by Teacher’s Name in the same manner and length of time as they would be without the research project. This research will not take away from the normal learning environment in the classroom and there is no apparent risk to your child. The research is simply being conducted to make note of the

effects of using a model, which is a regular part of the fractions unit. If you choose not to have your child participate, he or she will still be engaged in the math lessons. The only difference is that his or her data will not be used. If you give permission for your child to participate, your child will also be asked whether he or she is willing to take part in this research.

You are welcome to contact me at 000-0000 or username@lakeheadu.ca if you have any questions concerning this research project. I would be very pleased to speak with you.

If you agree to allow your child to participate in the study, please sign the attached letter of consent and return it to Teacher's Name at the school. Please keep this letter in case you would like to contact any one of us.

Sincerely,

Susan Girardin

Mrs. S. Girardin
Master's Student
Lakehead University
807-000-0000
username@lakeheadu.ca

Dr. A. Lawson, Ph.D.
Thesis Supervisor
Lakehead University
807-343-8720
alawson@lakeheadu.ca

Principal
School Name
807-000-0000

Sue Wright
Research Ethics Board
Lakehead University
807-343-8283
swright@lakeheadu.ca

Appendix G

Parent/Guardian Consent Form

I DO give permission for my son/daughter, _____,
(Student's Name/please print)

to participate in the study with Susan Girardin as described in the attached letter.

I understand that:

1. My child will be videotaped in the classroom environment as part of the research.
2. My child's participation is entirely voluntary and I can withdraw permission at any time, for any reason, with no penalty.
3. There is no apparent danger of physical or psychological harm.
4. In accordance with Lakehead University policy, the raw data will remain confidential and securely stored at Lakehead University for five years and then destroyed.
5. All participants will remain anonymous in any publication resulting from the research project.
6. The video clips of the classroom or student work may be included in Professional Development for teachers conducted by me, Teacher's Name, or Dr. Lawson. If my child appears in the video clips he/she will be identified only by first name.

I initial this box to give permission for my child to appear in video clips which may be used for Professional Development purposes, as outlined in 6. above.

7. I can receive a summary of the project, upon request, following the completion of the project, by calling or writing, or by providing my address or email address below.

Please keep the introductory letter on file should you have any further questions.

If you agree to let your child take part in the study, please complete this page and have your child return it to Teacher's Name.

Name of Parent/Guardian (please print)

Signature of Parent/Guardian

Date

Address or email address (if you would like a summary of the findings):

Appendix H

Teacher Introductory Letter

February 2011

Dear Teacher's Name,

Thank you for considering participation in this study. My goal for my master's thesis is to investigate an area in mathematics where students often have difficulty learning and to find ways to improve the teaching of this topic. The focus of my research is on learning fractions and the use of models to understand fractions concepts. This study is designed to explore the impact on students' thinking when a teacher and students develop the clock model together in the context of a unit on fractions. The title of my study is "The role of co-construction of the clock model in the development of fractional understanding in a Grade 4/5 classroom." Presently there is very little information available about the effects of the co-construction of the clock model.

In order to gather the information needed for the study, I will be observing mathematics lessons in your classroom during the unit on fractions. The students will take a pre-test, mid-test, post-test, and retention test to determine what they have learned in the unit. You will have access to the test results for student assessment. Some samples of students' work will be collected. During some of the lessons, your teaching methods will be videotaped. Also, with permission, some groups of students will be videotaped so that I will be able to listen carefully to how they have solved the problems. Conversations may be transcribed and quoted anonymously in my final project in order to illustrate their use of models. You, I, or my supervisor Dr. Lawson, may also make use of some of the edited classroom footage and student work samples for professional development for teachers.

As part of the project you will need to: distribute and collect the cover letters and permission forms from parents or guardians and students; collect student work; and, allow time for the tests (including the retention test). I will ensure that you have any of the resources you might need for the lessons. I hope that you will participate for the duration of the study; however, you may withdraw at any time, for any reason, without penalty, as your participation is entirely voluntary. I do not anticipate any negative consequences as a result of participation in this study.

You and your students will not be identified in any written publication, including my master's thesis, possible journal articles or conference presentations. If video data is used for professional development, your students will be identified by first name only, but if children use your surname it may be revealed. The raw data that is collected will be securely stored at Lakehead University for five years after completion of the project and then destroyed. A report of the research will be available upon request. I can be reached at 000-0000 or username@lakeheadu.ca.

The research project has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 343-8283 or swright@lakeheadu.ca.

If you agree to participate in the study, please sign the attached letter of consent and return it to me.

Sincerely,

Susan Girardin

Mrs. S. Girardin
Master's Student
Lakehead University
807-000-0000
username@lakeheadu.ca

Dr. A. Lawson, Ph.D.
Thesis Supervisor
Lakehead University
807-343-8720
alawson@lakeheadu.ca

Sue Wright
Research Ethics Board
Lakehead University
807-343-8283
swright@lakeheadu.ca

Appendix I

Teacher Consent Form

I, _____, do agree to participate in the study with
(Teacher's Name/please print)

Susan Girardin as described in the attached letter.

I understand that:

1. I will be videotaped in the classroom as part of the research.
2. My participation is entirely voluntary and I can withdraw permission at any time, for any reason, without penalty.
3. There is no apparent danger of physical or psychological harm.
4. In accordance with Lakehead University policy, the raw data will remain confidential and securely stored at Lakehead University for five years and then destroyed.
5. I will remain anonymous in any publication resulting from the research project.
6. The video clips of the classroom or my work may be included in Professional Development for teachers conducted by Susan Girardin, myself, or Dr. Lawson. If I appear in the video clips I may be identified by surname.

I initial this box to give permission for me to appear in video clips which may be used for Professional Development purposes, as outlined in 6. above.

Name of Third Party Witness (please print)

Signature of Third Party Witness

Date

If you agree to take part in my study, please complete this page and return it to me.

Name of Teacher (please print)

Signature of Teacher

Date

Appendix J

Principal Introductory Letter

February 2011

Dear [Principal's Name],

Thank you for considering participation in this study. My goal for my master's thesis in education is to investigate an area in mathematics where students often have difficulty learning and to find ways to improve the teaching of this topic. The focus of my research is on learning fractions and the use of models to understand fractions concepts. This study is designed to explore the impact on students' thinking when a teacher and students develop the clock model together in the context of a unit on fractions. The title of my study is "The role of co-construction of the clock model in the development of fractional understanding in a Grade 4/5 classroom." Presently there is very little information available about the effects of the co-construction of the clock model.

In order to gather the information needed for the study, I will be observing mathematics lessons in Teacher's Name's classroom during the unit on fractions. The students will take a pre-test, mid-test, post-test, and retention test to determine what they have learned in the unit. She will have access to the test results for student assessment. Some samples of students' work will be collected. During some of the lessons, Teacher's Name's teaching methods will be videotaped. Also, with permission, some groups of students will be videotaped so that I will be able to listen carefully to how they have solved the problems. Conversations may be transcribed and quoted anonymously in my final project in order to illustrate their use of models. I, Teacher's Name or my supervisor Dr. Lawson, may also make use of some of the edited classroom footage and student work samples for professional development for teachers.

This research does not affect classroom instruction time, with the exception of the 45-minute retention test. The lessons are being carried out by Teacher's Name in the same manner and length of time as they would be without the research project. This research will not take away from the normal learning environment in the classroom and there is no apparent risk. If parents choose not to have a child participate, the child will still be engaged in the math lessons. The only difference is that his or her data will not be used. If parents give permission for a child to participate, the child will also be asked whether he or she is willing to take part in this research.

I hope that Teacher's Name and her students will participate for the duration of the study; however, you may withdraw your permission at any time, for any reason, without penalty, as participation is entirely voluntary. I do not anticipate any negative consequences as a result of participation in this study.

The School Board Name, School Name, Teacher's Name, and her students will not be identified in any written publication, including my master's thesis, possible journal articles or conference presentations. If video data is used for professional development, the students will be identified by first name only; however, if students use the teacher's surname it may be revealed. The raw data that is collected will be securely stored at Lakehead University for five years after completion of the project. A report of the research will be available upon request. I can be reached at 000-0000 or username@lakeheadu.ca.

The research project has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 343-8283 or swright@lakeheadu.ca.

If you give permission for participation in the study, please sign the attached letter of consent and return it to me.

Sincerely,

Susan Girardin

Mrs. S. Girardin
Master's Student
Lakehead University
807-000-0000
username@lakeheadu.ca

Dr. A. Lawson, Ph.D.
Thesis Supervisor
Lakehead University
807-343-8720
alawson@lakeheadu.ca

Sue Wright
Research Ethics Board
Lakehead University
807-343-8283
swright@lakeheadu.ca

Appendix K

Principal Consent Form

I, _____, do give consent for participation in the
(Principal's Name/please print)

study with Susan Girardin as described in the attached letter.

I understand that:

1. Teacher's Name and her students will be videotaped in the classroom as part of the research.
2. Their participation is entirely voluntary and I can withdraw permission at any time, for any reason, without penalty.
3. There is no apparent danger of physical or psychological harm.
4. In accordance with Lakehead University policy, the raw data will remain confidential and securely stored at Lakehead University for five years and then destroyed.
5. The School Board Name, School Name, Teacher's Name, and her students will remain anonymous in any written publication resulting from the research project.
6. The video clips of the classroom or student work may be included in Professional Development for teachers conducted by Susan Girardin, Teacher's Name, or Dr. Lawson. If students appear in the video clips, they will only be identified by first name. If Teacher's Name appears in the video clips, she may be identified by surname.

I initial this box to give permission for Teacher's Name and her students to appear in video clips which may be used for Professional Development purposes, as outlined in 6. above.

If you approve of participation in my study, please complete this page and return it to me.

Name of Principal (please print)

Signature of Principal

Date