☒ **Institutional Review Board**
(submit completed form to Graduate Studies Office)

☐ **Departmental Review Committee**
(submit completed form to Committee Chair)

MINNESOTA STATE UNIVERSITY moorhead

Institutional Review Board
Ethical Compliance Questionnaire

Name of Principal Investigator:	Christine P. Malone
Title of Study:	Effects of Working Memory Training on Reading Comprehension and Fluency

Instructions: Complete all items on this form and/or on a separate sheet of paper attached to this form. The table format used on this form will expand as you enter text.

I. Subject Recruitment and Requirements

1. What type and how many human subjects will you require? (gender, age, location, affiliation, special characteristics, estimated number required)

Participants will include 30 – 40 students in the Fargo Public School District (FPSD) grades 1 – 8 that are at least one grade level behind in reading.

2. Where and how do you propose to recruit subjects?

Students are referred by their teachers for a working memory intervention already in place within the FPSD.

3. If your study involves subjects in institutions other than MSUM (schools, hospitals, other agencies), how will institutional consent be obtained? A signed letter of permission from an institutional representative is required. Attach copy to proposal.

I am currently waiting for approval from FPSD. All paperwork has been turned in and I am waiting for a reply. Once consent from FPSD has been obtained, I will provide the IRB with all required permission forms.

4. How much time will be required of each subject?

Approximately 15 – 20 minutes before the intervention and another 15 – 20 minutes after the intervention.

5. Will subjects be compensated for participation? ☐ Yes ☒ No

If yes, please specify:

6. Is confidentiality assured? ☒ Yes ☐ No

If yes, how?

Any paperwork with identifying information of participants will be kept in a locked filing cabinet or in a password protected computer file. All results will be reported in group format only.

If no, why not?

7. What benefits do subjects obtain by participating?

Participants learn what it is like to participate in a research project. Additionally, participants might improve performance on memory skills and on memory tasks.

II. Subject Risk

Certain practices are generally to be avoided. If any are included in the proposed study, check the blank next to the appropriate category and justify with attachments.

☐ Deceptions	☐ Pain, threat, or aversive stimulation	☐ Embarrassment	☐ Invasion of privacy

III. Informed Consent

A copy of the signed Informed Consent form must be given to subjects or guardians. For surveys and questionnaires that do not involve sensitive topics or minors, return of the questionnaire can be taken as implying consent. However, a cover letter must be included which contains the elements of consent and gives enough information about the survey that the subjects can choose to participate or not. Attach copy of cover letter if appropriate.

Minors and/or Adults Incapable of Giving Consent

1. Will your study use minors or adults legally incapable of giving consent? ☒ Yes ☐ No

If yes, how will permission be obtained from parents or guardians and asset from the subject?
Permission forms will be sent home to parents, who will send them back to the school. Students will be given the opportunity to give verbal assent. Prior to testing, the student will be told that the measures are for research only, and won't affect their grades in any way. They will be told that they can discontinue testing at any time for any reason. See Assent form

2. Is informed consent form, method of obtaining assent, and/or cover letter attached? ☒ Yes ☐ No

Consenting Adults

1. If subjects are of legal age and capable of giving consent, how will consent be obtained?
2. .

3. Is informed consent form or cover letter attached? ☐ Yes ☐ No

IV. Debriefing

1. Will subjects be provided with feedback about the study? ☐ Yes ☒ No

If yes, when and how?

2. Is a debriefing form attached? ☒ Yes ☐ No
Include debriefing statement when applicable.

3. If deception has been used, how will the subjects be informed?

4. What follow-up supports will be available if subjects experience undesirable consequences of participation?
Undesirable consequences are not expected for this research. If any do arise, the child will be referred to a school psychologist with the FPSD who will provide any aftercare or referrals to school counselors if necessary.

V. Materials

1. What questionnaires, inventories, tests, or other instruments will be used? Attach copies of investigator-prepared materials or a description of commercially prepared or copyrighted materials.
   Woodcock Johnson tests of cognitive Abilities, 3rd Edition Numbers Reversed, Visual-Auditory Memory, and Auditory Working Memory Subtests. A complete description of each is included within the methods.

2. Will you make audio-tapes, video-tapes, or photographs of subjects? ☐ Yes ☒ No
   Consent must be obtained from subjects in the informed consent form for these types of materials. Include statements about assurance of confidentiality, the planned use and eventual disposition of these materials (i.e., use of materials at conferences, published research, posting to the internet).

3. What electrical, electronic, or mechanical equipment will be used? If any have been specially constructed or modified for use in this study, provide a description with sufficient detail so that any physical danger may be assessed. Supplementary documents may be attached if necessary.
   The intervention includes a computer program called Cogmed. A full description is included in the methods.

Federal guidelines required that *all* materials related to the research be retained for at least three years. See current copy of *Code of Federal Regulations* for details.

This form and complete instructions are available online at: http://www.mnstate.edu/irb

Abstract

Working memory (WM) is a key component of thinking and learning, and is a required skill needed to be successful in school. Children that are in school place heavy demands on WM, and deficits can have major implications. Research has shown a correlation between scores on achievement tests and scores on complex working memory tasks. Recently, research has shown that computerized training can improve working memory. The present study will examine whether computerized working memory training will have an influence on reading comprehension and reading fluency scores as well as on tests measuring working memory.

CHAPTER III

METHOD

Participants

Participants in this study will be 30-40 students from a Midwestern public school district that are in grades 1 through 8 that have below grade level reading abilities. The students will be identified and suggested by teachers as good candidates for intervention.

Materials

A variety of measures will be used to measure WORKING MEMORY and reading skills. Three subtests from the Woodcock Johnson III Tests of Cognitive Abilities (WJ-III COG) will be used to measure WORKING MEMORY. The WJ-III COG is a standardized, norm referenced test used to measure the cognitive abilities of individuals ranging in age from 2 through over 90+ years old. Reading skills will be measured using two Curriculum-Based Measurement (CBM) tools that are used to assess reading fluency and reading comprehension.

Woodcock Johnson III Tests of Cognitive Abilities Numbers Reversed Subtest. The Numbers Reversed subtest is a classic backward digit span where the test administrator says a string of numbers and the participant repeats the series backwards. Item difficulty increases as the test continues and more numbers are added to the series. The test authors suggest Numbers Reversed measures primarily short-term memory span, but can also be classified as a measure of working memory or attentional capacity (Mather & Woodcock, 2001). Dehn (2008) suggests that Numbers Reversed is better described as a measure of

executive working memory, because it requires a test taker to hold a series of phonological information before performing the mental operation of reversing the order. The test has median reliabilities of .86 in the 5 – 19 year old age range (Mather & Woodcock, 2001).

Woodcock Johnson III Tests of Cognitive Ability Visual-Auditory Learning Subtest. The Visual-Auditory Learning is a rebus learning task where a participant is shown a symbol and told a word to associate with the symbol. Success on the task depends on the effective coordination of working memory and long-term retrieval because the associations between the visual stimuli and the words are completely novel (Dehn, 2008). The task extends for several minutes, and includes continual additions of more visual-auditory associations. The participant must retain the new information in a readily accessible pool within long-term memory while working memory accesses the relevant rebus associations and inhibits irrelevant information. This is considered a test of both long-term retrieval (Mather & Woodcock, 2001) as well as a measure of learning very similar to reading (Dehn, 2008). The Visual-Auditory Learning subtest has a median reliability of .86 in the 5 – 19 year old age group (Mather & Woodcock, 2001).

Woodcock Johnson III Tests of Cognition Auditory Working Memory. The Auditory Working Memory subtest requires a participant to listen to a tape that lists digits and objects and requires them to reorder the information and repeat the objects first in sequential order followed by the digits in sequential order. This subtest has the highest demand on a participant's working memory offered in the WJ-III COG (Dehn, 2008). The participant is required to hold information in immediate awareness, divide the information into two groups, and shift attentional resources to the two ordered sequences (Mather &

Woodcock, 2001). The median reliabilities of this subtest are .88 in the 5 – 19 year old age group (Mather & Woodcock, 2001).

Oral reading fluency scores. Curriculum-Based Measurement (CBM) Oral Reading Fluency (ORF) is a standardized, individually administered test of accuracy and fluency with connected text. On a conventional ORF reading passage, student performance is measured by having students read a passage aloud for one minute. The number of words omitted, substituted, or delayed on for three seconds or more are counted as errors. The number of correct words per minute from the passage is defined as the ORF rate.

Maze Curriculum-Based Measurement. Maze CBM is a standardized, multiple choice close task where a student silently reads a 150 – 400 word passage. Within the passage, the first sentence is complete. After the first sentence, every seventh word is replaced by three words within parentheses and the student must select the appropriate word to complete the sentence.

Cogmed Working Memory Training. Cogmed is an intervention focused on improving WORKING MEMORY skills and capacity in its users. Cogmed is an adaptive computer program that works to improve the attention and working memory of its users. The training consists of 25 computerized training sessions lasting 30 – 45 minutes each. Each session consists of a selection of various tasks that target the different aspects of working memory. It is a rigorous program designed to improve working memory through intensive and systematic training. Each participant has a Cogmed Qualified Coach, a professional that is trained by Cogmed that monitors progress. During training, the user's performance is tracked online and can be viewed by the user and his/her Cogmed Qualified Coach who communicates with the user throughout the five weeks to assist him/her

through the program. The Coach works with the participant to provide structure, motivation, and feedback on progress throughout the five weeks.

Procedure

Prior to completing anything from the study, permission will be sought from the district as well as parents of any participating students. Also, student assent will be sought prior to any data collection.

This study will include students that are being referred to the Cogmed program by their teachers. Prior to participating in the Cogmed training, the participants will take a pretest that includes the three subtests from the Woodcock Johnson III Tests of Cognitive Abilities. These subtests measure student working memory functioning and start points will be adjusted by age of the student. The students will also be given CBM reading probes to measure reading fluency and comprehension at the student's current grade level. The students will participate in the five weeks of Cogmed Working Memory Training. Once the student completes the training, the same subtests from the WJ-III COG will be given and comparable CBM fluency and comprehension measures will be given.

January 24, 2011
Dear Parents/Guardians:

My name is Dan Bultsma, and I am a graduate student in the school psychology program at Minnesota State University under the supervision of Dr. Christine Malone. Your student was recently referred as a potential candidate for the Cogmed Working Memory Training Program. If your child participates in this program, I would like to also include your child in a research project looking at the outcomes of the Cogmed Working Memory Training Program and its effects on reading comprehension and fluency.

If your child takes part in this research, your child will be given three brief measures of working memory as well as two brief reading assessments before and after taking part in Cogmed. Each time will total approximately 20 minutes of your student's time, and will be completed during the school day.

Your child's participation in this research is completely voluntary, and will not affect their ability to participate in the Cogmed program. In addition to your permission, your child will also be asked if he or she would like to take part in this project. Only those children who have parental permission and who want to participate will do so, and any child may stop taking part at any time. You are free to withdraw your permission for your child's participation at any time and for any reason. These decisions will have no effect on your future relationship with your child's school, his/her grades or status there, as well as MSU Moorhead and its School Psychology Program.

The information that is obtained during this research project will be kept strictly confidential and will not become a part of your child's school record. Any sharing or publication of the research results will not identify any of the participants by name.

In the space at the bottom of this letter, please indicate whether you **do or do not** want your child to participate in this project and return this note to your child's teacher as soon as possible. Please keep the second copy of this form for your records.

If you have any questions about this project, please contact us using the information below. If you have any questions about your rights as a participant in research involving human subjects, please feel free to contact the Minnesota State University Institutional Review Board (IRB) Office at 218.477.2474.

Please keep the attached copy of this letter for your records.

Sincerely,

Dan Bultsma
605.261.1167
bultsmada@mnstate.edu

Christine Malone, PhD
218.477.2804
malonech@mnstate.edu

****

I do/do not (circle one) give permission for my child _____ (name of child) to participate in the research project described above.

_____
(Print) Parent/Guardian's name

_____ _____
Parent/Guardian's signature Date

Debriefing Script

Name, I wanted to thank you for participating in this research project. By participating, you have helped us see if Cogmed is something that helps students do better in school. You have provided valuable information to see if it is a program that will help other students in the future, too. I want to reassure you that how well you did on these tests will have no impact on your grades, and will be kept completely confidential.

Statement of Assent

Hi *name*,

I would like you to help me with some research that I am doing for a class at Minnesota State University. I would like you take three brief measures that look at your memory skills and how you remember things. It will take about 15 minutes. Your results will not be shared with anybody and it won't affect your grades in school. You can choose to stop testing at any time for any reason.

Institutional Review Board

MINNESOTA STATE UNIVERSITY moorhead

Human Subjects Approval
Expedited Review

Date:	January 31, 2011
Principle Investigator:	Christine Malone
Co-Investigator(s):	Daniel Bultsma
Title of Study:	Effects of working memory training on reading comprehension and fluency

Thank you for submitting the requested modifications to your research proposal. Your proposal has been approved and you may proceed with your study. Should there be any significant change in the methods or materials you presented for approval, please inform the Institutional Review Board.

You will need to complete a *Project Completion or Continuing Review Form* before the end of the academic year. You will be notified when this review is due. The criterion for these reviews is available on the IRB website.

Modifications requested: none

Approved by:

Richard K. Adler, Chair
Institutional Review Board
adlerri@mnstate.edu
(218) 477-2474

☒ **Institutional Review Board**
(submit completed form to Graduate Studies Office)

☐ **Departmental Review Committee**
(submit completed form to Committee Chair)

MINNESOTA STATE UNIVERSITY moorhead

Institutional Review Board
Human Research Approval Form

Principal Investigator (must be MSUM faculty or staff):		Date:	12/7/2010	
Name:	Christine P. Malone	Dragon ID No:	00256185	
Department:	Psychology	Telephone No:	218.477.2804	
Building/Room No:	Bridges 360	E-mail address:	malonech@mnstate.edu	
Signature:	Christine P. Malone	NIH Training:	☒ Yes	☐ No

Co-Investigator (attach separate sheet if more than two)			**Co-Investigator** (attach separate sheet if more than two)		
Name:	Daniel Bultsma		Name:		
☐ Faculty ☒ Graduate Student ☐ Undergraduate Student			☐ Faculty ☐ Graduate Student ☐ Undergraduate Student		
Department/Program:	School Psychology		Department/Program:		
Telephone:	605.261.1167		Telephone:		
E-mail address:	bultsmada@mnstate.edu		E-mail address:		
Dragon ID No:	00311336		Dragon ID No:		
NIH Training?	☒ Yes	☐ No	NIH Training?	☐ Yes	☐ No
Signature:	Daniel J. Bultsma		Signature:		

Title of study:	**Effects of Working Memory Training on Reading Comprehension and Fluency**				
Date submitted:	12/7/2010	Project starting date:	2/1/2011	Project ending date:	5/15/2011
Type of Review Requested:					
☐ Exempt Status (complete *Request for Exempt Status*)			Submit 2 copies (original and 1 photocopy)		
☒ Expedited Review* (include reasons below)			Submit 2 copies (original and 1 photocopy)		
☐ Full Review			Submit 12 copies (original and 11 photocopies)		
* Reason for requesting Expedited Review:	The present research involves only minimal risk to the participants				

Institutional Review Board Recommendation:			
Exempt Status Approval:	☐ Yes	☐ No	☐ Revise and Resubmit (see attached)
Expedited Review Approval:	☒ Yes	☐ No	☐ Revise and Resubmit (see attached)
Full Review Approval:	☐ Yes	☐ No	☐ Revise and Resubmit (see attached)

IRB Chair's Signature:		Date:	1/26/11

This form and complete instructions are available online at: **http://www.mnstate.edu/irb**