

Evaluation of the Foodborne Illness Teaching Resource, *Buffet Busters*

by

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Dedication

This thesis is dedicated to my family. My husband Réal for supporting me through this journey and to my daughter Céleste whose love of learning drives me to work harder and learn more, simply because I can.

Abstract

This study is a measure the effectiveness of the “*Buffet Busters*” teaching resource in improving children’s knowledge about foodborne illness and the basic epidemiological principles when used within the provincial and territorial science units focused on the human body.

The student sample consisted of 78 children in Grade 5 and the study was implemented in both French and English. Student knowledge was measured both pre and post implementation by questionnaire. Teacher interviews were also used to collect information regarding the value of the “*Buffet Busters*” resource in their classrooms.

The study was able to conclude that children’s knowledge of foodborne illness improved in many topic areas. Improved knowledge was most significant in the understanding of general sources of agents which cause foodborne illness, and food related sources where these agents can be found. Entrance knowledge of personal hygiene and food preparation as a means to prevent foodborne illness was well established. The difficulty of the resource was examined and it was found to be suitable for its intended use in Grade 5 classrooms with minimal modifications. It is suggested that since “*Buffet Busters*” is an approved resource for Grade 5 science it should be more widely used to support curricular outcomes.

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Chapter 1: Introduction

Buffet Busters and Teaching about Foodborne Illness in Grade 5

In 1998 Canada's National Biotechnology Advisory Committee conveyed concern over the number of youth expressing an interest in science and technology, and the committee members issued a challenge to industry, government and educators to work together to promote "science culture" and expose youth to opportunities in biotechnology (Public Health Agency Canada, internal memo). Since 2003, Health Canada's National Microbiology Laboratory (NML) has been actively involved in numerous health research outreach programs. Outreach is crucial not only to the NML, but to the health research community as a whole.

As a result of the 2003 SARS outbreak, public interest in infectious diseases increased, especially in Winnipeg where more than 30,000 specimens were examined at the then new National Microbiology Laboratory. Effective communication between the Public Health Agency of Canada and the Canadian public was imperative in preventing mass hysteria and spread of the disease. Public health education began in earnest to reduce fear and build confidence in our health care system. In 2005, the Outreach Coordinator for the Public Health Agency met with a group of teachers to discuss ways in which the agency could work with teachers across all Grade levels, Kindergarten through Senior 4, to introduce students to concepts in Public Health, particularly infectious disease. The teachers, using provincial curriculum documents, identified areas of potential collaboration. Ideas generated from these meetings were subsequently presented to scientists and epidemiologists, working in the field, who validated the basic science and proposed approaches to meet the learning outcomes specified by the teachers.

As a consequence of this collaboration, a number of resources have been created with the assistance of grants from Canadian Institutes of Health Research, Canadian Foundation for Innovation, National Institutes of Health and the support of educational outreach proponents including, Frank Plummer and Dr. Dorothea Blandford of the NML (Sklarczuk, 2007). One of these resources is *Buffet Busters*.

Buffet Busters is a resource for Grade 5 educators and students. “It compliments Grade 5 studies of the human body, found in the science curricula of most Canadian provinces and territories¹, by showing how environmental factors can affect personal health (*Buffet Busters*, 2007).

Table 1.1 Provincial Curricular comparisons in Canada

Province	B.C.	Sask.	MB	Ontario	Atlantic	YT
Grade level	Grade 5	Grade 4	Grade 5	Grade 5	Grade 5	Grade 5
Topic	How the main systems of the human body work together	Nutrition and Digestion	Maintaining a Healthy Body	Human Organ Systems	Meeting Basic Needs & Maintaining a Healthy Body (Human Body Systems & Development)	How the main systems of the human body work together

Buffet Busters was developed to promote infectious disease awareness and to introduce concepts related to food and waterborne infectious diseases as well as the basic principles of epidemiology. It was produced by the Public Health Agency of Canada, with input by Manitoba teachers, and is currently available in both official languages through the Public Health Agency of Canada and the Manitoba Department of Education Training and Youth.

¹ Grade 5 content on the human body is not found in the provinces of Alberta and Quebec. The Northwest Territories utilizes the science curricula of British Columbia. Curriculum development in Nunavut is ongoing.

Buffet Busters was designed to assist in the attainment of a number of outcomes in the life science cluster of the Manitoba Grade 5 science curriculum, “Maintaining a Healthy Body”. As such, the collection of activities in *Buffet Busters* is not intended for exclusive use in meeting the outcomes of the curriculum but as a supplement to existing teacher lesson plans in the targeted cluster. The curriculum for “Maintaining a Healthy Body” indicates that lifestyle choices and both natural and human-caused environmental factors that impact on human health should be studied along with the identification of the body’s defenses against infections. In the suggestions for instruction addressed to Manitoba Grade 5 teachers, however, food poisoning and safe food handling practices are not among the exemplars presented. Therefore, it is assumed that the topic of foodborne illness rarely enters the classroom as a context for instruction.

The goal of *Buffet Busters* is to promote infectious disease awareness and introduce concepts related to food and waterborne infectious disease using basic principles of epidemiology. This was to be achieved by design criteria that have been recommended for educational resources on public health. These “Enduring Epidemiological Understandings” (Kaelin, Huebner Cordell, & Szklarczuk, 2007) include:

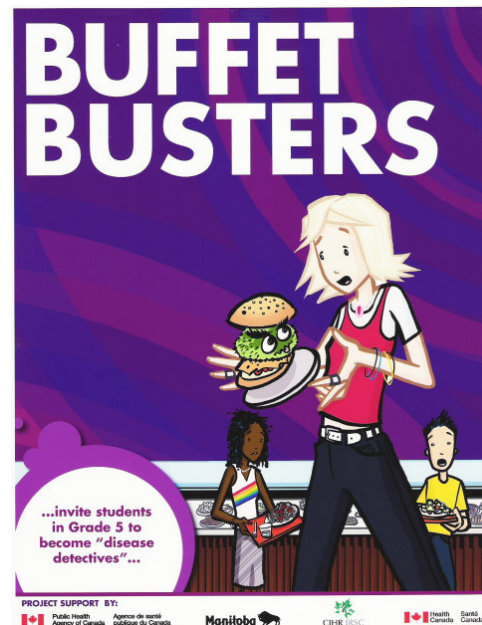
The causes of health and disease are discoverable by systematically and rigorously identifying their patterns in populations, formulating causal hypotheses, and testing those hypotheses by making group comparisons. These methods lie at the core of the science of epidemiology. Epidemiology is the basic science of public health, a discipline responsible for improving health and preventing disease in populations. (page 5)

Health and disease are not distributed haphazardly in a population. There are patterns to their occurrences. These patterns can be identified through the surveillance of a population. (page 6)

Analysis of these patterns can help formulate hypotheses about the possible causes of health and disease. (page 6)

A hypothesis can be tested by comparing the frequency of disease in selected groups of people with and without exposure to determine if the exposure and the disease are associated. (page 6)

The *Buffet Busters* resource is a series of interactive classroom activities that serve as an introduction to infectious diseases and the human impacts of disease. Students work through case studies that build in complexity and difficulty, where they are tasked with identifying the cause and source of an infectious disease (Szkłarczuk, 2007). Students are invited to become “disease detectives”, to find out how different foods become tainted with bacteria. As they search for clues, the students gain insight into the role of epidemiologists. They discover what causes foodborne illnesses (also known as food poisoning), how foodborne illnesses are transmitted and how contamination and transmission can be prevented.



The *Buffet Busters* resource includes five activities for the classroom. The first activity is designed to activate student interest and gauge prior knowledge regarding foodborne illness. Following this initial brainstorming, the students are introduced to a simulated cafeteria-like setup and asked to participate in the buffet. With participation in the simulation, a number of students become ill. Working together, and with the assistance of a facilitator, the entire class of students must determine which buffet food

caused the illness. In the third activity the facilitator is advised to introduce the concept of cross-contamination. Once again students participate in the buffet, a number of students become ill, and the cause must be determined. A follow-up activity introduces Kevin's story. Here the students must apply their skills of epidemiology and cross-contamination to the scenario. The fifth and final activity in the package is a board game that can be used to further reinforce the concepts outlined. An online animated game has been made available to achieve the same outcome of the board game.

Buffet Busters differs from other educational resources developed by public service groups in that it specifically links all outcomes to curriculum based educational goals for Grade 5 students across most Canadian provinces.

Buffet Busters also takes the responsibility for content delivery out of the hands of teachers and places it with competent senior years students who have been trained in the delivery procedure, so that the teacher is free to monitor student activity and to participate in the activity.



The following chapter is a review of the literature available in regards to foodborne illness in Canada, the causes, prevalence and prevention. It also characterizes the ways in which these messages are communicated to school-age children. Chapter 3 outlines the methodology employed in this study wherein both qualitative and quantitative processes are used to assess the usefulness of *Buffet Busters* in Grade 5

classrooms and its impact on students understanding of foodborne illness. Chapter 4 contains the presentation of results before and after the implementation of the teaching resource followed by a discussion of the interpretation of the data collected. Chapter 5 includes the conclusions from the research conducted, the limitations of the study and gives suggestions for further research.

Chapter 2: Literature Review

Waterborne and foodborne enteric gastrointestinal diseases remain important public health issues around the world. With the number of cases annually in Canada estimated between 11 and 14 million, it is important to recognize that the actual number of cases is proposed to be much larger.

The purpose of this review is twofold: (1) to review the literature on foodborne illness, the causes, prevalence and prevention methods; and (2) to examine ways in which messages regarding foodborne illness and safe food handling practices can best be conveyed to school-age children. Educating children about safe food handling, foodborne illness and epidemiology will help to make them better informed about how they can protect themselves and others against the spread of gastrointestinal infections. Educating children will reinforce the adult education campaigns aimed at reducing cross contamination of food during preparation and the consumption of improperly cooked foods.

Most gastrointestinal illnesses in developed countries, including Canada, are self-limiting and mild, therefore, many are never diagnosed or treated. Most surveys regarding the incidence of foodborne illness in a given population depend heavily on self-reporting and passive surveillance (Majowicz et al., 2004). Even though the majority of foodborne illness cases do not end in serious injury or death, bacterial gastrointestinal infections are associated with an increased short-term risk of death (Medeiros et al., 2001) and present a significant economic impact, as yearly costs due to health care and loss of income can rise to in excess of 10 billion per year (Health Canada, 2006)

In North America the majority of foodborne illness is caused by the Norwalk and Norwalk-like viruses. *Campylobacter* and non-typhoidal *Salmonellae* together account for about one-fourth of the cases where the pathogen can be detected. Less common bacterial infections, such as *Listeria monocytogenes* and Shiga-toxin –producing *Escherichia coli*, cause even fewer infections but are associated with higher mortality rates and severe complications (Mao & Boedeker, 2003). This was the case in August 2008 when an outbreak of *Listeria* occurred in Canada. The cause was attributed to lunch meat originating from a Maple Leaf plant. As of July 21, 2009 there were 53 confirmed cases of Listeriosis and 6 unconfirmed cases. Of the confirmed cases, 22 resulted in death and Listeriosis was identified as the underlying or contributing cause. To date, 3 additional deaths have occurred and although Listeriosis was confirmed it was not the underlying or contributing cause of death

Poultry has become identified as the most commonly encountered reservoir for foodborne pathogens both in Canada and abroad (Mao & Boedeker, 2003; Redmond et al., 2004). A recent study in Canada indicated that the favourite food choices of children, chicken nuggets and chicken strips prepared at home, are the leading risk factors for endemic *Salmonella* Heidelberg infections as are undercooked eggs (Currie et al., 2005). Furthermore, for a substantial proportion of chicken nugget/strips, consumers do not perceive, handle or prepare these products as they would raw, unprocessed chicken, in spite of the fact that the majority of these products on the Canadian market are raw or partially cooked (par-fried) (Currie et al., 2005). In addition to *Salmonella* Heidelberg, data from a U.S. study found that 69% of chickens in supermarkets tested positive for *Campylobacter jejuni* (Mao & Boedeker, 2003). Cattle have been shown to be a major

reservoir of harmful *E. coli*, specifically when consumed as raw ground beef. This bacterium is also known to reside in other foods and beverages such as raw salad vegetables, unpasteurized fresh fruit juice products, and water (Mao & Boedeker, 2003). Health Canada's Food Directorate is currently drafting an addition to the Food and Drug Regulations requiring mandatory safe handling labels to be applied to high risk undercooked foods (Currie et al., 2005).

To be most effective, food safety education needs to identify a target audience and focus on changing those behaviors most likely to result in illness (Medeiros et al., 2001). In Canada, females report more gastrointestinal illness than males with a significantly higher rate in women aged 25-64 years. Previously this increased rate was attributed to higher functional gastrointestinal issues among women. Majowicz and colleagues (2004) suggest that this rate is more likely due to exposure of foodborne pathogens incubating in the kitchen via food preparation.

The behaviors associated with decreased risk of infection include personal hygiene, adequate cooking /avoidance of cross-contamination, keeping food at safe temperatures and avoiding foods from unsafe sources (Medeiros et al., 2001). Pathogens for which personal hygiene is a primary control factor are those for which transmission is primarily via human feces (Medeiros et al., 2001). A number of pathogens like Norwalk/Norwalk-like viruses, *E. coli* O157:H7 and *Shigella* species have very low infective doses and are transmitted by contaminated food. Educating food handlers to wash their hands well after bowel movements would likely decrease the incidence of foodborne illness dramatically (Medeiros et al., 2001).

Cross-contamination during food preparation has a significant impact in the number of cases of foodborne illnesses. *Campylobacter jejuni* is a common contaminant of poultry products and is relatively easy to kill by heat (Medeiros et al., 2001; Mao & Boedeker, 2003). The number of *Campylobacter* infections is substantial even though most people do not report consuming undercooked fowl. A likely conclusion would be that many of the campylobacteriosis cases are the result of cross-contamination during meal preparation.

Effective ways to “reveal” the invisible pathogens and teach how to avoid cross-contamination are needed (Medeiros et al., 2001). Food safety can sometimes come at the cost of convenience or a quest for natural foods. This specifically calls awareness to ready-to-eat foods including raw or unpasteurized dairy products, uncooked seafood, home-canned, low acid foods improperly processed and raw sprouted seeds (Medeiros et al., 2001). Attention must be given to the incidence of illness among these products. Findings from chicken nugget/strip studies have been shared with food safety educators to encourage development of effective consumer education strategies regarding the safe handling and preparation of these products (Currie et al., 2005).

Overall, the rates of many foodborne pathogen infections are on the decline. From 1996-2005, *Yersinia* infections decreased by 49% and *Shigella* infection decreased by 43%. Progress has also been made against *Salmonella*, *Campylobacter*, *Listeria* and *Escherichia coli* 0157:H7 (Hammonds, 2007). Successful industry and regulatory efforts combined with widespread public education about the importance of practicing safe food handling is attributed to this reduction (Hammonds, 2007).

It is suggested that continual reinforcement, repetition, and creative positioning of core messages are required in order to have an impact. Loss of education initiatives leads to loss of consumer safe practices, which are, in turn, revealed as an increase in disease (Hammonds, 2007).

Educational resources promoting public health initiatives are not new to Canada or to any country wishing to ensure healthy and vibrant citizens. Over the past decade such initiatives have been made on a variety of infectious diseases including HIV/AIDS, hepatitis, meningitis, and general hygiene, as well as foodborne illness. All of these educational resources have one thing in common; they try to convey a simple message on how to protect oneself from disease and continue to be healthy. The delivery of the message differs depending on the country and the specific conditions of the differing educational systems and can incorporate traditional lectures, games (both computer and traditional board games), plays, dramatizations and simulations. For the purposes of this literature review, educational resources targeting Kindergarten through Grade 8 students in an educational setting will be examined.

The literature reflects that even though public health resources are available, the number of public health resources available for K-12 classrooms is limited. Stroup and Thacher (2007) conducted a literature review to determine existing resources for use of epidemiology and public health in education. Two hundred twenty eight articles were found and, of these, 204 were disregarded because the focus was on the methodology of teaching public health issues. Of the 24 remaining articles, 10 presented discrete exercises for use in classrooms. Frequently the resources that are available are not implemented in classrooms, because teachers do not easily see links to the provincial and

state curriculum documents they use to guide their teaching. By closing this gap between the need for public health instruction and government curriculum documents there is a greater likelihood that there would be an increase in the use and implementation of such programs (Cliona et al., 2007). Similarly, embedding public health outcomes in mandated school curricula makes the resource package more sustainable rather than a “one off” campaign. The research literature also suggests that the availability of the resources is key. Making the materials available through teacher associations would increase teacher awareness and access (Cliona et al., 2007).

As mentioned above, only a few educational resources on Public Health exist for Grades K–12. These include *Detectives in the Classroom* developed by Montclair State University, *Excellence in Curriculum Integration through Teaching Epidemiology* (EXCITE) developed by the Center for Disease Control, and the *Young Epidemiology Scholars* (YES) curriculum developed by the Robert Wood Johnson Foundation and the College Board (Kaelin et al., 2007; Stroup & Thacker, 2007). One well documented resource, *Fight Bac! Keep Food Safe from Bacteria*® was developed through a non profit partnership between the U.S. Departments of Health and Human Services, Agriculture, and Education, industry leaders and consumer leaders. The initial partnership has since grown to include a number of additional stakeholders. *Fight Bac!* is a science-based resource designed to promote safe food handling practices in the U.S. (Hammond, 2007). A fifth resource, *Bug Investigators*, focuses on improving hygiene and prudent use of antibiotics. *Bug Investigators* uses a variety of hands-on activities paired with in-class discussions. It is one resource that has a well documented evaluation process. The goal of the evaluation was “to determine the effectiveness of the *Bug*

Investigators pack as a teaching resource in primary schools by measuring children's knowledge of micro-organisms and antibiotics and hygiene before and after use of the pack" (Cliona et al., 2007). The evaluation was conducted using a "before and after study design" wherein students were given pre- and post-questionnaires in order to assess the effectiveness of the learning resource. The pre-questionnaire was delivered immediately before the implementation of the program and the post-questionnaire was given one to six weeks after the implementation. The findings of this study include knowledge improvement in the areas of the use of antibiotics, their use and the value of each individual's natural flora. Entrance knowledge regarding how germs spread and hand hygiene was excellent and saw only a slight improvement. Discussions with teachers indicated that some of the worksheets were too advanced for the target age. (Cliona et al., 2007)

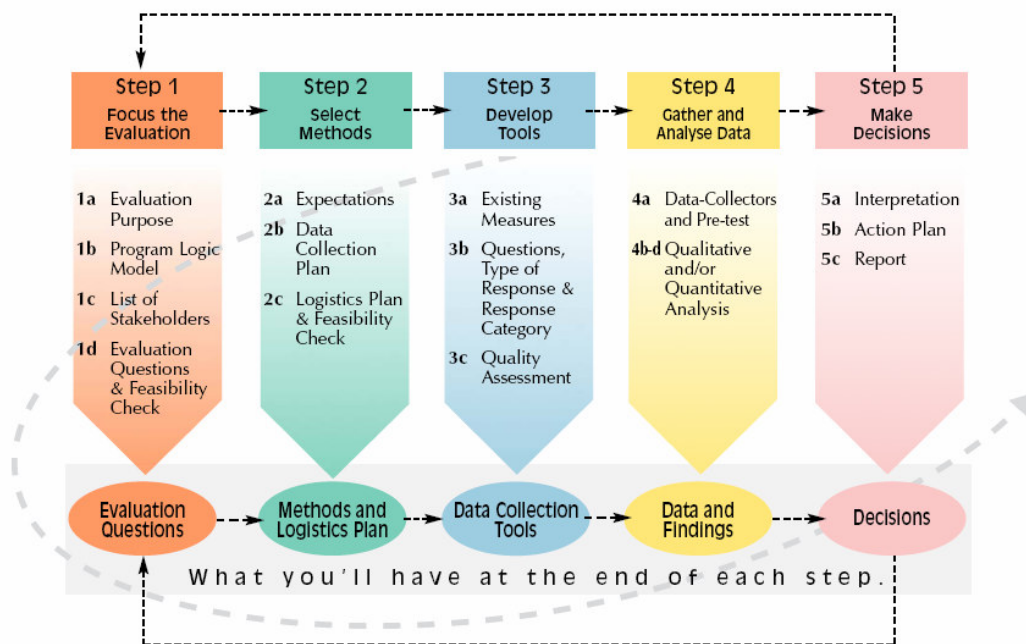
Foodborne illness remains a serious concern in Canada and other countries around the world with a large number of cases annually. Few educational resources exist which present this topic to school-age children. The next chapter outlines the specific methodology used in this study to evaluate the *Buffet Busters* teaching resource. The Program Evaluation Toolkit is presented as are the questionnaires and interview modes of data collection that were used with participants.

Chapter 3: Methodology

The study presented here is aimed at determining the effectiveness of *Buffet Busters* as a teaching resource in Grade 5 classrooms. Children's pre-instructional and post-instructional knowledge of foodborne illness, safe food handling practices and epidemiology were assessed in order to determine if engagement in the *Buffet Busters* activities and game has an impact on their understanding and application of the content.

The Program Evaluation Toolkit provided by the Public Health Agency of Canada was used to evaluate the success of the *Buffet Busters* resource. The evaluation examined both the processes and outcomes of the teaching resource. Since *Buffet Busters* is a product of the Public Health Agency of Canada's outreach program, it was decided that the approved PHAC Program Evaluation Toolkit would be an appropriate way to evaluate the *Buffet Busters* resource. The Toolkit is an organizational tool that assists the researcher in defining the research to be done and how the research will be conducted. The toolkit is composed of five modules (figure 3.1) that are essentially a "how to" guide to the evaluation process. Instructions are given for methods of data collection and analysis, and worksheets are available to expedite the process. (Appendix 1)

Figure 3.1: Overview of the Program Evaluation Toolkit from the Public Health Agency of Canada



All five steps of the toolkit were employed in this study however, some of the information that was suggested by the worksheets were irrelevant as they pertain to a complete program evaluation rather than one portion of a program as found in this study. The logistics is a good example of where this is the case. (Appendix 1, page B-9)

Research Methods

Setting and participants.

The study was conducted within a convenience sample of Grade 5 students in the Pembina Trails School Division of Winnipeg. Four schools were recruited for participation.

Since *Buffet Busters* is a bilingual teaching resource, two French and two English track classes made up the pool of student participants with a total of 82 students taking

part. Class size ranged from 17 to 24 students, with a mean class size of 20. In total, 78 students completed both the pre-activity and post-activity questionnaires, the other 4 students were absent from school on one of the days the questionnaire was administered.

All Pembina Trails schools with Grade 5 students, 21 in total, were invited to participate in the study. An e-mail invitation was sent to the applicable school principals and Grade 5 teachers. The invitation included a brief summary of the program, as well a letter of consent which clearly outlined the program and expectations of participants (Appendix 2). Paper copies of the invitation followed in the regular post. Once interest was indicated by a school, the researcher contacted the principal and teachers by phone. During this call, a date for delivery of the resource was established and questions about the program were discussed. Classroom teachers participating in the study were given the teaching resource prior to its delivery and at no cost. Consent forms for participating students and student pre-questionnaires were sent to teachers as hard copies along with the necessary instructions. The introduction and delivery of the resource coincided as much as possible with the delivery of the Manitoba Grade 5 science cluster, “Maintaining a Healthy Body”.

The three schools, which chose to participate in the study, fit the criteria outlined above. School “X” is a dual track French and English school of 500 students. One third of the student population attends the Kindergarten to Grade 8 English Program and two thirds attend the Kindergarten to Grade 8 French Immersion Program. One French class and one English class from School X participated in the study with a total of 37 students out of 65 participating. School “Y” is a Kindergarten to Grade 6 French milieu school where all 568 students are in a French Immersion program, 65 of them are in Grade 5.

One Grade 5 class of 19 students in School Y participated in the study. School “Z” is a Kindergarten to Grade 6 school with a population of approximately 440 students who are instructed in English with 82 students in Grade 5. One Grade 5 class of 22 in School Z participated in the study. All participating schools are located in catchment areas with a predominance of single family homes and a small number of apartments and multi-family housing units.

Four teachers participated in the study. Their teaching experience varied from novice to seasoned veteran. In School X, Teacher 1 and Teacher 2 worked in the Grade 5 French Immersion program and English language program, respectively, Teacher 3 worked with Grade 5 in School Y, and Teacher 4 was a Grade 5 teacher in School Z.

Teacher 1 was new to the Grade 5 French classroom. Teacher 2, in contrast, had prior experience with this Grade level. The language of instruction for this class was English although English may not have been the first language of some of the students. Teacher 3, expressed reservations about participating in the study due to time constraints. However, participation was forthcoming when a clearer understanding of the program was achieved. The delivery of the *Buffet Busters* program was in French. Teacher 4 also had extensive experience with this grade level and the science curriculum especially the topic “Maintaining a Healthy Body”.

Materials and Procedure

The four classes of students participated in pre-test and post-test questionnaires (Appendix 3) and in the cafeteria activities, which were led by senior years students from the local high school. Senior years students were volunteers who were identified by

classroom teachers as showing strong communication and leadership skills. Six identified students were approached by the researcher for participation with four accepting the invitation. Students attended an instructional workshop for *Buffet Busters*, approximately 45 minutes which was presented by the researcher. Immediately following each of the classroom presentations of the cafeteria activity, the senior years students completed a questionnaire (Appendix 4). The questionnaire was developed as a component of the Program Evaluation Toolkit from the Public Health Agency of Canada. The questions were designed to assess the delivery process as outlined in Appendix 1. The day after the cafeteria activity the participating Grade 5 students individually worked on the “Chain of Contamination Activity” (Appendix 5) to determine their ability to apply the concept of cross contamination in food preparation. The remainder of the activities in the *Buffet Busters* resource and the online game were implemented by the classroom teachers who chose to do so. The researcher encouraged their use; however, at the time of the interview two of the four teachers had indicated that their students had played the online game.

Classroom teachers were invited to participate in an interview (Appendix 6) to determine if the messages learned by the student participants using the *Buffet Busters* resource were clearly understood and if the resource was able to meet student and teacher needs in the classroom. Classroom teachers were contacted for an interview 2-4 weeks after the program had been implemented. Each interview was approximately 30 minutes in duration, and concerned the following:

- 1) The degree to which the educator believed *Buffet Busters* addressed curricular outcomes.

- 2) The appropriateness of the *Buffet Busters* activity for Grade 5 students.
- 3) The overall effectiveness of *Buffet Busters* as an educational resource in their classroom.

The interviews followed an open-ended protocol of questions, and they were audio recorded and transcribed for further analysis.

Analysis

As stated in the “Program Evaluation Toolkit”, evaluation information began with a review of all the collected data to find the emerging themes or patterns. Questionnaires were collected by the researcher and analyzed with the use of a paired t-test and percent improvement to determine the degree of change in knowledge regarding infectious disease and foodborne illness. The “Chain of Contamination” activity was marked by the classroom teachers and photocopied. The photocopies were sent to the researcher for analysis to determine whether the principles of epidemiology presented in the cafeteria activity were useful to individual students in successfully completing the activity. Senior years students’ questionnaires were studied for the process evaluation component as outlined in the Evaluation Toolkit. Teacher interviews were transcribed and, as directed by the Toolkit, analyzed to determine emerging themes regarding the *Buffet Busters* resource as a viable classroom activity. Given the relatively small sample size no analysis was performed based on language of presentation (French/English).

Appropriate protocol for sample selection occurred with all participants providing letters of consent. All students in the participating classrooms took part in all portions of the classroom based activities including those from whom consent was not given. However, only questionnaires and worksheets from those who did provide consent were

collected and made available to the researcher for the basis of this study. Grade 5 participants were given questionnaires to evaluate their knowledge of foodborne illness pre and post program implementation. Teachers were interviewed regarding the usefulness of the resource in their classrooms and senior years students completed questionnaires regarding program delivery and allowed to express their views of the presentations. In Chapter 4 the results of the study are presented followed by a discussion of the results and how they relate to the value of “*Buffet Busters*” as a teaching resource in Grade 5 classrooms.

Chapter 4: Presentation and Discussion of Results

As previously mentioned the collected data were analyzed with the use of the Public Health Agency of Canada Toolkit as a means to group and organize data according to themes and for the purpose of tracking outcomes of the evaluation. The results are presented below.

Knowledge before use of the education resource

Before teaching (pre-questionnaire results), children had variable levels of knowledge about each topic area (Table 4.1). Their knowledge of infective agents (viruses/germs and bacteria/germs) of foodborne illness, where the correct answer was “both” viruses and germs and “both” bacteria and germs can lead to foodborne illness, was between 78 and 91 percent, respectively. However, students struggled with general sources of these infective agents: students chose water, 0 percent; food, 35 percent; and both water and food, as the correct response, 46 percent. Similarly, students were unable to demonstrate an understanding that people and animals can serve as a source of infective agents. Only 58 percent chose the response that, indeed, both are reservoirs for these pathogens. Students had knowledge about the importance of cooking food well in order to prevent foodborne illness as 72 percent answered correctly. Students’ correct responses ranged between 86-96 percent when responding to scenarios where they were asked to assess behaviors that can lead to foodborne illness.

Table 4.1 Percentage of Students with correct responses before and after program implementation and the statistical results obtained.

Question	Percent correct before	Percent correct after	Percent improvement	Paired <i>t</i> -test
<i>Which of the things listed below do you think can make you sick?</i>				
Bacteria				
Germ				
Both	91	99	8.8	0.2062
Other people				
Animals				
Both	58	74	27.5	*0.0854
Viruses				
Germ				
Both	78	99	26.9	0.2205
Water				
Food				
Both	46	63	36.7	0.0109
<i>Which of the things listed below do you think help us from becoming sick?</i>				
Washing our hands	91	100	9.9	0.4149
Changing your socks	74	63	-14.9	0.4979
Eating healthy food	81	84	3.7	0.4901
Cooking your food well	72	96	33.3	0.2227
Exercising	64	79	23.5	0.1010
Getting enough sleep	80	74	-7.5	0.4502
<i>Which of the foods listed below do you think can sometimes lead to food poisoning?</i>				
Undercooked Chicken	82	98	19.5	0.3506
Undercooked hamburger	85	96	12.9	0.3677
Unwashed fruit	82	76	-7.3	0.4355
Well cooked meat	3	7	133	0.0917
Washed vegetables	5	21	3.2	0.3536
Raw eggs	74	82	10.8	0.5581
Unwashed vegetables	76	82	7.9	0.5092
Unrefrigerated salad	69	85	23.2	0.2147
Potato chips	21	27	28.6	0.3393
<i>Uncle Tom always takes his hamburgers off of the grill when they are pink so they are extra juicy.</i>	86	100	16.3	0.4502
<i>When you get home from grocery</i>	96	100	4.2	0.4950

<i>shopping you wash your fruit before eating it.</i>				
<i>At a birthday party you notice that Jake's Mother cuts up raw chicken strips and then uses the same knife to cut up the cake..</i>	94	100	6.4	0.4545
<i>At the "all You Can Eat Buffet" you take a clean plate each time you go up for more food</i>	96	94	-2.1	0.8962
<i>At a picnic your sister allows the potato salad to sit in the sun until its time to eat.</i>	94	100	6.4	0.3910

**Variables x and y failed to reach statistical significance, but did have p values of less than 0.1*

Knowledge after use of the education resource.

Table 4.2 Percentage of Students with correct responses before and after program implementation and the statistical results obtained in clustered topics.

Topics	Percent correct before	Percent correct after	Percent improvement	Paired t-test
General infective agents of foodborne illness (bacteria, virus, germs)	74	91	22.9	*0.0668
General sources of infective agents (people, animals, water, food)	62	85	37.1	0.0016
Behaviours to prevent foodborne illness (washing hands, etc.)	80	95	18.8	*0.0645
Sources of foodborne illness (undercooked chicken, etc.)	18	23	27.8	0.0165
Assessment of scenarios	97	99	2.1	0.1246

**Variables x and y failed to reach statistical significance, but did have p values of less than 0.1*

Students' knowledge after participating in the *Buffet Busters* activities was improved (Table 4.1, percent improvement 1-57) in all but three questions that were posed in the questionnaire. Only one question was shown to be significant: "Which of

these things listed below can make you sick? Water, food or both.” The correct response is “both” (Table 4.1, $p < 0.05$).

Students demonstrated the greatest significant increase when topic area questions were clustered and examined (Table 4.2). Clustered topic areas include general sources of infective agents (i.e. people, animals, water, food), percent improvement 37.1 and $p = 0.0016$; and sources of foodborne illness (i.e. undercooked chicken), percent improvement 27.8, $p = 0.0165$. Behaviours which support the prevention of foodborne illness (i.e. handwashing) and general infective agents of foodborne illness (bacteria, virus, germs) were examples where variables x and y failed to reach statistical significance, but did have p values of less than 0.1, percent improvement was 18.8, $p = 0.0645$ and 22.9, $p = 0.0668$, respectively. Even though the data did not prove to be statistically significant, given the importance of recognizing behaviours that can lead to foodborne illness and the causative agents the data suggests a “practical significance” where knowledge is increased regarding this topic area. This data may have been historically biased due to the onset of such diseases as the Listeriosis outbreak in 2008 and the H1N1 pandemic in 2009. Both situations sent very strong messages on causes of infectious disease and prevention of their spread. Similarly, some of the behaviours used in the calculation of the clustered data may not be routinely observed by all students, for example, washing of fruit and vegetables prior to consumption. Many of these items come “ready to eat”. Clustered data was calculated by taking the total of correct responses for individual questions and finding the average.

Teacher Interview Findings

In response to Interview Question 1, “Did the outcomes indicated in the *Buffet Busters* resource correspond with those in the Manitoba science curriculum for grade 5?” the teacher in the English program at School X agreed *Buffet Busters* teaching resource was an appropriate resource for the Manitoba Grade 5 science curriculum topic “Maintaining a Healthy Body”.

I think that they [*Buffet Busters* resources] fit in perfectly, especially Grade 5 in the human body and in science, nutrition and health. I think they also do nutrition and health in Grade 4, so I think it fits in really, really well with both health and science. (Teacher 2)

However, not one of the four participating teachers, in responding to Interview Question 2, “How do you normally meet the outcomes listed in the *Buffet Busters* resource?” mentioned having previously used the context of safe food handling and foodborne illness as a means to fulfill the outcomes.

We never really looked at it from the perspective of foodborne illness or health and safety about food. So it does fit. We just did not notice it on our own.
(Teacher 2)

To meet the outcomes for Grade 5 Science, the French language teachers, Teacher 1 and Teacher 3, relied heavily on curricular resources that were located within the appendices of the French curriculum guide, *Sciences de la nature 5^e année, Regroupement 1: Le Maintien d’un Corps en Bonne Santé*.

Well normally, we use the provincial curriculum guide which has in it a number of resources which are available for teachers to use. They really are quite good.

They have in there a meal plan and a nutrition summary. So that is how we would have addressed those outcomes. (Teacher 1)

Teacher 3 stated that she used,

Stuff from the French library. I don't have the titles, the curriculum guide and discussions.

In the appendixes of the French curriculum document there are projects and activities to support the learning outcomes for this unit. Examples of these include comparisons of the nutrient content of foods and evaluation of a student's diet. In the English curriculum document, *Grades 5 to 8 Science: A Foundation for Implementation* (2000), there are suggestions for instruction but available resources are not mentioned. Having few other resources to pull from, Teacher 2 indicated that she had previously "just skimmed right over the outcomes"

In responding to Interview Question 3, "What were your general impressions of the Buffet Busters resource when you first received it?", all four teacher participants mentioned being impressed by the professionalism of the *Buffer Busters* resource stating that:

When I first received the resource I thought it was very eye-catching and professionally laid out. (Teacher 1)

Nice! Colorful. Well laid out. (Teacher 2)

Generally I think it was well organized. I do think it was something that I will use again, and it probably should be used again. And I liked the idea that it was in French. We have a difficult time getting resources that are in French, and I really was impressed that this one was, and it was a fun activity as well. (Teacher 3)

Teacher 4 remarked on the teacher friendly organization of the resource:

Resources were well laid out and divided into sections which made it easy to understand and follow.

Regardless, of these first impressions, some of the participating teachers indicated that they were not able to spend the time to fully examine the document in its entirety.

I did not go through the whole resource, and I apologize for not having gone over the whole resource. However, I was impressed with the resource. (Teacher 1)

Often that is the case with new resources. We think that they are great, but time is always an issue. I did not have a lot of time to look over it, or spend time looking through it, but it was really good. (Teacher 2)

The pre-activity questionnaire that was designed for the study was intended to give a baseline of entrance knowledge for the Grade 5 participants and perhaps activate interest. Interview Question 4, “Do you feel that the pre-activity questionnaire was able to activate interest among your students and generate discussion?” was posed to determine if the pre-activity questionnaire did arouse student interest and motivate discussion. Some of the students in French Immersion programs struggled with the language as foodborne illness or food poisoning was novel vocabulary at this grade level. At times, the teacher had to intervene and assist students with the completion of the questionnaire.

They really did not understand the food poisoning terms in French. So we had to do a little discussion around that. (Teacher 3)

One teacher indicated that although there was not a lot of discussion in the class, the pre-activity questionnaire definitely activated interest by setting them up in the right frame of mind for the program.

It just gave them something to start with and begin a conversation. (Teacher 1)

In other classrooms students freely engaged in discussion and stories of their experiences.

I think that since my students seemed to have a lot of prior knowledge about the topic, it really got them talking about their personal experience and everyone wanted to tell their story. So I guess that it did stimulate interest and discussion. (Teacher 4)

Though some did and didn't really know what it was [food poisoning]. So if I said, 'If you eat something and it makes you feel ill', they said 'Oh, yeah, yeah, yeah' and they had all kinds of stories. (Teacher 3)

In their responses to Interview Question 5, "From your observations during the *Buffet Busters* cafeteria scenario, did your students seem engaged in the activity and in determining the trail of infection?", teacher participants indicated that they believed that their students were engaged in the experience and were interested in determining the trail of infection especially with the obvious colour change of the liquid.

They seemed quite excited. Especially because of the colour of the solution, and the colours that they turned. And so I do think that they were more interested in what was going on. (Teacher 1)

Oh, yeah. They really, really like it. Yesterday we were discussing it, and some of the kids that were away were back, and they were telling them, and they were really excited. (Teacher 2)

Aside from the change in the colour of the liquid, teachers also felt that the use of the menu cards and the chart displayed on the Smart Board assisted students in their task to trace the trail of infection

Very engaging, and the menu cards also really made it easier for them to remember what they ate and compare it to others. (Teacher 4)

It was very helpful for them to have the activity cards where they could look at what they ate and help them to make the comparison about what they ate. They were very engaged with the use of the Smart Board where the chart was about who was affected and who was not affected. (Teacher 1)

However, the cafeteria activity did not always occur as planned. In one classroom the pictures that accompanied the activity became a stumbling block.

Well I do believe that they thought that at each station that one of the two foods would cause foodborne illness, and I think that was attributed to the fact that the actual pictures seemed to be very angry, like something was wrong with them. They depicted a negative connotation. So I think it was expected for each one of those to have something wrong with them or at least one from each pair. When they noticed that it wasn't the case, it was then that they were able to figure it out. (Teacher 1)

Teacher participants' responses to Interview Questions 6 and 7 indicate that their students' knowledge of foodborne illness had increased as a result of the implementation of *Buffet Busters* in their classrooms even where the level of prior knowledge was high.

Overall, yes, [knowledge increased], but I can specifically cite that one of my students that I worked with on the pre-activity and the post-activity questionnaire was able to articulate a little bit more understanding about foodborne illness.

Some things, still, the student was unsure of, and the student required teacher intervention to help them through the survey. But there was definitely an improvement in the learning. (Teacher1)

Teacher 3 spoke specifically of new information that was uncovered by the students during the activity.

Yes, especially with the raw hamburger, not even raw, but the not well done hamburger, and the using the knife with meat and then to cut vegetables. They talked about that a lot. How to make hamburgers, and people that they know who make rare hamburgers, and how that's not good for you.

When asked to provide general impressions of the implemented *Buffet Busters* resource in Interview Question 8, all participants expressed concerns regarding the "Chain of Contamination" activity. In both the French and English classrooms, students struggled with completion of the worksheet and required teacher intervention. This is supported by the teacher comments and analysis of students' worksheets where the beginning answers on the worksheet were much better formulated than those at the

end. Some students failed to complete the worksheet, and others resorted to single word answers of “ditto” to complete the task. However, the degree to which students accurately completed the activity relied heavily on teacher involvement. Overall, teachers felt that the story, as written, contained too much text information without enough breaks.

The reading level in Kevin’s story was a little bit high for my students. It was something that they could manage if I worked through it with them, and I did. Similarly, if they did not complete the activity, the chart on Kevin’s story, it was not because they probably could not understand it. It was because the story was very long. There was a lot of text, and it was not broken up. So it tended to be a little overwhelming for my students. (Teacher 1)

The little activity that we had to do afterwards where we had to read the little story, we did it together...because the vocabulary was a little difficult and there was a lot of reading. (Teacher 3)

Not bad [referring to the Chain of Contamination activity]. It’s just with my group, we have to do lots of work together. They really need a lot of guidance.
Teacher 2

Teacher 4 recounted the students frustration with what they believed was a critical piece of information in the story.

My students really struggled with the “Chain of Contamination” activity. At the beginning of the story they were unclear if the chicken was on a plate or not. This was such a mental block for many of them. They could not get over it and move on to the rest of the story. I had to read the story about 5 times especially on some

paragraphs. I could not believe it when they said “again”. I said, ‘Are you sure “again”?’ So it was not until the end of the story that it tells you the chicken was on a plate. I may make that clear from the beginning next time.

Despite these shortcomings, when responding to Interview Question 9, all teacher participants indicated that they would indeed use the *Buffet Busters* resource again in their classroom with slight modifications to the “Chain of Contamination” activity to suit the individual needs of their students.

Next time I would modify the activity to suit my students with special needs and differing abilities. (Teacher 4)

Teacher 3 decided visuals could be helpful in assisting students to follow the story.

We did pictures on the board as we were going along. You know the chicken infected the sandwich and where did that go. And they really found that interesting. and they were able to follow the concept.

In all four of the test classrooms, the *Buffet Busters* resource was delivered by local senior years students as indicated in the methodology section of this paper. All presenters were well received by the younger students. Teacher 3 commented on the impact that it had on her class.

It really made a difference having young students do the presentation. It was really good for my class.

Process Analysis of Implementation

Implementation of the *Buffer Busters* resource followed the methodology outlined earlier in this paper and restated here.

- Pre-questionnaire given to students by the classroom teacher.
- Delivery of “Cafeteria Activity 1” by senior years students from a neighboring high school. The presenters included 2 French immersion students who implemented *Buffer Busters* in Schools X and Y, and two English students who implemented *Buffer Busters* in Schools X and Z.
- Post-questionnaire given to students by the classroom teacher.
- “Chain of Contamination” activity delivered by the classroom teacher.
- Interview of classroom teacher by the researcher between 2-4 weeks after presentation.

The surveys completed by the senior years students indicated that appropriate materials were present, and that the time allotment for the “Cafeteria Activity” was adequate. The four presenters felt well prepared and supported by the classroom teachers. They described student engagement as being high, with clear and relevant questions asked and enthusiasm demonstrated in deciphering the trail of infection. One presenter summed it up by saying,

Kids seemed to really enjoy the activity, and I think that it taught them to be more aware about foodborne illnesses.

Chapter 5 is a discussion of the conclusions drawn from the data collected by both questionnaire and interview methods presented along with the limitations of the study,

suggestions for further research, and the implications for the use of “*Buffet Busters*” as a teaching resource for Grade 5 classrooms.

Chapter 5: Conclusions

It was found that *Buffet Busters* is an effective teaching resource, which led to improvements in children's knowledge and understanding of foodborne illness, safe food handling practices and epidemiology. The greatest increase was in the area of general sources of infective agents, specifically that disease can be spread by humans and animals through both food and water. Teachers participating in the study reported that the activity having the most impact on the students was the cafeteria activity, which effectively demonstrated the source of illness and how that source could be determined using data collected. As a result, all four participating teachers indicated that this was a worthy resource that they were interested in adding to their current repertoire of teaching resources for Grade 5 science. Reasons given by the teachers for again using *Buffet Busters* in subsequent years were that the resource (a) supports the learning outcomes of the provincial Grade 5 Science curriculum document, (b) is professional, (c) is easy to use and (d) actively engages students in the learning process. Criticisms of the resource package were limited to formatting concerns with the "Chain of Contamination" activity which can, as indicated by the respondents, be modified upon delivery for individual classrooms. The modifications suggested by the teacher participants should be incorporated into the resource to assist teachers with identification of potential pitfalls for students.

Even though students struggled with the "Chain of Contamination" activity, many were able to follow the path of contamination from person-to-person and food item-to-food item with the assistance of their teacher, and many were able to show understanding of the cross contamination, food-borne illness, and epidemiology. Despite the catchy

appearance of the resource package, teachers did not fully examine or evaluate *Buffet Busters* prior to implementation due to a lack of time to do so. Therefore, as found previously by Clidna and colleagues (2007), the results of this study also suggest that making the materials available through professional development opportunities offered by teacher associations would increase teacher awareness and access. In Manitoba, this would most likely involve the annual provincial Special Area Group in-service offered by the Science Teachers' Association of Manitoba.

It was found that even though the Evaluation Toolkit provided by the Public Health Agency of Canada was more of an organizational tool rather than a set method for collecting data and evaluating the project, it did present the framework for planning the course of the research, thus, ensuring that the goals of the research were met.

Limitations

The scope of this study was limited to one school division and four classrooms, two in schools with French Immersion programs and two in schools with English programs. This represents only a small segment of the general population. The use of a convenience sample in this study suggests a lack of randomness in the participants given that they all originate from the same urban setting in the same school division. When used more widely, the improvement in knowledge may vary significantly from the findings reported here.

This study did not include the use of a control group wherein students would have completed the questionnaires and the "Chain of Contamination" worksheet without the

Buffet Busters presentation. Therefore, there is really no way of comparing the level of impact afforded participants by the *Buffet Busters* teaching resource over those students who did not participate.

Involvement in the study was voluntary. As a result, it may be that teachers who are more enthusiastic about the topic were more likely to participate. This could have an impact on the data attained and the conclusions drawn. Finally, this study did not examine the results, particularly changes in behaviour, in the home. Therefore, it is not possible to assess the students' incorporation of the concepts of safe food handling into their daily lives or to know if they passed the information on to others in their household.

Further Research

In all cases, student pre-questionnaires indicated that students had a prior knowledge of foodborne illness. This was a surprising outcome, given that foodborne illness is a topic that is not found in a provincial curriculum document prior to Grade five. The question that arises from this data is “Where did these students acquire their background knowledge on the subject?” Possible sources may be school lunch programs, educational television, guidance from the home or public health messages regarding the recall of foods or the prevention of spread of the H1N1 virus.

Similarly, since the participants in this study were urban residents of the southwest portion of the city who were attending schools in the same school division, the results may not be reliably extrapolated to all Grade 5 students in the city or province. Students in other school divisions whether, urban, rural and northern, may have very different levels of entry knowledge and experience based on exposure to foodborne

illness and messages regarding the spread of infectious disease. However, more definitive answers requires further study.

Implications

Educating children about foodborne illness will hopefully increase their knowledge of sources of enteric pathogens and prevention. Improved food handling practices and increased personal hygiene will also reduce the spread of gastrointestinal outbreaks. Educating children also reinforces adult education campaigns aimed at prevention of foodborne illness. Successful implementation of the *Buffet Busters* resource will reinforce the collaborative program design between the Public Health Agency of Canada and teachers. Such reinforcement may result in an increase of public health related educational resources developed for the education system. The *Buffet Busters* resource package has been recognized by Manitoba Education, Training, and Youth as an approved educational resource for Grade 5 science. The outcomes listed in the *Buffet Busters* resource are compatible with those of most provinces and the Yukon Territory in Canada. Therefore, national implementation of the resource is possible. Summative evaluations of this program will be released to all stakeholders including interested participants (i.e. school division superintendent, school principals, Grade 5 teachers, and parents/guardians of Grade 5 students), the Public Health Agency of Canada Outreach Program and the Government of Manitoba Department of Education.

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appendix B

Blank Worksheets

<i>Purpose Statement</i>

CAT Worksheet		
Components What are the main sets of activities?	Activities What things are done? What services are delivered?	Target Groups At whom are activities directed?

SOLO Worksheet			
What is the <i>direction</i> of change (↑ or ↓)?	What is the program intending to change?	Is it short-term or long-term?	Which components contribute to this outcome?

appendix B

<i>Stakeholder Checklist</i>	
Internal <ul style="list-style-type: none"> <input type="checkbox"/> program manager <input type="checkbox"/> program staff <input type="checkbox"/> planners <input type="checkbox"/> Medical Officer of Health <input type="checkbox"/> other senior managers in the health unit <input type="checkbox"/> other 	External <ul style="list-style-type: none"> <input type="checkbox"/> partners in planning or delivering the program <input type="checkbox"/> Board of Health <input type="checkbox"/> Ministry of Health <input type="checkbox"/> other funding agencies <input type="checkbox"/> accreditation body <input type="checkbox"/> program participants <input type="checkbox"/> community members or groups <input type="checkbox"/> program volunteers <input type="checkbox"/> organizations offering similar programs <input type="checkbox"/> other

Evaluation Questions Checklist		Who needs to know?	
		H = High Priority L = Low Priority	
Activities		Manager of Program	Other Stakeholders
		Internal	External
Think about which activities contribute towards the program's outcomes. Are there any activities you are particularly concerned about?	Were activities implemented as planned? (how often, when, where, duration)		
	How did the activities vary from one site to another?		
	Were required resources in place and sufficient?		
	Did staff think they were well prepared to implement the activities?		
	Did staff think they were able to implement the activities as planned? If not, what factors limited their implementation?		
	Did staff and community partners think the partnership was positive?		
	Did community partners think the activities were implemented as planned?		
	What activities worked well? What activities did not work so well?		
	What was the cost of delivering the activities?		
Target Groups			
Think about who the program is designed for. What do you need to know about who you are reaching and who you are not?	How many people were reached?		
	Did the program reach the intended target group?		
	To what extent did activities reach people outside the target group?		
	What proportion of people in need were reached?		
	Were potential participants (non-participants) aware of the program?		
	Were participants satisfied with the program?		
	Does the program have a good reputation?		
	How did participants find out about the program?		
	How many people participated in the program?		
Outcomes			
Think about which outcomes are most crucial. Which outcomes are the most difficult to achieve?	Have the short-term outcomes been achieved? (List the short-term outcomes of the program from the logic model.)		
	Have the long-term outcomes been achieved? (List the long-term outcomes of the program from the logic model.)		

Expectations Worksheet		
Evaluation Question (Copy from Evaluation Questions Checklist)	"I expect to have . . .	
	How Many?	What?

Methods Worksheet									
Evaluation Questions	2a Expectations of the Program (based on Expectations Worksheet)	2b Data Collection Plan						2c Logistics (based on Logistics Worksheet)	
		Does Data Exist?	Type of Tool	Who could Provide the Data (source)	Who Can Get the Data? (collector)	Design	How Many?		Timeframe
	"I expect to have..."	<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No							<input type="checkbox"/> Yes <input type="checkbox"/> No



[illegible]

Tool Worksheet			
Type of Tool:			
Expectations of the Program (copy from <i>Methods Worksheet</i>)	Individual Question on Tool	Type of Response (open or closed)	Pre-Set Response Categories (for closed- ended questions only)

Qualitative Data Analysis Worksheet			
Evaluation Question:			
Colour, code or symbol:			
Points (ideas, opinions, feelings, etc.)	Quotes which illustrate points	Findings	
			Unexpected findings

appendix B

[illegible]

3

Unexpected findings:

Interpretation of Findings Worksheet					
Purpose of Evaluation: (Copy from Purpose Statement)		Findings (Copy from Data Analysis Worksheet)	Expectations Met?	Why? "Most plausible explanation is..."	Conclusion(s) "In Summary..."
Evaluation Questions (Copy from Evaluation Questions Checklist)					
Unexpected findings:					

Decisions and Action Plan Worksheet						
Decisions about Program	Priority / Timeframe	Tasks	Responsibility	Resources Required	Assessing Change (Evaluation Questions)	

appendix B

Appendix #2



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Letter of Information for Superintendent of Pembina Trails School Division

Research Project Title:

Evaluation of a Foodborne Illness Teaching Resource: *Buffet Busters*

Researcher: **Sheri M. Gregorash**

Supervisor: **Dr. Barbara McMillan**

Date

Dear Superintendent,

This letter describes a research project that I am conducting as a Master's student in the Faculty of Education at the University of Manitoba, and describes how your school division might participate in the project if you so choose. I have organized the letter around the following topics:

- 1) a brief description of the purpose of the research and the specific procedures that would involve your school division;
- 2) Information about how the privacy of participants will be protected.
- 3) Information about how your school division can receive a copy the results of the study.

Purpose of the Research: The role of this research project is to evaluate a "*Buffet Busters*" teaching resource developed and distributed by the Public Health Agency of Canada. *Buffet Busters* is a resource developed for Grade 5 teachers and students and delivered by Grade 10 students. It was developed to promote infectious disease awareness and to introduce concepts related to food and waterborne infectious diseases as well as the basic principles of epidemiology. *Buffet Busters* was designed to assist in the attainment of a number of outcomes found in the Grade 5 science curriculum, cluster 1 "Maintaining a Healthy Body". This study examines the effectiveness of the *Buffet Busters* in meeting those outcomes, and its appropriateness for Grade 5 students.

Procedures Involving Participants:

Recruitment

Grade 5 teachers will be recruited, by the researcher, from English and French language schools in the Pembina Trails School Division (one English and one French school from both the north and south ends of the division). Invitations to participate will be by phone calls to Grade 5 teachers at their place of work, followed by an e-mailed letter of introduction (with consent form). Selection of the participating teachers and their Grade 5 students will be determined by the consent forms returned by the first four teachers who meet the location and language requirements. French-English bilingual Grade 10 students will be recruited by a senior years science teacher working in Vincent Massey Collegiate, a school in the Pembina Trails S.D. Once the Grade 10 students are recruited, arrangements will be made with the school's administration for making up missed classes (equivalent to one full school day). Transportation of the Grade 10 students to and from the four schools and classrooms participating in the project will be arranged by the researcher. The participating classroom teachers will be given the teaching resource free of charge prior to instruction. The delivery of the resource will coincide as much as possible with the teaching of Grade 5 "Maintaining a Healthy Body" outcomes.

Teacher participants of this study will be asked to (1) distribute and collect the letters of consent for the parent/legal guardian of each student and to (2) administer a pre- and post-*Buffet Busters* questionnaire that has been developed to assess Grade 5 students' understanding of foodborne illnesses and to forward the responses of participating students to the researcher (5-10 minutes per questionnaire). Participating teachers will also be asked to (3) assess the problem solving activity in *Buffet Busters* with the title *Chain of Contamination* that each of the students will complete and to (4) remove student names from these papers (approximately 4 minutes per student), and to (5) forward participating student responses to the researcher. Teacher participants will be (6) interviewed by the researcher (Sheri Gregorash) on one occasion for about 30 minutes but not more than 45 minutes.

In so far as is possible, the time and place of the interview with each participating teacher will be arranged at the convenience of the teacher about 2-4 weeks after the delivery of the *Buffet Busters* resource. I will inquire about their experience with the *Buffet Busters* educational resource. I will also ask the teacher to relate perceptions of the effectiveness and quality of this resource in serving the intended purpose. The interview will be audio recorded and transcribed for later analysis.

Senior Years Student Participants: The *Buffet Busters* activities are designed to be set up and facilitated by senior years students in approximately 1 hour. Two or four bilingual, Grade 10 students will be recruited for this project by a senior years science teacher working in Vincent Massey Collegiate.

- These students will be trained in the use of the Buffet Buster activities by the researcher (approximately 45 minutes).
- These students are responsible for preparing and delivering the foodborne illness outbreak simulation (approximately 1 hour / school) and completing a feedback form for each classroom that will assist in the assessment of the *Buffet Busters* Resource (approximately 10 minutes).

- Delivery of the resource will take place at two English language and two French language elementary schools in the Pembina Trails School Division. Arrangements will be made with the administration of Vincent Massey Collegiate regarding missed classes and transportation. The maximum time commitment for each Grade 10 student will be the equivalent of one full school day.

Grade 5 Students: Where permission is granted for involvement in the study, participation will include the following:

- Responding to a questionnaire administered by their classroom teacher that assesses understanding of foodborne illness before the *Buffet Busters* activities (simulation and problem solving) are delivered (requires approximately 15-20 minutes).
- Involvement, with their classmates, in the two required activities within the resource (approximately 60 minutes in total):
 - A drama-like simulation of a foodborne illness outbreak
 - A problem solving activity with the title *Chain of Contamination*
- Responding to the same questionnaire that assesses understanding of foodborne illnesses on the day following the simulation and problem solving activity (approximately 15 minutes).

Confidentiality of Information: Comments and responses during the audio-taped interviews with each participating teacher, Grade 5 participating students' responses to the pre- and post- *Buffet Busters* questionnaire and *Chain of Contamination* activity, and the Grade 10 students' completed feedback forms for each participating classroom will be used as data. This data may be used in reports of the program evaluation and study, including the researcher's thesis, conference and/or workshop presentations, and articles in non-refereed and/or refereed journals. However, any personal or privileged information will remain confidential and the sources of the information will not be identified in the analysis or reporting of the results. The researcher will use pseudonyms and will disguise any other identifying information, both in presentations of the research and in written reports.

The Grade 5 student pre- and post-questionnaire will provide the researcher with the name of the participating school. No information that could be used to identify a student participant will be collected by questionnaire. The "Chain of Contamination" activity will have all student identification removed by the teacher prior to delivery to the researcher. The senior years (Grade 10) student feedback form requests the names of the student presenters, and the names of the Grade 5 teacher and the school. In cases such as these where names are provided, the names will be replaced with pseudonyms. The participating classroom teachers who agree to be interviewed will be providing their professional opinions. Should private or privileged information be shared by a teacher and audio recorded, any reference to that information will be concealed in such a manner as not to compromise the participant or those he / she may name. All questionnaires, feedback forms, audio recordings, transcriptions of the audio recordings, and field notes

will be stored in a locked cabinet in my office at Vincent Massey Collegiate. Only the researcher will have access to these materials, which will be destroyed by paper shredding, or deleting as in the case of the digital audio recordings, no later than 5 years from the date obtained. Copies of the questionnaires, feedback forms and audio transcriptions with all identifying information removed will be shared with the researcher's thesis advisor.

Feedback about the study: If interested, I would be happy to provide you with a summary of the results of the study. The summary will be approximately 2-3 pages in length and will focus on the general findings of the study. If you would like a copy of the summary mailed to you please include your address at the bottom of this letter.

General Comments: I will provide you with a copy of this consent form for your records. It is only a portion of the process of informed consent, because it gives you the basic idea of what the research is about and what your participation will involve. If you would like more detail about anything mentioned here, or information not included here, you should feel free to ask. Your continued participation should be as an informed as your initial consent, so feel free to ask for clarification or new information whenever you want.

Your signature at the bottom of this letter indicates that you understand to your satisfaction the information about participation in the research study, and that you agree to participate. In no way does the letter or your signature waive your legal rights, nor release me as the researcher from my legal and professional responsibilities. You are free to withdraw from the study at any time, or to refrain from answering any particular questions, without prejudice or consequence.

Contact Information for the Researcher, Sheri (Mackie) Gregorash:

Telephone number: 204-770-7440

Email address: smackie@pembinatrinals.ca

Work address: Vincent Massey Collegiate 975 Dowker Avenue
Winnipeg, MB R3T 1R7

Contact Information for the Thesis Advisor, Barbara McMillan

Telephone Number: 204 474-9036

Email address: bmcmill@cc.umanitoba.ca

Work address: Department of Curriculum, Teaching, and Learning
Faculty of Education
University of Manitoba
Winnipeg, MB R3T 2N2

This research has been approved by the Education/Nursing Research Ethics Board (ENREB). If you have any concerns or complaints about this project you may contact the above-named persons or Margaret (Maggie) Bowman, the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

(Participant's Signature)

(Date)

(Researcher's Signature)

(Date)

Consent form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, (name of superintendent), have read and understood the terms
and conditions of this study and I agree to allow this study to proceed within the
Pembina Trails School Division.

Name (please print) _____

Date: _____

Letter of Information/Consent for School Principals

Research Project Title:

Evaluation of a Foodborne Illness Teaching Resource: *Buffet Busters*

Researcher: **Sheri M. Gregorash**

Supervisor: **Dr. Barbara McMillan**

Date

Dear Principal,

This letter describes a research project that I am conducting as a Master's student in the Faculty of Education at the University of Manitoba, and describes how your school might participate in the project if you so choose. I have organized the letter around the following topics:

- 1) a brief description of the purpose of the research and the specific procedures that would involve your school;
- 2) Information about how the privacy of participants will be protected.
- 3) Information about how your school division can receive a copy the results of the study.

Purpose of the Research: The role of this research project is to evaluate a "*Buffet Busters*" teaching resource developed and distributed by the Public Health Agency of Canada. *Buffet Busters* is a resource developed for Grade 5 teachers and students and delivered by Grade 10 students. It was developed to promote infectious disease awareness and to introduce concepts related to food and waterborne infectious diseases as well as the basic principles of epidemiology. *Buffet Busters* was designed to assist in the attainment of a number of outcomes found in the Grade 5 science curriculum, cluster 1 "Maintaining a Healthy Body". This study examines the effectiveness of the *Buffet Busters* in meeting those outcomes, and its appropriateness for Grade 5 students.

Procedures Involving Participants:

Recruitment

Grade 5 teachers will be recruited, by the researcher, from English and French language schools in the Pembina Trails School Division (one English and one French school from

both the north and south ends of the division). Invitations to participate will be by phone calls to Grade 5 teachers at their place of work, followed by an e-mailed letter of introduction (with consent form). Selection of the participating teachers and their Grade 5 students will be determined by the consent forms returned by the first four teachers who meet the location and language requirements. French-English bilingual Grade 10 students will be recruited by a senior years science teacher working in Vincent Massey Collegiate, a school in the Pembina Trails S.D. Once the Grade 10 students are recruited, arrangements will be made with the school's administration for making up missed classes (equivalent to one full school day). Transportation of the Grade 10

students to and from the four schools and classrooms participating in the project will be arranged by the researcher. The participating classroom teachers will be given the teaching resource free of charge prior to instruction. The delivery of the resource will coincide as much as possible with the teaching of Grade 5 "Maintaining a Healthy Body" outcomes.

Teacher participants of this study will be asked to (1) distribute and collect the letters of consent for the parent/legal guardian of each student and to (2) administer a pre- and post-*Buffet Busters* questionnaire that has been developed to assess Grade 5 students' understanding of foodborne illnesses and to forward the responses of participating students to the researcher (5-10 minutes per questionnaire). Participating teachers will also be asked to (3) assess the problem solving activity in *Buffet Busters* with the title *Chain of Contamination* that each of the students will complete and to (4) remove student names from these papers (approximately 4 minutes per student), and to (5) forward participating student responses to the researcher. Teacher participants will be (6) interviewed by the researcher (Sheri Gregorash) on one occasion for about 30 minutes but not more than 45 minutes.

In so far as is possible, the time and place of the interview with each participating teacher will be arranged at the convenience of the teacher about 2-4 weeks after the delivery of the *Buffet Busters* resource. I will inquire about their experience with the *Buffet Busters* educational resource. I will also ask the teacher to relate perceptions of the effectiveness and quality of this resource in serving the intended purpose. The interview will be audio recorded and transcribed for later analysis.

Senior Years Student Participants: The *Buffet Busters* activities are designed to be set up and facilitated by senior years students in approximately 1 hour. Two or four bilingual, Grade 10 students will be recruited for this project by a senior years science teacher working in Vincent Massey Collegiate.

- These students will be trained in the use of the Buffet Buster activities by the researcher (approximately 45 minutes).
- These students are responsible for preparing and delivering the foodborne illness outbreak simulation (approximately 1 hour / school) and completing a feedback form for each classroom that will assist in the assessment of the *Buffet Busters* Resource (approximately 10

minutes).

- Delivery of the resource will take place at two English language and two French language elementary schools in the Pembina Trails School Division. Arrangements will be made with the administration of Vincent Massey Collegiate regarding missed classes and transportation. The maximum time commitment for each Grade 10 student will be the equivalent of one full school day.

Grade 5 Students: Where permission is granted for involvement in the study, participation will include the following:

- Responding to a questionnaire administered by their classroom teacher that assesses understanding of foodborne illness before the *Buffet Busters* activities (simulation and problem solving) (requires approximately 15-20 minutes).
- Involvement, with their classmates, in the two required activities within the resource (approximately 60 minutes in total):
 - A drama-like simulation of a foodborne illness outbreak
 - A problem solving activity with the title *Chain of Contamination*
- Responding to the same questionnaire that assesses understanding of foodborne illnesses on the day following the simulation and problem solving activity (approximately 15 minutes).

Confidentiality of Information: Comments and responses during the audio-taped interviews with each participating teacher, Grade 5 participating students' responses to the pre- and post- *Buffet Busters* questionnaire and *Chain of Contamination* activity, and the Grade 10 students' completed feedback forms for each participating classroom will be used as data. This data may be used in reports of the program evaluation and study, including the researcher's thesis, conference and/or workshop presentations, and articles in non-refereed and/or refereed journals. However, any personal or privileged information will remain confidential and the sources of the information will not be identified in the analysis or reporting of the results. The researcher will use pseudonyms and will disguise any other identifying information, both in presentations of the research and in written reports.

The Grade 5 student pre- and post-questionnaire will provide the researcher with the name of the participating school. No information that could be used to identify a student participant will be collected by questionnaire. The "Chain of Contamination" activity will have all student identification removed by the teacher prior to delivery to the researcher. The senior years (Grade 10) student feedback form requests the names of the student presenters, and the names of the Grade 5 teacher and the school. In cases such as these where names are provided, the names will be replaced with pseudonyms. The participating classroom teachers who agree to be interviewed will be providing their professional opinions. Should private or privileged information be shared by a teacher and audio recorded, any reference to that information will be concealed in such a manner

as not to compromise the participant or those he / she may name. All questionnaires, feedback forms, audio recordings, transcriptions of the audio recordings, and field notes will be stored in a locked cabinet in my office at Vincent Massey Collegiate. Only the researcher will have access to these materials, which will be destroyed by paper shredding, or deleting as in the case of the digital audio recordings, no later than 5 years from the date obtained. Copies of the questionnaires, feedback forms and audio transcriptions with all identifying information removed will be shared with the researcher's thesis advisor.

Feedback about the study: If interested, I would be happy to provide you with a summary of the results of the study. The summary will be approximately 2-3 pages in length and will focus on the general findings of the study. If you would like a copy of the summary mailed to you please include your address at the bottom of this letter.

General Comments: I will provide you with a copy of this consent form for your records. It is only a portion of the process of informed consent, because it gives you the basic idea of what the research is about and what your participation will involve. If you would like more detail about anything mentioned here, or information not included here, you should feel free to ask. Your continued participation should be as an informed as your initial consent, so feel free to ask for clarification or new information whenever you want.

Your signature at the bottom of this letter indicates that you understand to your satisfaction the information about participation in the research study, and that you agree to participate. In no way does the letter or your signature waive your legal rights, nor release me as the researcher from my legal and professional responsibilities. You are free to withdraw from the study at any time, or to refrain from answering any particular questions, without prejudice or consequence.

Contact Information for the Researcher, Sheri (Mackie) Gregorash:

Telephone number: 204-770-7440

Email address: smackie@mackie.ca

Work address: Vincent Massey Collegiate 975 Dowker Avenue
Winnipeg, MB R3T 1R7

Contact Information for the Thesis Advisor, Barbara McMillan

Telephone Number: 204 474-9036

Email address: bmcmill@cc.umanitoba.ca

Work address: Department of Curriculum, Teaching, and Learning
Faculty of Education
University of Manitoba
Winnipeg, MB R3T 2N2

This research has been approved by the Education/Nursing Research Ethics Board (ENREB). If you have any concerns or complaints about this project you may contact the above-named persons or Margaret (Maggie) Bowman, the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

(Participant's Signature) (Date)

(Researcher's Signature) (Date)

Consent form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash (Mackie)

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, _____, have read and understood the terms
and conditions of this study and I give permission for this study to take place within
my school.

Name (please print) _____

Date: _____

If you would like a summary of findings to be sent to you upon completion of the study
please provide your contact information below.

Mailing address: _____

Email address: _____

Letter of Consent for Teacher Participants

Research Project Title:

Evaluation of a Foodborne Illness Teaching Resource: *Buffet Busters*

Researcher: **Sheri M. Gregorash (Mackie)**

Supervisor: **Dr. Barbara McMillan**

Date

Dear Educator,

This letter describes a research project that I am conducting as a Master's student in the Faculty of Education at the University of Manitoba, and describes how you might participate in the project if you so choose. It also includes a request for you to participate and a way for you to indicate your willingness to participate. I have organized the letter around the following topics:

- 4) a brief description of the purpose of the research and the specific procedures that would involve you;
- 5) information about how your privacy will be protected and how your freedom to participate will be respected; and
- 6) information about how you can receive a copy the results of the study.

Purpose of the Research: The role of this research project is to evaluate a "*Buffet Busters*" teaching resource developed and distributed by the Public Health Agency of Canada. *Buffet Busters* is a resource developed for Grade 5 teachers and students. It was developed to promote infectious disease awareness and to introduce concepts related to food and waterborne infectious diseases as well as the basic principles of epidemiology. *Buffet Busters* was designed to assist in the attainment of a number of outcomes found in the Grade 5 science curriculum, cluster 1 "Maintaining a Healthy Body". This study examines the effectiveness of the *Buffet Busters* in meeting those outcomes, and its appropriateness for Grade 5 students.

Procedures Involving Participants: If you participate in this study, you will be asked to assess the problem solving activity in *Buffet Busters* with the title *Chain of Contamination* that each of your students will complete (approximately 4 minutes per

student). You will also be interviewed by the researcher (Sheri Gregorash/Mackie) on one occasion for about 30 minutes but not more than 45 minutes.

In so far as possible, the time and place of the interview will be arranged at your convenience about 2-4 weeks after the delivery of the *Buffet Busters* resource in your classroom. I will inquire about your experience in delivering the *Buffet Busters* educational resource. I will also ask you to relate your perceptions of the effectiveness and quality of this resource in serving the intended purpose.

Recording and Transcribing: The interview will be audio recorded and transcribed for later analysis.

Confidentiality of Information: Your comments and responses to the interview will be used as data, and this data may be used in reports of the program evaluation and study. However, any personal or privileged information will remain confidential and the source of the information will not be identified in the analysis or reporting of the results. The researcher will use pseudonyms and will disguise any other identifying information, both in presentations of the research and in written reports.

Feedback about the study: If interested, I would be happy to provide you with a summary of the results of the study. The summary will be approximately 2-3 pages in length and will focus on the general findings of the study. If you would like a copy of the summary mailed to you please include your address at the bottom of this letter.

General Comments: I will provide you with a copy of this consent form for your records. It is only a portion of the process of informed consent, because it gives you the basic idea of what the research is about and what your participation will involve. If you would like more detail about anything mentioned here, or information not included here, you should feel free to ask. Your continued participation should be as an informed as your initial consent, so feel free to ask for clarification or new information whenever you want.

Your signature at the bottom of this letter indicates that you understand to your satisfaction the information about participation in the research study, and that you agree to participate. In no way does the letter or your signature waive your legal rights, nor release me as the researcher from my legal and professional responsibilities. You are free to withdraw from the study at any time, or to refrain from answering any particular questions, without prejudice or consequence.

Contact Information for the Researcher, Sheri Gregorash (Mackie):

Telephone number: 204-770-7440

Email address: smackie@pembinatrails.ca

Work address: Vincent Massey Collegiate 975 Dowker Avenue
Winnipeg, MB R3T 1R7

Contact Information for the Thesis Advisor, Barbara McMillan

Telephone Number: 204 474-9036

Email address: bmcmill@cc.umanitoba.ca

Work address: Department of Curriculum, Teaching, and Learning
Faculty of Education
University of Manitoba
Winnipeg, MB R3T 2N2

This research has been approved by the Joint-Faculty Research Ethics Board (JFREB). If you have any concerns or complaints about this project you may contact the above-named persons or Margaret (Maggie) Bowman, the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

(Participant's Signature)

(Date)

(Researcher's Signature)

(Date)

Consent Form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash (Mackie)

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, _____, have read and understood the terms and conditions of this study, and I agree to participate in the "Evaluation of the Foodborne Illness Teaching Resource".

Name (please print) _____

Date: _____

If you would like a summary of findings to be sent to you upon completion of the study please provide your contact information below.

Mailing address: _____

Email address: _____

Letter of Information/Consent for High School Students

Research Project Title:

Evaluation of a Foodborne Illness Teaching Resource: *Buffet Busters*

Researcher: **Sheri M. Gregorash (Mackie)**

Supervisor: **Dr. Barbara McMillan**

Date

Dear Student,

I am a Master's of Education student in the Department of Curriculum, Teaching, and Learning of the Faculty of Education, University of Manitoba. Based upon what we have already discussed, I am writing to formally request permission for your participation in this study.

As part of my thesis research, I want to evaluate a teaching resource created by the Public Health Agency of Canada for Grade 5 students in Canada. This resource, *Buffet Busters*, focuses on the development of Grade 5 students' understanding of the causes and prevention of foodborne illness. Delivery of the resource will take place at two English language and two French language elementary schools in the Pembina Trails School Division.

Your participation in the research will include the following:

- You and a partner will facilitate and participate in the delivery of *Buffet Busters* in two or four classrooms of Grade 5 students in schools within the Pembina Trails School Division. You will be responsible for:
 - Attending an instructional workshop for *Buffet Busters* (approximately 45 minutes;
 - Preparing and delivering a drama-like simulation of a foodborne illness outbreak (approximately 1 hour / school); and
 - Completing a feedback form for each classroom visit that will assist in the assessment of the *Buffet Busters* resource (approximately 10 minutes / school).

Arrangements will be made with the administration of Vincent Massey Collegiate regarding classes you may miss and transportation. Transportation from Vincent Massey

Collegiate to the elementary schools in the Pembina Trails School Divisions will be provided by me, Sheri Gregorash. The maximum time required for your training, transportation to and from schools, and work in Grade 5 classrooms will be the equivalent of one full school day.

I have already been granted permission for this study by _____, _____, and your parent / legal guardian, and I would like to get your permission. If you agree to participate in the study, you may rest assured that your privacy will be protected at all times. Please know that your identity, your parent's / legal guardian's identity, the schools, the schools principals', and the Grade 5 teachers' identities will be kept confidential in the thesis and in any other presentations or publications. I will not use your real name but will identify you and all other participants using a fake name (a pseudonym). Moreover, I will take great care to assure that your identity will not be revealed in any other fashion. The data gathered through this study, including your responses to the feedback form for each school, will be kept confidential, known only to me and the members of my thesis committee. All materials will be kept in a locked file in my office that is only accessible to me. All data collected for this study will be destroyed within five years.

Your participation in this study is voluntary. Should you decide to withdraw from this study, you may do so without having to give any reason and without incurring any adverse consequences. The researcher will not be communicating any evaluative comments to your principal, teacher or any other person in authority.

This research has been approved by the Education/Nursing Research Ethics Board (ENREB). If you have any questions about your rights as a participant in this study, you may contact the University of Manitoba Ethics Secretariat at 474-7122 or Margaret (Maggie) Bowman 208-194 Dafoe Road (CTC Building) University of Manitoba margaret_bowman@umanitoba.ca Fax: (204) 269-7173

If you agree to the conditions of this study, please complete both copies of the attached form and return one copy to me, and keep one copy for your records.

Once this study is completed, if you like, I can give you a copy of my findings. I would greatly appreciate your cooperation. If you would like to receive more information about the study, please contact me at 204-770-7440 or smackie@pembinatrails.ca.

Sincerely,

Sheri Gregorash (Mackie)
Med. Candidate
Faculty of Education
University of Manitoba

Consent Form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash (Mackie)

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, _____, have read and understood the terms and conditions of this study, and I agree to participate in the “Evaluation of the Foodborne Illness Teaching Resource”.

I, _____, I give permission to the researcher, Sheri Gregorash (Mackie), to transport me from Vincent Massey Collegiate to participating elementary schools and back to Vincent Massey Collegiate in her personal vehicle.

Name (please print) _____

Date: _____

If you would like a summary of findings to be sent to you upon completion of the study please provide your contact information below.

Mailing address: _____

Email address: _____

**Letter of Information and Consent for the Parent/Legal Guardian
(Grade 5 students)**

Date

Dear (Name of Parent/Legal Guardian)

I am a Master's candidate in the Department of Curriculum, Teaching and Learning at the Faculty of Education, University of Manitoba. I am writing to you to formally request your permission for the participation of your son or daughter in a study I'm carrying out as part of my thesis research.

I will be evaluating a teaching resource created by the Public Health Agency of Canada for Grade 5 students in Canada. This resource, called *Buffet Busters*, focuses on foodborne illness.

If you give permission, your son or daughter's participation in the research will include the following:

- Your child will participate with their classmates in answering a series of questions administered by their classroom teacher that assess their understanding of foodborne illness (requires approximately 15-20 minutes).
- The next day your child will participate in the two required activities within the resource (approximately 60 minutes in total):
 - A drama-like simulation of a foodborne illness outbreak
 - A problem solving activity with the title *Chain of Contamination*
- After the completion of the simulation and problem solving activity, each student will participate in the same series of questions presented prior to the two *Buffet Busters* activities (approximately 15 minutes).
- The problem solving activity will be assessed by your child's classroom teacher and a copy will be forwarded to me for my assessments.

In addition to your child's participation I will be interviewing your child's classroom teacher regarding the resource and its appropriateness for Grade 5 students.

If you agree to allow your child's participation in the study, you may rest assured that the identity of your child, the school, and your child's teacher will be kept confidential. I will

not use your child's real name or your child's teacher's name in my thesis and in any presentations or publications of the *Buffet Busters* evaluation.. I will identify all participants using a fake name (a pseudonym). Moreover, I will take great care to assure that each participant's identity will not be revealed in any other fashion. The raw data gathered through this study will be kept confidential, and known only by me. The members of my thesis committee may see copies of the data but with all identifying information removed. All materials will be kept in a locked file in my office that is only accessible to me. All data collected for this study will be destroyed upon thesis completion.

The participation of your child in this study is voluntary. Should you decide to withdraw your child from this study, you may do so without having to give any reason and without your child incurring any adverse consequences. The researcher will not be communicating any evaluative comments to your child's principal, teacher or other persons in positions of authority.

If you have any questions about your child's rights as a participant in this study, you may contact me, Sheri Gregorash, at 770-7440 or smackie@pembinatrails.ca, my thesis advisor, Dr. Barbara McMillan, at 474-9036 ,or the University of Manitoba Ethics Secretariat at 474-7122 or Margaret (Maggie) Bowman 208-194 Dafoe Road (CTC Building) University of Manitoba margaret_bowman@umanitoba.ca Fax: (204) 269-7173

If you agree to the conditions of this study, please complete both copies of the attached form and return one copy to me, and keep one copy for your records.

Once this study is completed, I can provide you with a summary. Please indicate you interest in receiving a summary by writing your address in the space below.

I greatly appreciate your cooperation.

Sincerely,

Sheri Gregorash
Master's of Education Candidate
Faculty of Education
University of Manitoba

Consent Form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash (Mackie)

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, _____, have read and understood the terms and conditions of this study, and I agree to allow my child _____ to participate in the "Evaluation of the Foodborne Illness Teaching Resource".

Name (please print) _____

Date: _____

If you would like a summary of findings to be sent to you upon completion of the study please provide your contact information below.

Mailing address: _____

Email address: _____

Letter of Information/Consent for Grade 5 Students

Research Project Title:

Evaluation of a Foodborne Illness Teaching Resource: *Buffet Busters*

Researcher: **Sheri M. Gregorash (Mackie)**

Supervisor: **Dr. Barbara McMillan**

Date:

Dear: Student,

I am a Master's of Education student in the Department of Curriculum, Teaching, and Learning of the Faculty of Education, University of Manitoba. As part of my work at the University, I am going to evaluate a teaching resource developed by the Public Health Agency of Canada for Grade 5 students in Canada. This resource is called *Buffet Busters*. *Buffet Busters* was created to help Grade 5 students understand the causes and prevention of foodborne illness.

Buffet Busters is going to be used in two English language and two French language elementary schools in your school division, Pembina Trails. Your teacher, was one of the first Grade 5 teachers to agree to let me and two of my Grade 10 students come to your class to see how well *Buffet Busters* helps you to know about foodborne illness and how to prevent foodborne illness.

I already have permission from your principal, teacher and your parent/legal guardian; however before we visit your classroom, I would like to get your permission to collect data in your teacher's Grade 5 classroom. Your participation in my evaluation of *Buffet Busters* will include the following:

You and your classmates will answer a series of questions given to you by your teacher that ask you about foodborne illness (requires approximately 15-20 minutes). Your responses to these questions will be forwarded to me by your teacher.

You and your classmates will participate in the two *Buffet Buster* activities. One is a drama-like simulation of a foodborne illness outbreak and the other is a problem solving activity called, "Chain of Contamination" (approximately 60 minutes in total). Your responses to the "Chain of Contamination" will be marked by me after your teacher has deleted your name.

After the completion of the simulation and problem solving activity, you and your classmates will answer a series of questions about foodborne illness given to you by your teacher (approximately 15 minutes). Your responses will be forwarded to me by your teacher.

If you agree to participate in the study, you should know that your privacy will be protected at all times. Please know that your identity, your parent's / legal guardian's identity, the school's, the school principal's, and your teacher's identities will be kept confidential in my Master's of Education thesis and in any other presentation I might give or paper I might write. I will not have responses with your name, and will identify your teacher using a fake name (a pseudonym). Moreover, I will take great care to assure that your identity will not be revealed in any other fashion. The data gathered through this study, including your responses to the foodborne illness questions and "Chain of Contamination" activity, will be kept confidential, known only to me and the members of my thesis committee. All materials will be kept in a locked file in my office that is only accessible to me. All data collected for this study will be destroyed within five years.

Your participation in this study is voluntary. Should you decide to withdraw from this study, you may do so without giving a reason and without negative consequences. The researcher will not be communicating any evaluative comments to your principal, teacher, or any other person in authority.

This research has been approved by the Education/Nursing Research Ethics Board (ENREB). If you have any questions about your rights as a participant in this study, you may contact the University of Manitoba Ethics Secretariat at 474-7122 or Margaret (Maggie) Bowman 208-194 Dafoe Road (CTC Building) University of Manitoba margaret_bowman@umanitoba.ca Fax: (204) 269-7173

If you agree to the conditions of this study, please complete both copies of the attached form and return one copy to your teacher, and keep one copy for your records.

Once this study is completed, if you like, I can give you a copy of my findings. I would greatly appreciate your cooperation. If you would like to receive more information about the study, please contact me at 204-770-7440 or smackie@pembinatrails.ca.

Sincerely,

Sheri Gregorash (Mackie)
Med. Candidate
Faculty of Education
University of Manitoba

Consent Form

Title of the Research: Evaluation of the Foodborne Illness Teaching Resource,
Buffet Busters

Name of the Researcher: Sheri Gregorash (Mackie)

Institutional Affiliation: Department of Curriculum and Learning, Faculty of Education
University of Manitoba

Please complete, and sign both copies of the consent form. Return one copy to the researcher and keep one copy for your own records.

I, _____, have read and understood the terms and conditions of this study, and I agree to participate in the “Evaluation of the Foodborne Illness Teaching Resource”.

Name (please print) _____

Date: _____

If you would like a summary of findings to be sent to you upon completion of the study please provide your contact information below.

Mailing address: _____

Email address: _____

Appendix #3

Buffet Busters Pre/Post Instruction Questionnaire

Place a check ✓ next to the answer that you wish to choose.					
1. Have you ever felt sick after eating something?				Yes ___	No ___
If yes, what did you eat _____					
3. Did anyone in your family also get sick?				Yes ___	No ___
4. Did you feel like you wanted to					
Sleep ___	Vomit ___	Go to the bathroom ___	Cry ___		
5. Which of the things listed below do you think can make you sick?					
Bacteria ___		Germs ___	both ___	Other people ___ Animals ___ both ___	
Viruses ___		Germs ___	both ___	Water ___ Food ___ both ___	
6. Which of the things listed below do you think help us from becoming sick?					
Washing our hands ___		Changing your socks ___		Eating healthy food ___	
Cooking your food well ___		Exercising ___		Getting enough sleep ___	
Have you ever heard of food poisoning?				Yes ___	No ___
7. What do you think it is? _____					
8. Which of the foods listed below do you think can sometimes lead to food poisoning?					
Undercooked Chicken ___		Undercooked hamburger ___		Unwashed fruit ___	
Well cooked meat ___		Washed vegetables ___		Raw eggs ___	
Unwashed vegetables ___		Unrefrigerated salads ___		Potato chips ___	
9. Please read the scenarios below and determine which of the following are acceptable food handling practices					
Uncle Tom always takes his hamburgers off of the grill when they are pink so they are extra juicy.				Acceptable ___ Unacceptable ___	
When you get home from grocery shopping you wash your fruit before eating it.				Acceptable ___ Unacceptable ___	
At a birthday party your notice that Jake's Mother cuts up raw chicken strips and then uses the same knife to cut up the cake.				Acceptable ___ Unacceptable ___	
At the "all You Can Eat Buffet" you take a clean plate each time you go up for more food.				Acceptable ___ Unacceptable ___	
At a picnic your sister allows the potato salad to sit in the sun until its time to eat.				Acceptable ___ Unacceptable ___	

Appendix 4

Senior Years Students' Feedback Form

Date:	Time:			
Presenters:	School Name:	Teacher Name:		
Number of students present in the class _____				
Number of adults present in the class _____				
1 Poor	2 Fair	3 Good	4 Excellent	
General Evaluation Questions		Response		Comment
1. Were sufficient materials available for the workshop? (i.e. handouts, eyedroppers)	1	2	3	4
2. Did the students appear to have been informed about your presentation?	1	2	3	4
3. Did you feel well prepared to deliver the presentation?	1	2	3	4
4. Did you feel support from the classroom teacher? (i.e. discipline, order)	1	2	3	4
5. Did you have enough time to complete the presentation and activities?	1	2	3	4
6. Were the activities implemented as planned?	1	2	3	4
7. Which of the following activities did you present in the workshop?				
Buffet Buster Activity _	Cross-contamination Activity _	Buffet Busters Board Game _		Chain of Contamination Activity _
What would you improve?				
General Comments regarding presentation implementation				
Student Participation and Evaluation Questions		Response		Comment
1	2	3	4	

Poor	Fair	Good	Excellent	
8. Did the students seem engaged in the activities?	1	2	3	4
9. Did the students ask relevant questions	1	2	3	4
10. Did students seem confused with instructions?	1	2	3	4
11. Were students able to determine the food that caused the illness?	1	2	3	4
12. Overall, was the implementation of the resource successful?	1	2	3	4
What would you improve?				
General Comments:				

Worksheet #5a:

Chain of Contamination Description

It's Kevin's mom's birthday so he decides he wants to surprise his family by making a special "chicken teriyaki in a creamy sauce" recipe, his mom's favorite. When everyone is asleep, he takes the chicken out of the freezer. The fridge is stuffed with food since it is Monday, grocery shopping day. There is one tiny spot on top of the strawberry container, so he takes out a bowl of leftover potato salad and puts it aside on the counter. He places the chicken over the strawberry container.

During the night, the chicken starts to thaw and chicken juice starts to drip on the strawberries. It also drips into the jug of water at the bottom of the fridge and over the leftover chocolate cake. It also leaks into the vegetable compartment where the lettuce is kept.

The next morning, mom wakes up before everyone and the first thing she does, like every morning, is pour herself a tall glass of cold water from the fridge. Then she wakes her three children Jacinta, Kevin and Dimitri. Dad wakes up quite groggy because he has been sick, vomiting all night. Despite his queasiness, he helps Jacinta with her lunch since she is only 4 years old. However, he forgets to wash his hands. He packs a juice box, a fruit roll-up and makes her a peanut butter sandwich.

Dimitri offers to make his and Kevin's lunch. He prepares a ham and lettuce sandwich, strawberries and chocolate cake.

At school, at lunch time, Dimitri shares his lunch with his friend Alex, who forgot his.

Kevin realizes when he opens his lunch that he took the wrong bag, mistaking it for his own. He searches everywhere for his lunch but realizes that a girl in his class, Janelle, has taken his by mistake and is gone on a school outing. So he decides to eat Janelle's lunch (not too shabby since he ends up getting pizza, a can of iced tea, a cheese string, a tube of blueberry yogurt and a pack of cookies and icing).

Meanwhile, Janelle, attending a school radio workshop, realizes that she took the wrong lunch.

Having no choice, she eats it and is quite happy with her meal. She shares the strawberries with her best friend Stephanie.



At work, Dad makes arrangements with the regular cleaning lady, Gracie, to go over to the house to surprise Mom with a clean and tidy house. Dad tells her that he left her a lunch because he knew she had to work over the lunch hour. Gracie finds the leftover potato-salad and thinks that it is her lunch. She eats it and it tastes... OK. It would have tasted better if it had been cool but she is happy.

After school, Kevin runs back home before his parents come home from work to start preparing the barbecue. He invites his grandparents over for dinner as a surprise.

After everyone has arrived, he puts the chicken on a plate and brings it to the barbecue. He makes sure to cook the chicken well because he knows that **chicken needs to be well cooked**. He puts the cooked chicken back onto the same plate and serves his surprised guests and family. They are very impressed with Kevin's thoughtful gesture. Kevin's mom thanks her son and offers him some chicken, to which he answers: "No thanks mom. Remember, I don't like chicken."

Appendix 6

Teacher Interview Questions

1. How well did the outcomes indicated in the *Buffet Busters* resource correspond with those in the Manitoba science curriculum for Grade 5?
2. How do you normally meet the outcomes listed in the *Buffet Busters* resource?
3. What were your general impressions of the *Buffet Busters* resource when you first received it?
4. How well do you feel that the pre-activity questionnaire was able to activate interest among your students and generate discussion?
5. From your observations during the *Buffet Busters* cafeteria scenario, did your students seem engaged in the activity and in determining the trail of infection?
6. Do you feel that by using this activity in your class, your students' understanding of foodborne illness was improved by the use of this activity in your classroom?
7. What behaviors that would suggest this?
8. What are your general impressions about *Buffet Busters* now that the resource has been implemented in your classroom?
9. Would you use *Buffet Busters* in the future? Why or why not

