A Comparison of Personal Palmtop Computer System Instruction (MagnusCards©) Paired with Behavioural Skills Training and Behavioural Skills Training Alone to Teach Independent Meal Preparation Skills to an Adult Male with Intellectual Disabilities and Low Literacy

by Nicole Therrien

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St. Lawrence College
Kingston, Ontario
Canada.

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Dedication

I would like to dedicate my thesis to the sisterhood of Guiding, the girls and women that I have met and the ones I hope to meet in my future. Learning from all of you as a girl member and Guider, growing in my skills and abilities, having the opportunity to teach others as I have been taught, and sharing in the joys and challenges we set for ourselves to better ourselves and the world we live in has been one of the most important parts of my life. I hope that you always strive to grow within Guiding and in all areas of your lives and know that I am happy to have shared in our sisterhood with all of you. Be prepared.

I would also like to dedicate my thesis to my close friends and family. We may not all be directly related or live near each other anymore, but you are all part of my family and I extend my thanks and love to you. Thank you for listening when I needed to talk, letting me send you funny images or stories and sending some back to me, helping when I experienced personal or technical difficulties, giving a hug or a shoulder to lean on, and above all, just being you. One way or another, you have all helped me in your own ways and I am grateful for the time we have spent together.
Abstract
Activities of daily living (ADL) are routine activities normally completed on a daily basis as a part of independent living, such as the ability to prepare meals independently (van het Bolscher-Niehuis, den Ouden, de Vocht, & Franke, 2016). Individuals with intellectual disabilities display deficits in adaptive functioning that have negative impacts on their ability to perform the ADL. It was important to explore, select, and compare alternative methods of teaching to identify what would accelerate skills acquisition. Previous studies have noted that deficits in the ADL reduced quality of life, increased dependence on others, reduced participation in daily activities, and led to learned helplessness (Parmenter; Peterson & Bossio, as cited in Sigafoos et al., 2005). To mitigate these unwanted effects, ADL, like cooking, should be taught in a way that meets the needs of the learner and takes advantage of their strengths. Previous studies explored the use of teaching techniques such as task analyses, total task chaining, least-to-most prompting, graduated guidance, behavioural skills training (BST), picture-based systems, video-based systems, auditory systems, and personal palmtop computer systems. This thesis project hypothesized that an alternating treatments single subjects experimental design would reveal that BST paired with MagnusCards® would be superior to BST alone in generating faster and greater skills acquisition. The intervention was implemented over a 7-week period. Training occurred twice weekly. In one session the participant learned to cook a meal using BST paired with MagnusCards®. In the other session he learned to cook a different meal using BST alone. The results of this study showed that both teaching methods were effective yet BST paired with MagnusCards® was vastly superior in producing faster and higher skills acquisition. Future research might explore the conditions that dictate when additional prompts like the MagnusCards® app would accelerate BST or other teaching methods.
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# TABLE OF CONTENTS

Dedication .................................................................................................................... i  
Abstract ...................................................................................................................... ii  
Acknowledgments ....................................................................................................... iii  
Table of Contents ........................................................................................................ iv  
List of Tables ............................................................................................................... vii  
List of Figures ............................................................................................................. viii  

## CHAPTER I: INTRODUCTION ................................................................................. 1

## CHAPTER II: LITERATURE REVIEW .................................................................. 3

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is ID?</td>
<td>3</td>
</tr>
<tr>
<td>Why Cooking?</td>
<td>3</td>
</tr>
<tr>
<td>Traditional Approaches to Learning How to Cook</td>
<td>3</td>
</tr>
<tr>
<td>Alternative Methods Used to Teach People with ID How to Cook</td>
<td>3</td>
</tr>
<tr>
<td>Task Analyses</td>
<td>4</td>
</tr>
<tr>
<td>Total Task Chaining</td>
<td>4</td>
</tr>
<tr>
<td>Least-to-most Prompting</td>
<td>4</td>
</tr>
<tr>
<td>Graduated Guidance</td>
<td>5</td>
</tr>
<tr>
<td>Behavioural Skills Training</td>
<td>5</td>
</tr>
<tr>
<td>Picture-based Systems</td>
<td>5</td>
</tr>
<tr>
<td>Video-based Systems</td>
<td>6</td>
</tr>
<tr>
<td>Auditory-based Systems</td>
<td>6</td>
</tr>
<tr>
<td>Palmтоп Personal Computer Systems</td>
<td>6</td>
</tr>
<tr>
<td>Variations on How Digital Learning Materials Can be Presented</td>
<td>7</td>
</tr>
<tr>
<td>How Much of a Skill Should the Trainer Show Before the Participant Practices?</td>
<td>8</td>
</tr>
<tr>
<td>From Whose Perspective Should the Participant View the Steps?</td>
<td>9</td>
</tr>
<tr>
<td>Who Should the Person Performing the Task Be?</td>
<td>9</td>
</tr>
<tr>
<td>Reasons for Including or Rejecting Alternative Teaching Methods Within This Study</td>
<td>10</td>
</tr>
<tr>
<td>Task Analyses</td>
<td>10</td>
</tr>
<tr>
<td>Total Task Chaining</td>
<td>10</td>
</tr>
<tr>
<td>Least-to-most Prompting</td>
<td>11</td>
</tr>
<tr>
<td>Graduated Guidance</td>
<td>11</td>
</tr>
<tr>
<td>Behavioural Skills Training</td>
<td>12</td>
</tr>
<tr>
<td>Picture-based Systems</td>
<td>12</td>
</tr>
<tr>
<td>Video-based Systems</td>
<td>12</td>
</tr>
<tr>
<td>Auditory Systems</td>
<td>13</td>
</tr>
<tr>
<td>Palmтоп Personal Computer Systems</td>
<td>13</td>
</tr>
<tr>
<td>Comparing and Contrasting Behavioural Skills Training with Video Modeling and Video Prompting Using Koslof’s Checklist for Evaluating Research and Research Claims</td>
<td>13</td>
</tr>
<tr>
<td>Purpose of the Article</td>
<td>14</td>
</tr>
<tr>
<td>Literature Review</td>
<td>14</td>
</tr>
<tr>
<td>Scope and Feasibility</td>
<td>14</td>
</tr>
<tr>
<td>Design in Relation to the Research Question</td>
<td>15</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1. A Comparison of BST to BST Paired with MagnusCards© by Overall Mean and Standard Deviation Across Baseline and Treatment Weeks Combined ........................................ 21
Table 2. A Comparison of BST Alone to BST With MagnusCards© by the Average Percentage of Steps Performed Independently During Baseline and Intervention Across Recipes .............. 22
LIST OF FIGURES

Figure 1. Graph Showing the Average Percentage of Steps Performed Independently for all Recipes Taught Under the BST Alone Condition or Under the BST With MagnusCards® Condition Across Baseline, Training Baseline, and Intervention.......................................................... 23
Table 2. Graph Showing the Average Percentage of Independently Completed Steps for Individual Recipes During Baseline, Training Baseline, BST Alone, and BST With MagnusCards® Conditions........................................................................................................... 25
Chapter I: Introduction

Most individuals take for granted the ability to complete the seemingly simple tasks that are associated with daily life. However, these tasks were not always possible to complete independently, especially for people with intellectual disabilities. Activities of daily living were routine activities people normally completed on a regular basis and were needed for independent living (van het Bolscher-Niehuis, den Ouden, de Vocht, & Francke, 2016). Because people with intellectual disabilities often lacked some or all the skills to achieve activities of daily living, it was more challenging for them to function fully independently. These deficits in daily living skills can have a negative impact on quality of life (Parmenter, as cited in Sigafoos et al., 2005) and increased the need for dependence on others, which has also resulted in lessened participation in the activities of daily living and learned helplessness (Peterson & Bossio, as cited in Sigafoos et al., 2005). Sigafoos et al. (2005) stated that acquiring daily living skills could lead to increased self-determination, participation, and independence and to decrease the negative outcomes associated with dependence on others (i.e., learned helplessness and lessened participation).

For daily living skills to be successfully mastered, the skills need to be taught in a manner that takes advantage of the abilities of the individual being trained. One method of teaching was called self-instruction, where an individual is taught to use a form of technology (e.g. video on a portable DVD player) to access instructions that will assist in being able to complete the task (Smith, Shepley, Alexander, & Ayres, 2015). Self-instruction tasks lessened the need for the presence of a support person, which increased independence while still providing support for complex tasks (Smith et al., 2015). Therefore, it stands to reason that using a self-instruction format to teach an activity of daily living, such as meal preparation, would allow an individual with an ID to gain competency to complete the skill independently.

This thesis project hypothesized that a teaching method which combined a personal palm top computer system (MagnusCards© app) with behavioural skills training (BST) to teach meal preparation skills would result in a faster and higher percentage of steps completed correctly than using BST alone. An alternating treatments single subject experimental design was used to explore this hypothesis.

A personal palm top computer system (i.e., the MagnusCards© app) was defined as a digital application that can be downloaded to a mobile device and used to give a person the opportunity to follow step by step instructions in visual, auditory, and brief textual format for a variety of tasks in a manner that may increase independence and decrease reliance on support persons (Magnusmode, 2016a; Smith, Shepley, Alexander, & Ayres, 2015).

BST was a teaching method that consists of providing a person with verbal instructions, modeling the behaviour for that person to view, giving them an opportunity to practise the behaviour themselves, and providing feedback once the behaviour is completed (Buck, 2014).

This project included a review of the current research literature on the importance of meal preparation to independent living the limitations of traditional cooking instructions, and a critical review of various evidence-based teaching methods.

The method of this project provided an overview of how baseline and teaching phases were conducted with the participant and student researcher. The discussion and conclusion provided insight into the outcome of the study, limitations of the study, and areas for future research. The results of this study revealed the superiority of the MagnusCards© app with BST over BST alone. Images of the MagnusCards© card decks outlining the steps for six meals in a
picture format were also included as examples of the teaching materials the participant had available as learning tools.

Word Count: 614
Chapter II: Literature Review

What is ID?

The DSM-V (Nevid, Greene, Johnson, Taylor, & MacNab, 2015) defined ID as impairments in intellectual, conceptual, practical, social, and adaptive skills that emerge before 18 years of age. They suggested that it was caused by chromosomal abnormalities, prenatal factors, and cultural or familiar factors associated with impoverished households.

Why Cooking?

Sigafoos et al. (2005) suggested that adaptive skills deficits, like being unable to cook, would have a negative impact on independent functioning. Since eating is crucial to survival, cooking becomes an important activity. Being able to do so is a more economical solution to eating out, ordering in, or hiring someone else to do it (Schuster, as cited in Mechling, Gast, & Fields, 2008). They also suggested that this skill may provide opportunities for employment and social engagement. To the degree that this is possible, the above made points highlight some of the reasons why it is important for people with ID to learn how to cook.

Traditional Approaches to Learning How to Cook

Most people followed textual recipes that provided a list of ingredients, amounts, and step-by-step instructions that allowed them to prepare meals with minimal difficulty, if the learner was able to read and follow the instructions. Text-based recipes served as permanent prompts that helped people guide their behaviour and lessened the need to commit long sequences of steps to memory (Mechling, 2008).

How Traditional Approaches to Learning to Cook Posed Problems for People With ID

Traditional approaches to learning how to cook posed insurmountable challenges to many people with ID. Brunosson, Brante, Sepp, and Mattsson Sydner (2014) observed home economics classes offered to students with ID to report on the areas of cooking that the students tended to struggle with. Their results suggested that inconsistent expectations across teachers, standardized recipe formats, and limited background knowledge posed the greatest obstacles. Some teachers wanted the recipes to be followed exactly while others preferred a less precise approach. Traditional recipe formats separated amounts from instructions, included too much information in steps, grouped multiple instructions into single steps, and required prior knowledge that the students did not necessarily possess, such as understanding that an orange needed to be peeled and then divided into smaller sections before it could be cut with scissors (Brunosson, Brante, Sepp, & Mattsson Sydner, 2014).

Alternative Methods Used to Teach People with ID How to Cook

A long list of alternatives, used alone or in combination, follows:

- task analyses,
- total task chaining,
- least-to-most prompting,
- graduated guidance,
- behavioural skills training,
- picture-based systems,
- video-based systems,
- auditory systems,
- and palm top personal computer systems (e.g., MagusCards©).
**Task analyses.**

Task analyses alluded to the technique of separating a complex behavior into individual, teachable steps (Cooper, Heron, & Heward, 2007). The creation of a task analysis was important when teaching behavior chains because it determined the behavior sequence necessary for efficient completion of complex tasks (Cooper, Heron, & Heward, 2007). Task analyses have been created by watching a competent individual complete the task, ask an expert how the task is completed, or having the trainer complete the task themselves (Cooper, Heron, & Heward, 2007).

**Total task chaining.**

Total task chaining was an adaptation of forward chaining, where the participant learned to complete all the parts of a behavior chain in a session as opposed to only the first part and subsequent steps once they mastered the initial step (Cooper, Heron, & Heward, 2007). Werts, Caldwell, and Wolery (as cited in Cooper, Heron, & Heward, 2007) and Test, Spooner, Keul, and Grossi (as cited in Cooper, Heron, & Heward, 2007) trained elementary and high school students with differing levels of intellectual disabilities using total task chaining to teach skills. They were successful in teaching these students how to use a public telephone, operate a calculator, use an audiotape, and a pencil sharpener. Both studies (as cited in Cooper Heron, & Heward, 2007) found that pairing total task training with these other teaching methods led to increased number of performed steps performed correctly within the various task analyses. These studies suggest that total task chaining paired with other prompting procedures like BST might result in improved performance.

**Least-to-most prompting.**

Least-to-most prompting meant that the learner had to respond within a set period of time (e.g. 3 seconds) after the natural S^D appeared. If the participant did not initiate the correct response within that time period, the support person presented the natural S^D and the least intrusive prompt (e.g. a verbal prompt) (Cooper, Heron, & Heward, 2007). If following this prompt, the participant still had not generated the correct response, the support person re-introduced the natural S^D with a slightly more intrusive prompt (e.g. gesture) (Cooper, Heron, & Heward, 2007). If this level of prompting did not stimulate the appropriate response, the support person continued with increasingly more intrusive prompts until the participant performed the correct response (Cooper, Heron, & Heward, 2007).

Murzynski and Bourret (2007) compared least-to-most prompting to least-to-most prompting with video modeling in teaching activities of daily living (i.e., juice making, sandwich making, pants folding, and shirt folding) to two adult participants with ASD. They noted that previous studies had determined least-to-most prompting and video modeling (a method discussed later within this literature review) were both suitable teaching methods on their own but there was limited research on the combine effects of these methods. Within an alternating design, Murzynski and Bourret (2007) compared the effectiveness of the two methods. During the least-to-most condition, the participants received prompts for steps they did not complete with a set period of time and the prompts were delivered in this order: verbal, gestural, physical guidance at the forearm, and hand over hand physical guidance (Murzynski & Bourret, 2007). During the least-to-most and video modeling condition, the trainers followed the same prompting hierarchy but the participant first viewed a video of a model completing the task before they attempted to perform it (Murzynski & Bourret, 2007).
Murzynski and Bourret (2007) summarised that the results showed faster acquisition of steps and fewer required prompts during the least-to-most with video modeling condition than during the least-to-most alone condition. The study also showed that least-to-most prompting was effective on its’ own but combining it with video modeling enhanced the learning process for the participants (Murzynski & Bourret, 2007).

The results of this study were related to the hypothesis of the current thesis study in that it reviewed a well-established teaching method (least-to-most prompting) and found it was improved when combined with a digital teaching method (video modeling), which is what the current study sought to prove.

A limitation of this study was that the number of steps per task were relatively small (less than 10) and the accompanying videos were also short in length (less than 2 minutes) (Murzynski & Bourret, 2007). For these tasks, if the trainer went through the entire prompt hierarchy with the participant for multiple steps, it probably did not take up a large amount of time. However, within the current thesis project, the recipes chosen had more steps and were longer in duration, which could have led to overly long training sessions if a least-to-most prompting hierarchy was implemented. Another limitation this student researcher noticed was the use of physical guidance methods in the prompting hierarchy. The participant of the current study was not comfortable with physical contact with others and this researcher did not think that only using verbal and gestural prompts would be sufficient for teaching.

Graduated guidance.

Graduated guidance was a procedure used exclusively for chained skills (skills that consisted of multiple steps to form a complex behaviour) and involved the use of physical prompts (Neitzel & Wolery, 2009). Using graduated guidance, the teacher applied the type and amount of prompt needed to ensure the learner performed the target behaviour and instantly faded the level and type of prompt on a as needed basis while the learned acquired the skill (Neitzel & Wolery, 2009). Neitzel and Wolery (2009) stated that teachers needed extensive skills to use graduated guidance and if they did not fade prompts appropriately, the learners may have become prompt dependent.

Behavioural skills training.

Behavioural skills training (BST) was a thoroughly researched and clinically validated method for teaching new skills to others (Buck, 2014). In this method, the participant received instructions from a trainer, watched a model perform the skill, rehearsed the skill themselves, and received feedback and praise from the trainer (Miltenberger, 2004; Buck, 2014). When the trainer gave an instruction, they described the skill, the rationale for using it, and situations when the participant should or should not use the skill (Miltenberger, 2004). Modeling occurred when the trainer demonstrated how to complete the skill to the participant (Miltenberger, 2004). Rehearsal was when the participant practised performing the skill (Miltenberger, 2004). Feedback was defined as when the researcher provided positive praise for correct responses and corrective feedback following incorrect responses (Miltenberger, 2004).

Picture-based systems.

Picture-based systems had several variations that were chosen based on the needs of the learner and available resources. The steps of a task were represented as a stack of single pictures that were shown to the learner one at a time and set aside as each step was completed and single or multiple images per page were bound into a book format that the learner turned over themselves (or were turned over by a support person) as the steps were completed (Agran, Fodor-Davis, Moore, & Martella; Griffen, Wolery, & Schuster; Pierce & Schriebman; Schuster
& Griffen; Fiscus, Schuster, Morse, & Collins; Singh, Oswald, Ellis, & Singh, as cited in Mechling, 2008). Mechling (2008) stated that consensus had not been reached as to whether single or multiple images should be shown on the same page. While having multiple images on one page decreased the total number of pages needed and reduced the likelihood of mishandling pages or losing one’s place, it was also possible to lose one’s place if there were multiple images on one page (Mechling, 2008). The number of images per page varied based on learner preference and needs.

**Video-based systems.**

Video-based systems may allow for extra-instructional stimuli (e.g. showing the act of cracking an egg in one video clip showing the motion as opposed to several separated static images) to be accessed by the participant that other alternate teaching methods such as auditory or picture based systems may lack (Mechling, Gast, and Fields, 2008). In past studies, the skills being taught were recorded on VHS to be viewed on a VCR, but laptops and portable DVD players are used more frequently now because they are used and transported easily, as well as provided the option to easily skip or replay segments as needed (Mechling, 2008). Another advantage to using video systems is that it presented information in real world settings, gave multiple opportunities for teaching, and provided sound and motion for a more accurate representation of the step being completed.

**Auditory-based systems.**

Audio-based systems provided the learner with instructions using an auditory system that described a sequence of steps to be followed. Mechling (2008) described it as listening to the description of the first step, providing time for the learner to complete the step, and a way to start the description of the next step following the completion of the previous step (e.g. pressing a “Next” button). This chain of steps may prove to be challenging for people with ID, especially if they made an error and needed to repeat a step (Mechling, 2008). If they did not have prior knowledge on how to operate the auditory system, replaying steps when they made a mistake might become challenging. Lancioni, Klaase, and Goossens (as cited in Mechling, 2008) found no significant difference in the effectiveness of teaching with auditory prompts and pictures compared to teaching using only pictures. However, it was hypothesized by this researcher that having the option of audio paired with images was useful as it provided an additional source of learning stimuli in case the picture did not provide sufficient information for the learner to understand how to complete the step.

**Palmtop personal computer systems.**

Palm top personal computer systems like the MagnusCards© app, used task analyses in a game design format to teach various complex behaviours and activities in a step-by-step instruction manner using behavioural chains (Magnusmode, 2016a). People downloaded premade or created their own digital card decks that showed instructions in a picture format to allow people to learn new skills (Magnusmode, 2016b). Because this app was downloaded to a mobile device and did not require an Internet connection to view downloaded card decks, people who used the app were not restricted in where they could use it and could benefit from accessing it in school, home, and community environments (Magnusmode, 2016c). These card decks could be used by anyone who would benefit from step-by-step instructions and have been successfully used by people with ID, autism, acquired brain injury, and other cognitive needs (Magnusmode, 2016d). It was hypothesized by this researcher that pairing this app with behavioural skills training to teach cooking skills would result in an increased percentage of steps completed correctly.
Using assistive technology to learn skills was an opportunity to present learning in a fun and engaging format, which turned the learning experience into a game in some ways. Chen and Hwang (2014) found that game based learning promoted an increased motivation to learn, which was an important factor in improving student performance. By incorporating digital technology that captured the attention of students, skill acquisition and knowledge were enhanced (Woodwarth & Reith, as cited in Fernández-López, Rodríguez-Fórtilz, Rodríguez-Almendros, & Martínez-Segura, 2013). As well, because these technologies could be used on devices that a learner already had and that most other people used, the technology was less obtrusive than some variations of the picture based systems, did not mark the learner as different and it provided opportunities for learning to take place in locations that were relevant to learning, providing less restriction on where learning could take place (Brown, 2011). When using MagnusCards®, users earned points for creating card decks and viewing them. As users accumulated points, they advanced through levels of achievement, which served as effective reinforcers if the users understood what acquiring points meant and how they correlated with viewing the card decks. If a user did not find the point system reinforcing, the general appearance of the app was still aesthetically appealing and the behaviour of using the app was reinforced just because it enabled users to perform the tasks without help.

Cook and Hussey (as cited in Chihak, Kessler, & Alberto, 2008) stated that personal palmtop computer systems on handheld computers were promising because they were socially desirable, generally inexpensive, and easy to program and use. Davies, Stock, and Wehmeyer (as cited in Chihak, Kessler, & Alberto, 2008) noted that there was an extensive literature surrounding the efficacy of handheld computer software as a prompting system but there was a need for further research surrounding its’ use as a prompting method for more tasks, domains, and employment settings. The purpose of the study conducted by Chihak, Kessler, and Alberto (2008) was to determine how effective handheld computer software was when used as a prompting device to help students with moderate and severe intellectual disabilities to transition independently between tasks. The students used handheld computer software that provided pictorial and auditory prompts to proceed through the behaviour chains of their vocational tasks and to transition independently from one task to the next (Chihak, Kessler, & Alberto, 2008).

Chihak, Kessler, and Alberto (2008) set the success criterion for the students at 100% independent transitions across three consecutive sessions and all the students increased and maintained the number of task transitions completed independently while using the handheld prompting method. These findings replicated results from previous studies that showed students with intellectual disabilities could use handheld prompting systems effectively, increase their autonomy in the workplace, and decrease dependence on others (Chihak, Kessler, & Alberto; Davies, Stock, & Wehmeyer; Ferguson, Myles-Smith, & Hagiwara; Furniss et al.; Riffel et al., as cited in Chihak, Kessler, & Alberto, 2008).

**Variations on How Digital Learning Material Can Be Presented**

The alternative methods of picture-based systems, video-based systems, auditory-based systems, and palmtop personal computer systems had several options in how they presented the material to the learner. Three arguments were presented on how digital learning should be implemented. These arguments related to how much of a skill the participant watched before practising, the perspective from which the video was viewed, and who the model in the video was. Mechling (2008) listed these methods as video modeling, video prompting, video point of view, and video self-modeling.
How much of a skill should the trainer show before the participant practises?
The first option that needed to be considered was how much of a skill the trainer showed before the participant attempted to practise it. In video modeling, the learner watched the entirety of a task being completed before they attempted to copy the model, whereas in video prompting, the learner watched the task broken down into the individual steps where he or she completed each step after it was shown before they were able to move onto the next one (Mechling, 2008). Cannella-Malone et al. (2011) and Canella-Malone et al. (as cited in Mechling, 2008) both compared video prompting and video modeling in teaching activities of daily living to adults with ID, using an alternating treatments designs counterbalanced across participants and tasks. Both studies found video prompting to be a more effective treatment than video modeling, which was largely considered ineffective (Cannella-Malone et al., as cited in Mechling, 2008; Cannella-Malone et al., 2011). Mechling (2008) suggested one reason for video prompting being stronger was that adults who watched an entire task before they completed it were faced with more challenging attention and retention demands. Canella-Malone et al. (2011) supported this viewpoint and suggested video prompting was more successful because participants were required to pay attention for shorter intervals of time, which likely allowed for increased retention of knowledge.

Rehfeldt, Dahman, Young, Cherry, and Davis (2003) used video modeling to teach sandwich making to three adults with moderate to severe intellectual disabilities. The participants viewed a video of a model performing the task after they had first been given the chance to perform the task independently (Rehfeldt, Dahman, Young, Cherry, & Davis, 2003). If the participant did not achieve 100% performance completion, they had a second chance to review the video and try the task again before the session ended (Rehfeldt, Dahman, Young, Cherry, & Davis, 2003). Rehfeldt et al. (2003) continued the intervention until the participants achieved 100% mastery across three consecutive training sessions.

Rehfeldt et al. (2003) concluded that video modeling was an effective instructional method for teaching simple independent meal preparation skills to the participants. This student researcher noted one limitation of the study was that when the participants did not perform a step within three seconds or performed a step incorrectly the trainers either performed the step themselves and did not provide corrective feedback (Rehfeldt, Dahman, Young, Cherry, & Davis, 2003). This student researcher considered this to be a limitation because it meant that the participant did not have the opportunity to practise the correct performance of the step and had to watch the video and proceed through other steps a second time before they had a chance to try again. This could have caused a delay in learning how to properly perform the step and could have increased the length of intervention.

Horn et al. (2008) noted that both video modeling and video prompting had some shared advantages: the tasks were presented at exactly the same each time, there were opportunities to alter how the participant viewed the performance of the task, and they were cost-effective to implement with participants. Horn et al. (2008) intended to determine how much chunking (breaking up a large task into smaller parts) was required to teach functional skills to individuals with intellectual disabilities. They created a video that could be viewed as one entire segment or as increasingly more segments with fewer steps per segment (Horn et al., 2008).

Five intervention conditions were used across all participants, the conditions varied based on the degree of chunking. For example, in condition 1 the participants viewed the entire video, in condition 2 the video was chunked into two segments, and so forth. (Horn et al., 2008). Horn
et al. (2008) stated that participants proceeded through intervention conditions if they did not achieve 100% mastery of the steps for two consecutive sessions.

The results of the study showed that as the number of video segments increased (and the number of steps per segment decreased), the percentage of independently performed steps also increased (Horn et al., 2008).

Horn et al. (2008) stated that it was impossible to know in advance what level of chunking each participant required for success, and as such, the solution was to begin with viewing the entire video and then splitting the video into segments until the participant met criterion. This student researcher considered this strategy to be a potential limitation because it would have required additional skill and time to prepare the videos in the different breakdowns.

From whose perspective should the participant view the steps?

The next option that was normally considered was the perspective from which the tasks were shown. Canella-Malone et al. (2011) found that there was not a significant difference between showing the video from the viewpoint of the individual performing the task (i.e., showing a pair of hands completing the task, known as the participant perspective) and showing other views of the individual performing the task (e.g., spectator perspective). However, it is this researcher’s opinion that showing each step from the perspective of the individual performing the step would be allow the participant greater success in learning. This researcher believes the participant perspective would provide a more detailed view of the step being performed without additional potentially distracting stimuli or poor image quality from being blocked by the model. Therefore, it would maximize learning if the instructions were presented as individual steps and from the perspective of the person completing the task.

Who should the person performing the task be?

In addition to how the individual in the video was viewed, the identity of the person in the video was shown to have an impact on the efficacy of the intervention. Bandura (1977) hypothesized that individuals would be more successful in learning new skills if they watched a model with whom they could identify, respected, and felt equal to.

McGraw-Hunter, Faw, and Davis (2006) used video self-modelling, where the individual learning the skill also served as the model for the video being viewed. McGraw-Hunter et al. (2006) measured the percentages of steps completed correctly in a multiple probes across participants design and found self-modelling to be effective in teaching cooking skills to individuals with traumatic brain injuries. They believed the key reasons for this was a higher degree of identification with the model and that watching oneself on a screen was generally associated with higher levels of attention and in turn, increased observational learning (McGraw-Hunter, Faw, & Davis, 2006). A limitation to this study was that video self-modeling was not compared to using another person as the model. This weakened the experiment because although the authors proved the effectiveness of video self-modeling, they did not prove how it measured to using another person as the model, which could have given more strength to the argument that video self-modeling is an effective choice.

However, a problem associated with using the learner as the model was that while they learned the skill, they did not necessarily display the skill correctly (Mechling, 2008). The model being used needed to show the skill in its correct form and it was unlikely that the learner immediately displayed the skill correctly without assistance until they received more training (Mechling, 2008). When the learner acted as a model, the video or images needed to be edited to omit errors and then edited again to edit out the support person performing the step correctly.
(Mechling, 2008). This editing process proved to be time consuming if the learner was not proficient at the skill.

Therefore, this researcher predicted that creating digital instructions that used someone the learner looked up to, were viewed from the participant’s perspective, and divided into multiple steps would enhance the acquisition of meal preparation skills in people with ID.

**Reasons for Including or Rejecting Alternative Teaching Methods Within this Study**

**Task analyses.**

In the present experiment, the creation of task analyses allowed for accurate identification of the specific steps the participant needed to complete to prepare the meals independently or with assistance. This then provided the necessary information needed to create MagnusCards® card decks, provide behavioural skills training, and collect data on participant independence. An initial limitation was that this researcher needed to ensure that all steps in the task analyses were included and could be easily identified by anyone observing the participant. Based on these strengths and limitations, this student researcher determined that task analyses needed to be included in the present study.

**Total task chaining.**

Total task chaining provided an advantage over forward, backward, or backward with leaps ahead chaining, because the increased repetition allowed the participant to practise all the steps on every occasion that the recipe was practised, which meant more opportunities for learning and potential success (Chance, 2014).

In forward chaining, the learner completed the first step in the behavioural chain with prompting from the trainer, who then completed the subsequent steps to complete the chain (Cooper, Heron, & Heward, 2007). When the learner competently performed the first step, they then learned to complete the first and second steps, while the trainer completed the remaining steps (Cooper, Heron, & Heward, 2007). This sequence continued until the learner completed all the steps independently (Cooper, Heron, & Heward, 2007). Strengths of forward chaining included training steps in the order they naturally occurred (Fisher, Roane & Piazza, 2014). A limitation of forward chaining that this student researcher noted was that training only one step at a time until mastered before moving onto the following steps would have spread out the number of intervention sessions and caused a delay in reaching mastery, which could have caused frustration for the participant. Based on these strengths and limitations, this student researcher decided that forward chaining would not be used in the present study.

In backward chaining, the trainer completed almost all the steps in the behaviour chain and the learner completed the final step, which they received reinforcement for (Cooper, Heron, & Heward, 2007). When the learner competently completed the final step independently, the trainer then completed all the steps up until the last two, which the learner completed and received reinforcement for (Cooper, Heron, & Heward, 2007). Cooper, Heron, and Heward (2007) state that this pattern proceeded until the learner completed the entire chain independently. Strengths of backward chaining were that the participant received the terminal reward within close time proximity to his behaviour and program implementers found it to be less time consuming with briefer training sessions (Cooper, Heron, & Heward, 2007). Limitations of backward chaining were that it was more time consuming and like in forward chaining, the participant did not have the opportunity to perform every step each time a training session occurred, which increased the number of intervention sessions. Based on these strengths and limitations, this student researcher determined that backward chaining would not be used in the present study.
Backward with leaps ahead chaining was similar to backward chaining but some steps within the task analysis were skipped if they were already a part of the learner’s repertoire (Cooper, Heron, & Heward, 2007). Within these previously described methods, the learner normally only learned one step at a time until they competently performed it and then moved onto the next step. A strength of backward with leaps ahead chaining was that the participant did not need to re-enact steps that they were already proficient in, which made it less time consuming. This student researcher thought this could also be a limitation because if participants did not perform steps they had mastered, there was a possibility that they could regress from lack of training, losing their learned skills and then requiring retraining. Based on these strengths and limitations, this student researcher determined that backward with leaps ahead chaining would not be used in the present study.

Within total task training, the learner performed all the steps of the task analysis within each training session, regardless of what order they mastered the steps in (Cooper, Heron, and Heward, 2007). This was an advantage over the other methods because it provided additional opportunities to practise all steps within any given training session.

Another advantage of using total task chaining was that on every occasion that the participant practised the target behaviour, he gained access to the terminal reinforcer, which was the meal he had prepared (Chance, 2014). Since training started at a time when the motivating operation of hunger was stronger (an hour or so before lunch), the terminal reinforcer was more powerful than if he had made the meal after recently eating. However, even though quicker mastery of skills was likely, there were more opportunities for the participant to have made mistakes since the response chain was more complex (Cooper, Heron, & Heward, as cited in Chazin, Bartelmay, Lambert, & Houchins-Juarez, 2017). In the present study, in addition to an increased probability of mistakes, all of these mistakes were resolved using BST, which lengthened the process and delayed the access to the terminal reinforcer. Based on the strengths and limitations described, this researcher decided that total task chaining would be included in the present study.

Least-to-most prompting.

Least-to-most prompting was considered as an option because it allowed the learner to attempt the skill without prompts and then multiple opportunities to practise with initially less intrusive prompts (Fisher, Piazza, & Roane, 2014). However, the learning process per session could become drawn out if the participant required multiple prompts to complete the steps, which could have resulted in frustration for a participant who wanted to continue to the next step. If the participant required multiple prompts before responding, there was also a chance prompt dependence had developed, which was the opposite of what this researcher wanted to train. Based on the strengths and limitations described, this researcher decided that least-to-most prompting was not the method she wanted.

Graduated guidance.

Graduated guidance was also considered as a potential treatment method. A benefit to using graduated guidance was that it allowed the learner to be as independent as possible since the amount of guidance was only enough to evoke the target behaviour and provided an opportunity for errorless learning (Fisher, Piazza, & Roane, 2014). Errorless learning was a teaching procedure where the trainer prompted the participant to immediately make the correct response, which ensured the participant made the correct response each time (Fisher, Piazza, & Roane, 2014). The trainer then slowly faded the level of prompting, while ensuring participant accuracy with reduced errors and frustration (Fisher, Piazza, & Roane, 2014). Despite the
benefits of this teaching method allowing for errorless learning and participant independence, graduated guidance was a more intrusive procedure that may have damaged the dignity of a higher-functioning participant. Another concern to using graduated guidance was that the fading did not occur on a systematic basis, but were subjective judgements that needed to be made quickly based on how the participant progressed (Fisher, Piazza, & Roane, 2017). Based on the strengths and limitations described, this student researcher determined that graduated guidance was not a suitable teaching method and would not be used in the current study.

**Behavioural skills training.**

Behavioural skills training was another teaching method that was considered for use in this intervention. The BST model is strong because it provides the participant with instructions, modeling, rehearsal, and feedback. BST was initiated when the participant erred or did not initiate the step within 5 seconds. BST reduced prompt dependency because the participant had to complete the skill himself before moving onto the next step. One potential limitation this researcher noted was that if the behaviour chain was broken, to allow for BST, it was possible that the participant may have become frustrated by the delay if he was about to move to the next step. Another limitation to be considered was if the researcher did not have the presence of mind to ensure that none of the steps overlapped. If there was overlap between steps, BST for one step may have interfered with the initiation or completion of another step. In order to account for this potential problem, this researcher ensured that the task analyses had no steps that overlapped. Based on the strengths and limitations described, this student researcher determined that BST would be included in the current study.

**Picture-based systems.**

Picture-based systems were considered because the participant had previous success in using them to prepare meals with support. Pictures without text were used because the participant had low literacy. As mentioned above, some limitations of using a picture based system were that in past studies, learners had lost their place between pages or pictures (Mechling, 2008). As well, because translating recipes were translated into multiple image formats sometimes meant that the recipes consisted of multiple pages, which were rather obtrusive and set the participants apart from others (Brown, 2011). Based on the strengths and limitations described, this student researcher decided that a picture-based system was a promising start, but wanted to use a system that was easy to manipulate, access, and did not set the participant apart from others and decided that a system that included only pictures would not be used in the current study.

**Video-based systems.**

Video-based systems yielded an advantage over the picture-based system in that the instructions now included sound and video, which meant complex steps that needed to be shown in multiple images were displayed in a single video segment (e.g. cracking an egg and placing the yolk in a bowl). These additional stimuli were also a limitation in that the participant may have struggled in paying attention to the key information or became distracted by surrounding stimuli in the video. Also, if the participant had to repeat a step, replaying the instructions may have been difficult if the participant was not able to replay the video segment independently. After considering this information, this researcher decided that the intervention method needed instructions that provided visual and auditory information, but was simplistic enough that the participant could use it independently with ease.
Auditory systems.
Auditory systems were another possible method considered for teaching. Explicit auditory instructions provided the participant with sufficient information to complete the step and the omission of visual supplements eliminated the potential to be distracted by visual stimuli (Mechling, 2008). In one study reviewed by Mechling (Lancioni et al., as cited by Mechling, 2008), the authors found no significant difference between auditory prompting and picture prompting alone. Mechling (2008) also stated a limitation of this system could occur if the participant had to repeat an instruction since stopping, rewinding, and repeating the instructions were difficult for some participants to complete. Based on the strengths and limitations described, this student researcher decided that auditory systems would not be included in the current study, but the chosen prompting system needed to include auditory instructions.

Palmtop personal computer systems.
Palmtop personal computer systems (such as MagnusCards©) presented a combination of the different strengths noted in the previous methods. That is, the MagnusCards© app provided static images, auditory prompts, very brief textual prompts, one image per card, images were delivered from the perspective of the performer, involved the use of contemporary technology which enhanced the social validity of this teaching approach. It was a picture-based system but it also provided options to listen to the written instructions spoken aloud. As well, it was relatively easy for the participant to repeat a step or move onto the next one once he completed the previous step. This app was also visually appealing to the participant, easy to use, and free to download. In the present experiment, some limitations of this app existed primarily when this researcher was creating card decks for the participant to view. To create card decks that were accessible to the participant’s mobile device, this researcher had to create the decks using the web based version of the app, which limited the number of instructions per deck to 10 and meant that some recipes consisted of multiple card decks. This limitation was minimized by including instructions that showed the participant how to progress to the next part of a recipe and making sure that the recipes were ordered sequentially in the card library. Based on the strengths and limitations described, this student researcher determined that a personal palmtop computer system (MagnusCards©) would be included in the current study.

Comparing and Contrasting Behavioural Skills Training with Video Modeling and Video Prompting Using Koslof’s Checklist for Evaluating Research and Research Claims
Koslof’s checklist was a method for evaluating empirical research by reviewing different aspects of a study to determine if it adhered to the standards for high quality research. The purpose of critiquing the following two articles, using Koslof’s criteria, was to directly compare the results of teaching with BST alone to teaching with palm top computer systems alone in an attempt to demonstrate whether one was superior to the other. Based on this analysis, this student researcher was then able to control for limitations present in the two articles when conducting the present research.

What follows is a comparison of two studies. The first used video modeling and video prompting with computer software to teach complex tasks to individuals with autism spectrum disorder (ASD) (Burke et al., 2013); the second study used BST to teach conversational skills to a college student with a learning disability not otherwise specified (Beaulieu, Hanley, & Santiago, 2013). Koslof’s checklist was used, by this researcher, to determine the credibility of the two studies based on different aspects of the respective studies. Each of the headers that follow address specific considerations within Koslof’s checklist.
Purpose of the article.
Burke et al. (2013) tested computer software viewed on a video tablet that provided video prompting, video modeling, and feedback to improve job training and performance to four participants with ASD in a paid employment setting. Because the hypothesis could be proven false if the participants did not improve their skills using the computer software, it was a strong hypothesis and improved the study.

Beaulieu, Hanley, and Santiago (2013) assessed the effectiveness of peer-mediated behavioural skills training with homework on conversational skills of questioning, interrupting, and content specificity for a college student with a diagnosis of learning disability not otherwise specified. As with the previous study, this hypothesis could also be proven false if the student did not improve his conversational skills following the implementation of BST.

Literature review.
In the study which evaluated the use of video prompting and modeling, the literature review covered the impact of consistently low employment rates for individuals with ID, developmental disabilities, and ASD, benefits and limitations of using job coaches, and past studies that used video modeling and video prompting to teach a variety of skills (Burke et al., 2013). Burke et al. (2013) focused primarily on video modeling and video prompting, but they also discussed intervention methods such as social stories, live modeling, video-based error correction, and peer-mediated interventions used in combination with or compared to video modeling and video prompting. The literature review stated few investigators had considered using video modeling or prompting as a replacement for job coaches (Burke et al., 2013). Lastly, the researchers covered limitations of video modeling and prompting, which included continued need for a job coach to assist in using the technology, teaching steps that may not accurately represent the duration or complexity of most employment settings, problems when the tasks were not completed with 100% accuracy, and lack of universal design features that could affect effectiveness.

This literature review was very thorough in considering results of limitations of past studies, implications for the participants, employers, and customers, and areas for future research. The inclusion of specific and broad research regarding employment for individuals with ID and past teaching methods, as well as inclusion of criticisms of what the researchers intended to implement, made this literature review strong and gave credibility to the study.

In the literature review of the study that used BST to teach conversational skills, the researchers provided information on the importance of intraverbals, components of conversational speech that a learner needed to engaged in, and one study that used BST to teach pre-delinquent girls questioning and positive feedback (Beaulieu, Hanley, & Santiago, 2013). Because they only cited one study in which BST was used, did not provide studies that used alternate teaching methods, did not include sufficient criticism of their point of view, and only cited five other studies, this is a much weaker literature review than the one completed by Burke et al. (2013).

Scope and feasibility.
To teach complex shipping tasks using video prompting, Burke et al. (2013) focused on four participants who worked at a manufacturing and shipping warehouse. The skills they measured were the steps in the packing and shipping process, which was a responsibility of all the participants. In addition, the success criterion and environment set up were an exact replication of the workplace (Burke et al., 2013). By focusing on teaching a skill that the participants had to perform regularly as part of their employment, the authors improved the
feasibility more than if the skills taught were more complex than the participants were expected to complete as part of their responsibilities.

In the second study, it was noted that behavioural skills training has been demonstrated as effective in past studies, which contributed to the feasibility and potential of success of this study (Beaulieu, Hanley, & Santiago, 2013). Because the study looked at a small sample size and small number of dependent variables, it did not attempt to change too many variables at once, it is more likely that experimental control was uncompromised.

**Design in relation to the research question.**

The design of the video prompting study was a multiple baselines across subjects that had strong internal validity and allowed researchers to demonstrate the presence of a functional relationship between the independent and dependent variables of the study (Burke et al., 2013). In the second study, Beaulieu, Hanley, and Santiago (2013) assessed the effectiveness of a treatment (BST) that been previously implemented in a past study. They also included a comparison group of neurotypical peers which was compared against the baseline and treatment levels of the participant. Researchers collected both quantitative and qualitative data, but the quantitative data was the focus of the study. They used a multiple baselines across behaviours design, which allowed comparison of the effects of BST across the different behaviours measured and like the multiple baselines across subjects design, had strong internal validity and provided evidence of a functional relationship between the measured variables.

**Definitions.**

When considering the effectiveness of tablet based video modeling and prompting, Burke et al. (2013) measured only one dependent variable (percentage of correct steps), which they defined thoroughly and provided examples of steps the participants completed. The detail provided in the definition was important because it allowed more accurate data recording by observers and increased the accuracy of the results, which reinforced the credibility of the study.

In the study that assessed the use of BST to teach conversational skills, the researchers defined all the dependent variables measured (speaking, listener role, positive feedback, interrupting, questioning, high specificity, and content specificity) objectively and with a level of detail that allowed observers to easily determine occurrences of behaviour, which increased the credibility of the study (Beaulieu, Hanley, & Santiago, 2013).

**Objective measures.**

To determine the effect of video modeling and video prompting on complex skill acquisition, Burke et al. (2013) measured the dependent variable, social validity, and universal design using objective measures. Using objective measures meant that the data collected was not subject to observer bias or opinion, which made the data more accurate and the study stronger.

To establish the power of BST in teaching conversational skills, Beaulieu, Hanley, and Santiago (2013) also used objective measures when recording data to assess change in dependent variables. This added strength to the study because the objectiveness allowed for consistency between observers and reduced observer bias, as with the Burke et al. (2013) study.

**Multiple measures or triangulation.**

To ascertain the efficacy of video modeling and video prompting, this study measured the amount of time spent reviewing the video, percentage of correct steps completed, social validity, and universal design (Burke et al., 2013). Using multiple measures to assess the effectiveness of the teaching method allowed researchers the opportunity to provide ample evidence on the effectiveness of video modeling and prompting.
The second study (teaching conversational skills using BST) measured the change in six aspects of conversation skills, four of which were directly targeted within BST (Beaulieu, Hanley, & Santiago, 2013). Having measures of multiple variables gave evidence surrounding the reach a single variable could have on multiple behaviours, which cemented the effectiveness of the treatment and importance of the study.

**Data on outcome and intervention variables.**

In order to state that video modeling and prompting were responsible for change in behaviour, the researchers provided sufficient information on the preparation, baseline, and intervention conditions. This information included description of the on-site job training program, use of observer checklists, implementation of baseline sessions, and how the PDA software was used during intervention (Burke et al., 2013). Providing these details meant that there was a clear description of what variables were intended to change the behaviours and that gave strength to the study.

In the study using BST, the researchers thoroughly described how they conducted baseline and intervention sessions, which included the length of sessions, descriptions of sessions and homework, and examples of some dependent variables (Beaulieu, Hanley, & Santiago, 2013). Although this study consisted of fewer variables than the previously mentioned study, the variables used were described with enough detail for the researchers to pinpoint what aspects led to changes in behaviour.

**Sample in relation to the population.**

The study which aimed to teach complex shipping tasks had a sample that only included male participants aged 19-28 years (Burke et al., 2013). This may be representative of populations working within shipping and manufacturing, but future replications should include female and male participants, a larger age range, and different employment settings. Replications of the study with these additions would provide additional results and areas for future research on the effectiveness of video modeling/prompting using PDA’s.

In their study that analyzed the ability of BST to teach conversational skills, Beaulieu, Hanley, and Santiago (2013) also had a sample that was not completely representative of the population. Future studies would need to include participants of different ages, genders, education, and other variables to create a sample that is truly representative of the population, which would also provide more details on the effectiveness and areas to improve upon.

**Comparison groups.**

To view the change in correct steps following the implementation of video modeling and video prompting, Burke et al. (2013) compared the percentage of correct steps of each participant to the percentages of the other participants. A weakness of this study is that it did not include a control group.

To determine any changes in conversational skills following BST, Beaulieu, Hanley, and Santiago (2013) took normative data on the conversational skills of three undergraduate psychology students with no diagnoses or concerns with social skills and then compared these to the participant’s baseline and intervention levels. Having a comparison group that did not receive treatment allowed the researchers to determine if the implementation of BST increased the participant’s conversational skills to similar levels of neurotypical peers and gave credibility to the treatment effectiveness and made it stronger in this area than the Burke et al. (2013) study.

**Concluding remarks regarding comparison by Koslof’s checklist.**

To determine the overall effectiveness of the two studies, all the aspects from the checklist included in this review were considered together. Both studies had some areas of
weakness; the study on BST to teach conversational skills had a weak literature review while the study on video modeling and prompting to teach complex shipping tasks did not have a true comparison group. Despite this, both studies had more strengths than limitations, which have been thoroughly discussed. Based on this evaluation, this researcher determined that both video prompting/modeling and BST were effective teaching methods. If both teaching methods were equally effective in skill acquisition, this researcher determined that combining both these methods would create an even stronger teaching method.

**Concluding Remarks on the Literature Review and Its Relevance to This Thesis Study Project**

The teaching techniques that follow were critically analyzed: task analyses, total task chaining, least-to-most prompting, graduated guidance, picture based systems, video-based systems, auditory systems, BST, and palmtop personal computer systems.

Based on the above examination, this researcher concluded that the elements that follow should be incorporated into the present study:

- using contemporary and user friendly technology (such as the personal palmtop computer system),
- presenting the skills as individual steps,
- viewing these steps from the participant perspective,
- using a model the participant looked up to and identified with,
- using static images combined with brief textual and auditory prompts,
- limiting images to one per step,
- providing an opportunity to practise all the steps each time the participant completed the task,
- and using the teaching sequence of BST (i.e., instruction, modeling, rehearsal, and feedback).

The present study sought to incorporate the best practices listed above but with a twist. An alternating treatments design was used to compare the efficacy of BST alone versus BST with the MagnusCards© app on the acquisition of cooking skills. It was hypothesized that the latter would yield quicker and higher results.

**Word Count: 6060**
Chapter III: Method

Participant
This intervention was designed to provide an intellectually disabled person with the skills necessary to cook without assistance. The participant was a participant of the Developmental Services of Leeds and Grenville (DSLG) who expressed an interest in learning to cook but required training to do so. He was 33-years of age, had mild intellectual disabilities and low literacy, lived independently, and received support from a DSLG community support worker on a twice weekly basis.

Informed Consent and Ethical Approval
The participant provided voluntary and informed consent to participate in the study. A copy of the consent form can be found in Appendix A. Before giving his consent, the participant had the form read to him, was provided with information regarding risks, benefits, the purpose of the study, given the opportunity to ask questions, and was assured that he had the right to withdraw without explanation, penalty, or removal of DSLG services.

Two signed copies of the consent form were obtained: one was given to the participant and the other was provided to the agency. Since DSLG policy was to store consent on site, a verification letter (Appendix B) stating that consent was obtained was stored in a locked file at St. Lawrence College. All documentation surrounding the intervention, when not in use, was stored in a locked filing cabinet at DSLG or on an encrypted file on this researcher’s password protected computer. To ensure that data were kept confidential, the participant’s name was replaced by the number 1 on all documentation, be it printed or electronic, to maintain his anonymity.

The study received ethical clearance from the Research Ethics Committee for Behavioural Psychology (REC-P) under the authority of the St. Lawrence College Research Ethics Board (SLC-REB) (Appendix C).

Design
This study incorporated the use of a single-subject alternating treatments research design. Two treatments alternated:

1. MagnusCards© plus behavioural skills training.
2. Behavioural skills training alone.

MagnusCards© was a free app. The participant was taught to select the cooking instructions for the meal that he wished to prepare, download the deck of cards to his mobile device, and swipe through the cards so that he might receive their audible, textual, and pictorial instructions.

Behavioural skills training was a well-researched and clinically validated method for teaching new skills to others (Buck, 2014). Miltenberger defined it as “a procedure consisting of instruction, modeling, behavioural rehearsal, and feedback (2004, p.558).” Instruction was defined as providing a description of the skill, its importance or rationale, and when and when not to use the skill. Modeling was defined as showing the participant how to perform the skill. Rehearsal was defined as practice. It allowed the participant opportunities to practice the skill. Feedback was defined as this researcher providing positive praise for correct responding and some form of corrective feedback for incorrect responses.

The participant lived alone and the intervention took place in the kitchen of his apartment. The participant, this researcher, and a supervising behaviour therapist or community
support worker were present to collect inter-observer agreement data and provide feedback to this researcher. Lessons took place twice weekly for seven consecutive weeks. There were 12 lessons in all. Lessons lasted from 1.5 to 2.5 hours each. The participant prepared 18 meals. Some of the meals were repeated.

**Independent and Dependent Variables**

The independent variables were MagnusCards© with behavioural skills training and behavioural skills training alone. The dependent variable was the percentage of meal preparation steps that the participant was able to perform independently or with MagnusCards©.

**Setting and Apparatus**

The materials (Appendix D) for this study included groceries, kitchen utensils, major appliances, task analyses matched to MagnusCards© (Appendix E), inter-observer agreement recording sheets (Appendix F), and a mobile device with the MagnusCards© images installed. Screenshots of the MagnusCards© were created for all the recipes taught and can be found in Appendix G. The original recipes used to create the MagnusCards© instructions can be found in Appendix H.

Permission to use MagnusCards© in the present study was granted by the founder of MagnusCards© and is in Appendix I.

**Procedure**

Baseline data were collected on the participant’s ability to perform each of the steps necessary to prepare four different meals. The participant was asked to “Cook _________, please.” No further prompts were issued. Steps performed independently were recorded as such on the task analyses that were in sync with MagnusCards©.

Only training baseline data were collected on two of the six meals taught due to concerns that related to the participant’s willingness undergo further baseline sessions.

Cooking lessons occurred twice weekly for seven consecutive weeks. The participant received 12 lessons lasting 1.5 to 2.5 hours each. Lessons were taught by this researcher on Wednesdays and Fridays.

On Wednesdays, the participant prepared meals with MagnusCards© and behavioural skills training. On Fridays, he prepared different meals with behavioural skills training alone.

In the early version of the intervention, the participant prepared three meals per session. Later, the number of meals was reduced to one per session in response to the participant’s and behaviour therapist’s concerns that the sessions were too time consuming.

During each lesson, the participant prepared one to three simple meals. On Wednesdays, he was instructed to match his behavior to the image, text, and audio instructions delivered by MagnusCards© and, once matched, to advance to the next card in the sequence. If the participant erred on a step or paused longer than 5 seconds between steps, then this researcher delivered behavioural skills training to facilitate the performance of the step(s). On Fridays, the participant was instructed to prepare a given meal. The second teaching method involved using only behavioural skills training. If the participant erred on a step or paused longer than 5 seconds between steps, then this researcher delivered behavioural skills training to facilitate the performance of the step(s).

To provide the participant with additional exposure to the MagnusCards© app, the last session with Hamburger Helper (which was taught on a Friday) was conducted with MagnusCards© and behavioural skills training because this method of teaching clearly led to greater skill mastery and participant satisfaction.
Data Analysis

Data were collected on the participant’s ability to match his performance to the image, text, and audio-instructions delivered by the MagnusCards© app. The number of steps performed correctly, and in the absence of behavioural skills training, were recorded. Similarly, data were collected on the number of steps performed independently under the behavioural skills training alone condition.

Inter-observer agreement data (IOA) were collected on 92.21% of the data collected. The data were analyzed by calculating percentages, means, standard deviations, and the percentage of data points exceeding the median (PEM). These analyses were portrayed in tables and graphs.

Word Count: 1108
Chapter IV: Results

This study took place twice a week from October 12th, 2016 to December 7, 2016. Sessions did not occur on October 28th, November 9th, and November 11th. Baseline measures were taken on the participant’s ability to independently prepare four different meals in the absence of BST or BST with MagnusCards®. These data, for the purposes of visual and descriptive analysis, were then organized into two categories based on whether the meal was meant to be taught using BST alone (brownies, sausage and broccoli skillet) or BST with MagnusCards® (chicken and pasta, chili). Due to time constraints and low performance (< 2% of the steps in each recipe were performed independently), each recipe only had one baseline session and data stability was not calculated before commencing intervention.

Table 1
A comparison of BST to BST paired with MagnusCards® by overall mean and standard deviation across baseline and treatment weeks combined.

<table>
<thead>
<tr>
<th>Condition Phase</th>
<th>BST M(SD)</th>
<th>BST with MagnusCards® M(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1.14%(0.02)</td>
<td>0.00%(0.00)</td>
</tr>
<tr>
<td>Training Baseline</td>
<td>15.79%(0.00)</td>
<td>53.57%(0.00)</td>
</tr>
<tr>
<td>Intervention</td>
<td>31.41%(0.03)</td>
<td>70.02%(0.12)</td>
</tr>
</tbody>
</table>

Note: BST=Behavioural Skills Training (teaching method #1); BST with MagnusCards®=Behavioural Skills Training paired with MagnusCards® (teaching method #2); M=average percentage of steps performed correctly within the entirety of baseline or intervention for either teaching method; SD=standard deviation, the average distance of any data point from the mean.

The average percentage of steps performed independently and standard deviations for baseline measures were summarized in Table 1. These percentages and standard deviations were very low for both sets of baseline recipes, which indicated that the participant was not able to independently complete any steps in the recipe task analyses, with the exception of washing his hands at the beginning of one recipe. The baseline data also indicated that the level was low and the trend was stable.

Training baseline data were data collected during the participant’s first experience with BST plus MagnusCards® or BST alone. Training baseline data were higher than baseline data suggesting that prior learning had taken place. In training baseline, the participant prepared macaroni and cheese in the BST with MagnusCards® condition and Hamburger Helper in the BST alone condition. The percentage of steps performed independently in the BST alone condition was 15.79% and the percentage of steps performed independently in the BST with MagnusCards® condition was 53.57%, which was one initial demonstration that BST paired with MagnusCards® was a superior teaching method. Stability and standard deviations for training baseline could not be calculated because only one training baseline session took place for both recipes.

During baseline and training baseline sessions, inter-observer agreement data were collected on 28.57% of the sessions with 100% agreement.
Table 2
A comparison of BST alone to BST with MagnusCards© by the average percentage of steps performed independently during baseline and intervention across recipes.

<table>
<thead>
<tr>
<th>Recipe</th>
<th>Baseline Conditions</th>
<th>Intervention Conditions</th>
<th># of Teaching Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline %</td>
<td>Training Baseline %</td>
<td>BST Alone %</td>
</tr>
<tr>
<td>Chicken and Pasta</td>
<td>0.00%</td>
<td>53.57%</td>
<td>1</td>
</tr>
<tr>
<td>Chili</td>
<td>0.00%</td>
<td>68.19%</td>
<td>1</td>
</tr>
<tr>
<td>Sausage and Broccoli</td>
<td>2.27%</td>
<td>34.09%</td>
<td>1</td>
</tr>
<tr>
<td>Brownies</td>
<td>0.00%</td>
<td>31.58%</td>
<td>1</td>
</tr>
<tr>
<td>Macaroni and Cheese</td>
<td>53.57%</td>
<td>82.14%</td>
<td>4</td>
</tr>
<tr>
<td>Hamburger Helper</td>
<td>15.79%</td>
<td>28.58%</td>
<td>76.19%</td>
</tr>
</tbody>
</table>

Note: Baseline % = average percentage of steps performed independently during baseline; Training baseline % = percentage of steps performed independently during training baseline with BST alone or BST with MagnusCards©; BST Alone % = average percentage of steps performed independently under the Behavioural Skills Training alone condition; BST with MagnusCards© = average percentage of steps performed independently under the Behavioural Skills Training with the MagnusCards© condition; # of Teaching Opportunities = Number of sessions that the participant engaged in training for a recipe under either teaching condition. * = Due to procedural error, the Hamburger Helper recipe was taught under both BST alone and BST with MagnusCards© conditions.

During intervention, the participant learned to prepare three meals (sausage and broccoli skillet, Hamburger Helper, and brownies) in the BST alone condition and three different meals in the BST with MagnusCards© condition (chili, chicken and pasta, and macaroni and cheese). Procedural error led to Hamburger Helper being taught under both the BST alone and the BST with MagnusCards© conditions. Table 2 shows the average percentage of steps performed independently across recipes and conditions. These data were also graphed as shown in Figure 2.

Across recipes, and on average, the participant performed 31.41% of the steps independently under the BST alone condition. The percentages ranged from 28.58% to 34.09%, had a standard deviation of 0.03, and showed little variance. The standard deviation was small because the participant prepared each meal only once during the BST alone condition.

Across recipes, and on average, the participant performed 70.02% of the steps independently under the BST with MagnusCards© condition. The percentages ranged from 53.57% to 92.86%, had a standard deviation of 0.12, and showed little variance. It may be the case that the standard deviation was somewhat larger under this condition because the participant repeated the performance of some recipes, prepared each meal only once during the BST alone condition.

During the BST alone and BST with MagnusCards© conditions, IOA were collected on 63.64% of the sessions with 92.79% agreement.
Figure 1: Graph showing the average percentage of steps performed independently for all recipes taught under the BST alone condition or under the BST with MagnusCards© condition across baseline, training baseline, and intervention. _Note:_ baseline levels for BST with MagnusCards© were 0% but the percentage was raised to be visible on the graph.
Figure 1 shows the average percentage of steps performed independently for all the recipes under the BST alone condition or the BST with MagnusCards© condition. This graph provided a visual comparison of the data collected in Table 1 and provided evidence that the BST with MagnusCards© condition was superior to the BST alone condition. As was mentioned previously, this graph shows a large difference in percentage of steps performed independently between baseline and training baseline levels in both conditions, relating back to the possibility that prior learning had occurred.
Figure 2: Graph showing the average percentage of independently completed steps for individual recipes during baseline, training baseline, BST alone, and BST with MagnusCards© conditions. Note: the number above the bars within the graph indicate the number of times a recipe was taught during that condition. Note: baseline levels for brownies, chili, and chicken and pasta were all 0.00%, but the levels were raised so that it was visible on the graph.
Figure 2 shows the visual representation of the data collected during this study. It was represented as a bar graph because a traditional line graph showing the percentage of each individual recipe during each teaching session was too complex and did not allow for direct comparison between the two different teaching methods relative to baseline and treatment baseline. Labeling each condition phase as its own category on the graph with average percentages for each recipe and the number of times a recipe was taught made direct comparison between the two teaching methods much simpler. As such, trend lines could not be inserted on the bar graph. The percentage of data points exceeding the median (PEM) was 100% under both training conditions. Refer to Appendix J for the calculations performed to obtain the PEM.

BST with MagnusCards© was superior to BST alone. One factor that may have slightly influenced the success of BST with MagnusCards© were the two additional opportunities to practice under these conditions.

Word Count: 1098
Chapter V: Discussion

This study sought to demonstrate that combining BST with the MagnusCards© app would create a stronger teaching method than BST alone, in a single subject alternate treatments design.

Was the Hypothesis Proven True?

As was reviewed within the results section, both teaching methods facilitated the acquisition of the steps involved in preparing several different meals. The thesis hypothesis was proven to be correct in that BST paired with MagnusCards© was a preferable teaching method to BST alone. The combined method allowed the participant to acquire the steps in cooking skills and facilitated a greater independence since the app reduced dependence on this researcher to provide BST.

Treatment Effectiveness

Treatment effectiveness was determined, for both teaching methods, by visual inspection of the data and the comparison of percentage of data points exceeding the median (PEM) (Scruggs & Mastropieri, 1998; Ma, 2006), means, medians, and standard deviations.

Contribution to the Field of Behavioural Psychology

The superiority of BST plus MagnusCards© over BST alone could be considered a novel contribution to the field of behavioural psychology and ID. Prior to this thesis, no other studies had combined BST with personal palmtop computer systems to teach adaptive skills such as cooking. It may be the case that BST plus MagnusCards© could be successful in teaching a variety of other skills to other populations (i.e. individuals with acquired brain injury or autism spectrum disorder).

Strengths of This Study

Some strengths of this study were the implementation of an alternating treatment design. This single subject design gave the opportunity to compare the effectiveness of two teaching methods, which supported the validity of the results. By comparing the two methods, this researcher was able to state that BST with MagnusCards© was an effective treatment and that it was significantly more effective than BST alone. Another strength of the study was that using MagnusCards© increased the participant’s independence and led to less reliance on others.

Limitations of This Study

Some limitations of the study included the limited time to obtain baseline on new recipes that were more preferred, took less time to prepare, and reduced training time from three to one recipe per training session. That said, when the recipes were changed to better meet the needs of the participant and his behaviour therapist subsequent sessions led to less resistance, greater motivation, and relief from stress. In order to mitigate this problem of having no baseline data for recipes that were added later, the first days of intervention for teaching these recipes were considered training baseline. Another unwanted repercussion of the above-mentioned change was that it resulted in fewer sessions which may have had an impact on fluency.

Another limitation was that this researcher needed to use her own mobile device for the participant to view the recipes because his device was not available. This was a potential problem because the participant needed to have the recipes available once this researcher left the agency. This limitation was managed by using the agency’s mobile device once this researcher left.

One final limitation to this study was that there was no way to ensure that the recipes in one condition were completely matched, by complexity or length, to recipes taught in another condition. When this researcher counterbalanced the recipes, it was done to be as accurate as
possible but it was an estimate and did not guarantee that the participant would not find some steps harder than others. A method that could be used in future for more accurate counterbalancing would be to teach the same recipe with both teaching methods to two different participants using a combined multiple baseline across participants and alternating treatments design.

Ethical Considerations

An ethical consideration arose when the participant felt overwhelmed by the number and nature of the recipes taught during each session. It was important to consider the needs and concerns of the participant because he could not be forced to continue with the study and had the option to terminate his participation without explanation or risk of losing the agency services that were already in place. The previously mentioned changes (reducing the number and complexity of recipes per session) led to continued participation in the study.

Multilevel Challenges to Service Implementation

Client level.

Multilevel challenges affected the delivery of teaching methods and provided this researcher with the opportunity for problem solving. Challenges that this researcher encountered at the client level involved the participant’s willingness to participate and building rapport. During the time that the participant experienced stress because of having too many recipes to accomplish, he was not as willing to complete the study as he had been in the initial stages. This challenge was met by adjusting the study design to be less time and effort consuming. Another challenge that this researcher faced in the initial stages was in building rapport with the participant. Although he was very excited to learn more about cooking, he was also nervous, at the start, because it involved using kitchen appliances that he was fearful of (e.g., operating the stove top elements). This researcher worked through this challenge by providing behaviour specific praise on a dense schedule of reinforcement for using the appliances, discussing kitchen safety behaviours before starting each cooking session, and engaging in more conversation to get to know him better and help him to feel more comfortable.

Program level.

A challenge that this researcher encountered at the program level was in the setting where intervention took place. The participant’s kitchen was small, which meant that sometimes the participant and this researcher got in each other’s way. As well, the appliances were older and some ran at higher temperatures than what they appeared to be set at. To counter these challenges, this researcher kept out of the participant’s path when he needed to move to other areas of the kitchen. Regarding higher than indicated temperatures on appliances, temperatures were calibrated and the new set point became part of the MagnusCards© image, text, and auditory prompts.

Organizational level.

At the organizational level, one challenge was that the behaviour therapist had a limited amount of time available to spend with the participant during the study, which meant that lengthy and multiple recipes per session were not favourable. This was adjusted by reducing the number of recipes and choosing ones that took less time. This time restriction also affected the implementation of the program following the departure of this researcher because the behaviour therapist was not able to work with the participant to maintain skills as frequently. In other words, training time would be reduced from eight hours per month to 1 hour per month. That said, this problem would be ameliorated if the agency decided to assign cooking training to the community support worker who visited the participant once per week and every other weekend.
Our society is entrenched in computer technology. If the client were to receive no future training sessions, he might be further stigmatised because not only would he carry a diagnosis of ID, and everything associated with that, but he would be behind the learning curve by being technologically challenged and thus more reliant on services which would have an impact on the cost to society and the participant’s sense of self-efficacy.

**Societal level.**

At the societal level, a challenge that could occur is if the participant did not continue to use the skills and regressed to the point that he required to be retrained in skills that he had previously demonstrated. Another challenge within the societal level is the societal misconception that individuals with ID are not capable of taking care of themselves, which may cause delays or resistance when introducing teaching methods that would allow them to become more independent. However, it is very likely that many individuals with ID would be capable of taking care of themselves with minimal supports if they received effective training, as demonstrated by this thesis project. To counter the idea that individuals with ID cannot take care of themselves, it would be critical to show multiple cases in which individuals with ID live independently, explain how they achieved their level of independence, and show the ease with which independence can be achieved through proper teaching methods.

**Future Research**

Future research should consider the use of BST paired with palmtop personal computer systems to teach other adaptive skills besides cooking skills (e.g. going to the bank, using the internet, taking public transportation, etc.) to expand the opportunities in which this teaching method can be used.

Another area that would benefit from additional research is to investigate if BST alone is always the best option or if additional prompts were needed for improved learning. BST has always been considered a best practice in the field of behavioural psychology and it would be beneficial to determine if there are a certain set of behaviours that are better taught using BST alone or BST with MagnusCards© and if these behaviours share any specific characteristics. This researcher predicts that behaviours that have less steps would be well-supported by BST alone but behaviours that have more steps might be better taught with BST with additional prompts like MagnusCards©. Understanding which behaviours are better matched to certain teaching methods would be important because it could allow more effective teaching methods to be matched to behaviours and potentially increase skills acquisition.

**Critical Analysis of This Study Using Koslof’s Checklist for Evaluating Research and Research Claims**

Koslof lists 15 criteria for evaluating research articles: purpose of the study, claims of the study, the literature review, scope and feasibility of the study, research design in relation to the research question, definitions, objective measures, triangulation, casual time order, outcome and intervention variables, validation of instruments and measures, sample in relation to the population, comparison groups, extraneous variables, and claims in relation to the evidence. This study was strong in the regards to the purpose, claims, literature review, scope and feasibility, research design, definitions, objective measures, outcome and intervention variables, validation of instruments and measures, sample in relation to the population, comparison groups, and the claims of the study in general. This study was weak in the areas of triangulation and causal time order.
Purpose of the article.
This study sought to prove the hypothesis that BST with MagnusCards® was superior to BST alone, which could be prove false and provided validity to the study. The claims of the study were valid because they complimented and expanded past research conducted on different alternate teaching methods and the importance of these skills.

Literature review.
The literature review included within this paper extensively covered the importance of cooking skills, thorough descriptions of various alternate teaching methods, benefits and limitations based on past studies and for the participant himself, and an in-depth comparison of using Koslof’s checklist to compare two studies which used alternate teaching methods. The literature review covered areas that both agreed and disagreed with this researcher’s point of view. This literature review showed a high degree of critical thinking and analysis.

Scope and feasibility.
The scope of this study was initially unfeasible as it attempted to teach the participant too many recipes per session. Reducing the number and complexity of recipes taught per teaching session allowed the objective to be more feasible in terms of participant success.

Design in relation to the research question.
This study used an alternate treatments single subject experimental design, which was proper because it allowed this researcher to directly determine which treatment method was more effective and specify if the hypothesis was true.

Definitions.
This writer defined the dependent variable (i.e., the percentage of steps performed independently) within the method section and defined it as any step that the participant completed, under either of the two treatment conditions, that did not require the use of BST. The independent variables were the use of BST alone and the use of BST plus the MagnusCards® app, both which were also operationally defined. These definitions gave strength to the study because they were clear and included all important information, which allowed others to understand and be able to observe without having to interpret.

Objective measures.
The measures used with the study were objective because they consisted of direct observations that noted whether or not a step was completed independently. These measures were determined through observing the overt events, which make the measures stronger than if they had focused on covert events or were assessed using indirect measures. Further, IOA data were collected during baseline and treatment. During baseline IOA were collected on 28.57% of the sessions and rendered 100% agreement; during treatment, IOA were collected on 63.64 % of the sessions and rendered 92.79% agreement.

Multiple measures or triangulation.
A weakness of this study was that it was not triangulated (i.e., the use of multiple measures of the same behaviour) and used only one measure (i.e., percentage of steps performed independently) to track the participant’s improvement. If this study were replicated, additional measures to track cooking skills would render greater reliability and validity.

Causal time order.
This study was both strong and weak in regards to causal time order. Baseline data were collected for the initial recipes but baseline could not be considered stable because only one baseline data point was obtained per recipe. Also, baseline was unable to could not take place when the recipes were changed, which meant that although the participant had never made the
recipes before, it could not be determined with as much confidence that the intervention caused the increase in percentage. Recall that, two weeks into the intervention, the number of recipes taught per session had to be reduced from three to one to accommodate the needs of the client and his behaviour therapist and support staff. We have only treatment baseline on the two that were added as alternatives to the original six that were baselined and treated. However, since baseline and treatment baseline were followed by treatment, it seems reasonable to conclude that we can make statements about the relative effects of treatment which were demonstrably apparent.

**Outcome and intervention variables.**
The outcome and intervention variable data were considered a strength because detailed descriptions of how baseline and intervention sessions were run provided proof of what likely led to the increase of independent steps.

**Validation of instruments and measures.**
Measuring the percentage of steps performed independently was a validated instrument because the data collected using this method was directly observable and measured that which was intended to be measured which strengthened the internal validity of the measure, especially since such high IOA data were obtained.

**Sample in relation to the population.**
The sample was representative of the population in that the participant had a diagnosis of mild to moderate intellectual disability, which is the largest percentage of individuals diagnosed with ID. His age was representative of the population because learning to cook was a skill that individuals within his age range generally learned or needed to learn. This thesis project used a single-subject design. In and of themselves, single subject designs are considered by the academic community to be valid, reliable, and accurate. However, replications would enhance the validity, reliability, and accuracy of findings.

**Comparison groups.**
This study was strong in terms of comparison groups because it compared two different teaching methods, both of which were used with the same participant.

**Extraneous variables.**
Extraneous variables were a weakness within the study. To minimize these effects the writer sought to control for extraneous variables was by choosing recipes that the participant had not cooked himself before and that were matched by level of difficulty. This researcher matched recipes by the number and complexity of steps so that recipes performed during one condition contained approximately the same number of steps and the same level of difficulty of steps as the recipes performed during the other teaching condition. However, given the inherent degree to which meals vary, it was impossible to ensure that recipe components were identical during the matching process. This then lessened the potential effect of extraneous variables like past learning experience on the participant’s percentage of steps performed independently and supported the hypothesis that the intervention was responsible for the participant’s skills acquisition. That said, a known disadvantage of the alternating treatments single subject experimental design is that there are no controls for extraneous variables and you can not make statements about the absolute effects of treatment, only the relative ones (Hughes, 2013).

**Claims in relation to the evidence.**
Lastly, this writer’s claims about the study were permitted by the evidence. The data strongly suggests that BST paired with MagnusCards© was a superior to BST alone. This
exploration, based on Koslof’s checklist for evaluating research and research claims, suggests that this study was strong in most areas.

**Word Count: 2777**
References


Appendices
Appendix A: Draft Consent Form

Consent Form

Project title: Teaching Meal Preparation Skills to an Adult Male with Intellectual Disabilities Using Digitized Self-Instruction (MagnusCards) and Behavioural Skills Training

Principal Investigator (Student): Nicole Therrien

Supervisor: Colleen Cairns, MSc, ABA, BCBA

Institution: St. Lawrence College

Invitation:
You are being invited to take part in a research study. I am a student in my fourth year of the Behavioural Psychology program at St. Lawrence College. I am currently on placement at Developmental Services of Leeds and Grenville (DSLG). As a part of this placement, I am completing a research project (called an applied thesis). I would like to ask you for your help to complete this project. The information in this form will help you understand my project. Please read the information carefully and ask all the questions you might have before you decide if you want to take part.

Why is this study being done?
This program involves using digitized self-instruction tools (MagnusCards) and behavioural skills training to help an adult with intellectual disabilities gain useful skills that will allow him to lead a more independent life. We believe that this program will be helpful to you if you choose to participate. Your thoughts and opinions are important in this study.

What will you need to do if you take part?
If you choose to take part in this study, you will participate in learning and practising the skills needed to plan and prepare some simple and healthy meals of your choice. You will be assisted by someone close to you, whom I will train to be able to teach you, as well as myself. In order to learn the needed skills, you will be using a digital application called MagnusCards, which will give you step by step instructions in a picture format. Behavioural skills training will be where I will tell you what action you need to do, I will then demonstrate how to do the action for you to see, I will then watch you practise doing the action, and then I will tell you what you did well and what you need more help with. Your progress as you learn these skills will be marked over time to view improvement. We will meet twice times a week (Wednesdays and Fridays) for 7 weeks. Each session will last 1 ½ to 2 hours.

What are the potential benefits to me if I take part?
Potential benefits of taking part in this research study include the opportunity to achieve higher levels of independence in cooking and the ability to use computer technology to acquire and maintain newly learned skills.

What are the potential benefits of this research study to others?
The potential benefits of this research study to others may include an additional resource that can be used by individuals with intellectual or developmental disabilities and others to encourage skill-building and independence.

What are the potential disadvantages or risks to me if I take part?
Some potential risks include injury in the kitchen since you will be working with knives, hot surfaces, and broken glass should something fall and break.

What happens if something goes wrong?
Every individual is different. All possible precautions will be taken to make ensure something going wrong is unlikely to happen, such as engaging in behaviours to keep everyone involved safe. As preventative measures, kitchen safety practices will be incorporated into the Magnus Cards. Also, I will teach you how to operate a fire extinguisher and dial 911 in case of emergency. This training will precede every cooking session. We will always be accompanied by the behaviour therapist, Lori Tozer, and your community support worker will be present for half of the sessions. All of us have our own cell phones that we can use in case of an emergency. If you have any concerns regarding the nature of this research study, you may speak further with me or the behaviour therapist, Lori Tozer.

**Will the information you collect from me in this project be kept private?**
If you agree to participate, your signed consent form will be stored in a locked filing cabinet located in a secure office at DSLG and a verification letter confirming that your consent was obtained will be sent to St. Lawrence College, which will be stored in a locked filing cabinet in a secure office at St. Lawrence College. The consent form and verification letter will be stored as such for 10 years following the offset of the study, before they are destroyed. Your name will be replaced by the number 1 on all documentation, be it printed or electronic, to maintain your anonymity. The electronic task analyses, data collection, the data analysis, thesis, and poster files will be encrypted on my password protected computer. Upon completion of the study, the research data will be deleted from my laptop after it has been transferred to a memory stick that will be stored in a locked filing cabinet in a secure office at the agency. The memory stick will be retained for 10 years before it is destroyed.

**Do I have to take part?**
Taking part is voluntary. It is up to you to decide whether or not to take part. If you decide to take part, you will be asked to sign this consent form. If you decide to take part in this project, you are still free to stop at any time without giving any reason and without experiencing any penalty or negative effects. If you wish to stop participating, please tell the behaviour therapist, Lori Tozer or me.

**Contact for further information**
This research project has received ethical clearance from the Research Ethics Committee for Behavioural Psychology (REC-P) under the authority of the St. Lawrence College Research Ethics Board (SLC-REB). The project was developed under the supervision of Colleen Cairns, my supervisor from St. Lawrence College. I appreciate your cooperation and if you have any additional questions, feel free to ask me, Nicole Therrien (ntherrien26@student.sl.on.ca). You can also contact my College Supervisor, Colleen Cairns (ccairns@sl.on.ca). If you have concerns about the way this research is being conducted or about your rights as a participant, you may contact the SLC-REB Chair at reb@sl.on.ca.

**Consent**
If you agree to take part in this research project, please complete the following form and return it to me as soon as possible. A copy of this signed document will be given to you for your own records. We will keep an additional copy of your consent at DSLG.
By signing this form, I agree that
✓ the study has been explained to me.
✓ All my questions were answered.
✓ Possible harm and discomforts and possible benefits to myself from this study have been explained to me.
✓ I understand that I have the right not to participate and the right to stop at any time.
✓ I am free now, and in the future, to ask any questions I have about the study.
✓ I have been told that my personal information will be kept confidential.
✓ I understand that no information that would identify me will be released or printed without asking me first.
✓ I understand that I will receive a signed copy of this consent form.

I hereby consent for me, ________________ to take part.

Participant Name (Printed)       Signature of Participant       Date

Student Name (Printed)           Signature of Student           Date
Appendix B: Verification Letter

Verification Letter

This letter is to confirm that written consent was obtained by Nicole Therrien, Behavioural Psychology student at St. Lawrence College, to implement a program. The program was approved by Developmental Services of Leeds and Grenville (DSLG) and Colleen Cairns, MSc, ABA, BCBA. The written consent explained the details of the program/intervention, including the risks and benefits of participating. The consent form was signed by the participant on Wednesday October 26, 2016. The consent form will be kept in a locked storage cabinet at DSLG, for a minimum of 10 years according to the professional standard.

____________________  ____________________  ________________
Student Name (Printed)  Student Signature  Date

____________________  ____________________  ________________
Agency Supervisor Name (Printed)  Agency Supervisor Signature  Date
Appendix C: REC-P Application Approval

Research Ethics
Board Members
James Morris-Pocock (Chair)
Jill June
Lavina Tyagi
Marie-Lise Jolin
Andrea Rustik
Marie Olmstead
Jody Soula-Marleau

October 24, 2016

Student name: Nicole Therrien
Student address: ntherrien26@student.sl.on.ca
736 Craig Road, Oxford Mills, Ontario, K0G 150

SLC REB Reference Number: 2016-REC-20TN

Project Title: Teaching Meal Preparation Skills to an Adult Male with Intellectual Disabilities and Illiteracy Using Digitized Self-Instruction (MagnusCards) and Behavioural Skills Training

Dear Nicole Therrien:

I am writing to advise you that the Research Ethics Committee – Psychology (REC-P), a subcommittee of the St. Lawrence College Research Ethics Board (SLC-REB), has granted Approval to the above-named research study. Your research may now begin.

You have one year to complete the project from the time of approval. Should you require more time to complete your project, you will be required to submit a SLC-REB Request for Renewal or Amendment Form to request an extension on your ethics approval for your project. This must be submitted prior to SLC-REB approval anniversary date.

Please review St. Lawrence College’s Policy on Research Integrity. You are obligated to keep your files up to date and inform the SLC-REB of any changes to your study. Any changes to the approved protocol or consent materials must be reviewed and approved through the amendment process prior to its implementation. Both a SLC-REB Request for Renewal or Amendment Form and a revised application must be submitted to the Research Service Office for review by the SLC-REB.

Any adverse or unanticipated events during the course of your research must be reported to the SLC-REB as soon as you become aware of them. The SLC-REB reserves the right to review your file at any time to ensure that research is being conducted in accordance with all applicable SLC Policies and the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans (TCP32, 2014).

Once your project is complete, you are required to complete a Project Termination Form. This form must be submitted as a final report about your research to the SLC-REB.

Best wishes for the successful completion of your project.

Best Regards,

Jamie Morris-Pocock
Chair, Research Ethics Board
Appendix D: Materials List

The following materials are needed for each session of baseline and intervention and should be readily available.

<table>
<thead>
<tr>
<th>Food Ingredients</th>
<th>Tools, Kitchen Utensils/Appliances</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Pizza or tomato sauce</td>
<td>❖ Can opener</td>
</tr>
<tr>
<td>❖ Vegetable oil</td>
<td>❖ Cheese grater</td>
</tr>
<tr>
<td>❖ Eggs</td>
<td>❖ Frying pan with lid</td>
</tr>
<tr>
<td>❖ Brownie mix (No Name variety)</td>
<td>❖ Large pot with lid</td>
</tr>
<tr>
<td>❖ Sausage</td>
<td>❖ Small pot with lid</td>
</tr>
<tr>
<td>❖ Chicken breasts</td>
<td>❖ Large and small mixing bowl</td>
</tr>
<tr>
<td>❖ Cream of mushroom soup</td>
<td>❖ Sharp knife</td>
</tr>
<tr>
<td>❖ Pasta</td>
<td>❖ Spatula</td>
</tr>
<tr>
<td>❖ Frozen broccoli</td>
<td>❖ Cooking spoon</td>
</tr>
<tr>
<td>❖ Frozen vegetables</td>
<td>❖ Baking sheet</td>
</tr>
<tr>
<td>❖ Parmesan cheese</td>
<td>❖ Kitchen timer</td>
</tr>
<tr>
<td>❖ Onions</td>
<td>❖ Cooking spray</td>
</tr>
<tr>
<td>❖ Whole garlic</td>
<td>❖ Oven mitts</td>
</tr>
<tr>
<td>❖ Cream of broccoli soup</td>
<td>❖ Measuring spoons</td>
</tr>
<tr>
<td>❖ Powdered milk</td>
<td>❖ Measuring cups</td>
</tr>
<tr>
<td>❖ Bagels/tortillas for mini pizza</td>
<td>❖ Scissors</td>
</tr>
<tr>
<td>❖ Block of cheese</td>
<td>❖ Cutting board</td>
</tr>
<tr>
<td>❖ Pizza topping (cold meat, pineapple, etc.)</td>
<td>❖ Baking pan</td>
</tr>
<tr>
<td>❖ Ground beef</td>
<td></td>
</tr>
<tr>
<td>❖ Can of diced tomatoes</td>
<td></td>
</tr>
<tr>
<td>❖ Can of kidney beans</td>
<td></td>
</tr>
<tr>
<td>❖ Chili seasoning mix</td>
<td></td>
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<tr>
<td>❖ Margarine</td>
<td></td>
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<tr>
<td>❖ Margarine</td>
<td></td>
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<tr>
<td>❖ Garlic powder</td>
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<tr>
<td>❖ Salt</td>
<td></td>
</tr>
<tr>
<td>❖ Onion powder</td>
<td></td>
</tr>
<tr>
<td>❖ Hamburger Helper package</td>
<td></td>
</tr>
<tr>
<td>❖ Macaroni and cheese package</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E: Recipe Task Analyses

Macaroni and Cheese
1. Washes hands before starting.
2. Take out box of macaroni and cheese, powdered milk, and margarine.
3. Take out a pot, measuring cups, measuring spoons, large spoon, strainer, oven mitts, and kitchen timer.
4. Measure 4 cups of water.
5. Pour the water into the pot.
6. Measure 2 cups of water.
7. Pour the water into the pot.
8. Put the pot on the stove.
9. Turn the temperature to the red dot (high) and wait for the water to boil.
10. When the water is boiling, pour in the macaroni.
11. Turn the temperature to the orange dot (medium).
12. Set the timer for 10 minutes.
13. Stir the pasta while it is cooking.
14. When the timer goes off, turn off the stove.
15. Put a strainer in the sink.
16. Pour the macaroni into the strainer.
17. Pour the macaroni back into the pot.
18. Put the pot back on the stove.
19. Turn temperature to low.
20. Measure 1 tablespoon of powdered milk.
21. Pour the powdered milk into the pot.
22. Measure ½ cup of water.
23. Pour the water into the pot.
24. Measure 1 tablespoon of margarine.
25. Put the margarine into the pot with the macaroni.
26. Pour the cheese mix into the pot.
27. Mix everything together until sauce is creamy.
28. Turn off stove.
Hamburger Helper (Lasagna)
1. Washes hands before starting.
2. Take out Hamburger Helper and ground beef.
3. Take out a pot with a lid, measuring cups, large spoon, and a kitchen timer.
4. Put ground beef in pot.
5. Put pot on the stove.
6. Turn temperature to between the red and orange dots (medium high).
7. Cook and stir the ground beef with the spoon until it is browned.
8. Drains extra grease with spoon into can.
9. Open and pour sauce mix into pot with ground beef.
10. Turn on hot water tap and let the water run.
11. Measure 3 ¾ cups of water.
12. Pour the water in with the ground beef.
13. Pour uncooked noodles into the pot.
15. Wait for sauce to start bubbling.
16. When the sauce is bubbling, turn the temperature down to the yellow dot (low).
17. Put the lid on the pot.
18. Set the timer for 10 minutes and let everything simmer.
19. When the timer goes off, turn off the stove.

Hamburger Helper (Cheeseburger Macaroni)
1. Washes hands before starting.
2. Take out Hamburger Helper and ground beef.
3. Take out a pot with a lid, measuring cups, large spoon, and a kitchen timer.
4. Put ground beef in pot.
5. Put pot on the stove.
6. Turn temperature to between the red and orange dots (medium high).
7. Cook and stir the ground beef with the spoon until it is browned.
8. Drains extra grease with spoon into can.
9. Open and pour sauce mix into pot with ground beef.
10. Turn on hot water tap and let the water run.
11. Measure 3 1/3 cups of water.
12. Pour the water in with the ground beef.
14. Pour powdered milk into pot.
15. Pour uncooked noodles into the pot.
17. Wait for sauce to start bubbling.
18. When the sauce is bubbling, turn the temperature down to the yellow dot (low).
19. Put the lid on the pot.
20. Set the timer for 10 minutes and let everything simmer.
21. When the timer goes off, turn off the stove.
Hamburger Helper (Beef Noodles)
1. Washes hands before starting.
2. Take out Hamburger Helper and ground beef.
3. Take out a pot with a lid, measuring cups, measuring spoons, large spoon, and a kitchen timer.
4. Put ground beef in pot.
5. Put pot on the stove.
6. Turn temperature to between the red and orange dots (medium high).
7. Cook and stir the ground beef with the spoon until it is browned.
8. Drains extra grease with spoon into can.
9. Open and pour sauce mix into pot with ground beef.
10. Turn on hot water tap and let the water run.
12. Pour the water in with the ground beef.
13. Measure 2 tablespoons of powdered milk.
14. Pour powdered milk into pot.
15. Pour uncooked noodles into the pot.
17. Wait for sauce to start bubbling.
18. When the sauce is bubbling, turn the temperature down to the yellow dot (low).
19. Put the lid on the pot.
20. Set the timer for 10 minutes and let everything simmer.
21. When the timer goes off, turn off the stove.
Garlic Chicken
1. Washes hands before starting.
2. Gets out margarine, chicken breasts, garlic powder, salt, and onion powder.
3. Takes out a frying pan, small bowl, knife, tongs, measuring spoons, oven mitts, and kitchen timer.
4. Measure 1 teaspoon of garlic powder.
5. Pour garlic powder into bowl.
6. Measure 1/2 teaspoon of onion powder.
7. Pour the onion powder into the bowl.
8. Measure 1/2 teaspoon of salt.
9. Pours salt into bowl.
10. Mix everything together.
11. Measures out 2 tablespoons of butter and places in frying pan.
12. Puts the frying pan on the stove.
13. Turn the temperature to low (yellow dot).
14. Place the chicken in the frying pan.
15. Sprinkle the seasoning on the chicken with your fingers.
16. Turn the heat to the orange dot (medium).
17. Set the timer for 10 minutes.
18. When the timer goes off, turn the chicken over using the tongs.
19. Set the timer for another 10 minutes.
20. When the timer goes off this time, cut the chicken with a knife to make sure it is cooked.
21. Turn off the stove.
Chili

1. Washes hands with warm water and soap.
2. Take out a frying pan, scissors, spatula/spoon, oven mitts, strainer, can opener, measuring spoons, and oven timer.
3. Take out ground beef, diced tomatoes, kidney beans, and chili seasoning mix.
4. Places ground beef into frying pan.
5. Puts frying pan on stove.
6. Turn temperature to between red and orange dots (Medium high).
7. Cook and stir the ground beef until it is browned.
8. Drain the extra grease into a can using your spoon.
9. Reduce the heat to the yellow dot (low).
10. Open the can of tomatoes with the can opener.
11. Pour the tomatoes into the frying pan.
12. Open the can of kidney beans with the can opener.
13. Place strainer in sink.
14. Pour the kidney beans into a strainer over the sink.
15. Rinse the beans with cold water.
16. Pour the kidney beans into the pot.
17. Measure 1/2 teaspoon of chili powder.
18. Pour the chili powder into the pot.
19. Mix everything together.
20. Turn the temperature to the orange dot (medium).
21. Set the timer for 15 minutes and let the chili simmer.
22. When the timer goes off, turn off the stove.
Easy Chicken and Pasta
1. Washes hands before starting.
2. Takes out package of chicken breasts (normally 2-3 inside), cooking oil, a can of mushroom soup, pasta, and frozen vegetables.
3. Take out a frying pan, a pot, measuring spoons, measuring cups, a sharp knife, a cutting board, oven mitts, and a kitchen timer.
4. Cut the chicken into small pieces (with fork and knife, if desired).
5. Put the chicken into the frying pan.
6. Put the frying pan on the stove.
7. Measure 1 tablespoon of cooking oil.
8. Pour oil into the frying pan.
9. Turns the temperature to between the red and orange dots (medium high).
10. Set the timer for 10 minutes.
11. Stir the chicken while it is cooking.
12. Turn off the stove when the chicken is done and set aside.
13. Set the frying pan of chicken aside.
14. Open the can of cream of mushroom soup with the can opener.
15. Pour the can of cream of mushroom soup into the pot.
16. Measure 1 1/2 cups of water.
17. Pour the water into the pot.
18. Measure 1 cup of frozen vegetables.
19. Add the frozen vegetables into the pot.
20. Measure 1 cup of pasta.
21. Pour pasta into the pot.
22. Put pot on stove.
23. Turn the temperature to the red dot (high) and bring to a boil.
24. Set the timer for 10 minutes.
25. Stir the ingredients while they cook.
26. When the timer goes off, pour the chicken into the pot.
27. Stir everything together.
28. Turn off the stove.
Mini Pizzas
1. Washes hands with warm water and soap.
2. Takes out tortilla/bagel/bread, tomato/pizza sauce, cheese, and some pizza toppings (if desired).
3. Takes a pizza pan, a spoon, a knife, a cutting board, cheese grater, oven mitts, and kitchen timer.
4. Preheat the oven to 300 degrees.
5. Cuts bagel in half with knife (if using bagel).
6. Put the pizza crust (tortilla/bagel/bread) on the pizza pan.
7. Open the jar of pizza sauce.
8. Cover the crust with pizza sauce using the spoon.
9. Cut a piece of cheese off the larger block.
10. Grate the cheese with the cheese grater.
11. Sprinkle the cheese on top of the pizza until it is covered.
12. If participant wants toppings, cuts them into small pieces (otherwise n/a).
13. Place the toppings on top of the cheese (n/a if not using toppings).
14. Open the oven door and put the pizza inside.
15. Set the timer for 10 minutes.
16. When the timer goes off, takes pizza out of oven.
17. Turn off the oven.

Brownies
1. Washes hands before starting.
2. Takes out mixing bowl, spatula or cooking spoon, measuring cups, cooking spray, oven mitts, scissors, and oven timer.
3. Takes out eggs, brownie mix, and vegetable oil.
4. Make sure nothing is already in oven.
5. Preheats oven to 300 degrees.
6. Opens brownie mix box with hands and bag with scissors.
7. Pour brownie mix into bowl.
8. Measure ¼ cup of water.
9. Pour water into the bowl.
10. Measure 2/3 cup of oil.
11. Pours oil into bowl.
12. Cracks 2 eggs and drop into the bowl.
14. Sprays pan with cooking oil.
15. Pour the brownie mix into the pan using the spatula.
16. Put the pan into the oven.
17. Set the timer for 30 minutes.
18. Take the pan out of the oven when the timer goes off.
19. Turn off the oven.
Sausage and Broccoli Skillet
1. Washes hands before starting.
2. Takes out sausage, onion, cream of broccoli soup, powdered milk, frozen broccoli (or other vegetable), and pasta.
3. Takes out a large pot, strainer, small pot, can opener, cooking spoon, sharp knife, cutting board, measuring cups, oven mitts, and kitchen timer.
4. Pour 3 cups of water into the pot.
5. Place the small pot on the stove.
6. Turn the temperature to high and bring the water to a boil.
7. While waiting for water to boil, measures 1 cup of pasta.
8. If still waiting for water to boil, start cutting sausage into small pieces.
9. If water not boiled yet, peel the onion.
10. While still waiting for water, cut onion into small pieces.
11. After water has boiled, pour pasta into the small bowl.
12. Let the water come to a boil again.
13. Set the timer for 12 minutes when water is boiling.
14. Turn down temperature to the orange dot (6/medium).
15. Stir the pasta while it is cooking.
16. Put sausage into large pot.
17. Put onion into large pot.
18. When the timer goes off, turn off the stove.
19. Put the strainer into the sink.
20. Pour the pasta into the strainer.
21. Rinse the pasta with cold water.
22. Pour the noodles back into the small pot.
23. Set noodles aside.
24. Put large pot on element.
25. Turn temperature to between the red and orange dots (medium high).
26. Cook the sausage and onion until the sausage is brown.
27. Turn down temperature to the yellow dot (low).
28. Measure 1 cup of frozen broccoli.
29. When sausage is fully cooked, pour the frozen broccoli (or other vegetable) into the large pot.
30. Open the can of cream of broccoli soup with the can opener.
31. Pour the broccoli soup into the large pot.
32. Measure 1/4 cup of cold water.
33. Measure 1 tablespoon of powdered milk.
34. Pour 1 tablespoon of powdered milk into the water.
35. Stir the powdered milk and water together.
36. Pour the milk into the large pot.
37. Measure 1/4 cup of parmesan cheese.
38. Pour the parmesan cheese into the large pot.
39. Stir everything together.
40. Put the lid on the large pot.
41. Set the timer for 5 minutes.
42. When the timer goes off, turn off the stove.
43. Pour pasta in with the meat and vegetables in the large pot.
44. Stir everything together.
Appendix F: IOA Sheet Examples

(Brownies as Example)

<table>
<thead>
<tr>
<th>Step Description</th>
<th>Observer 1</th>
<th>Observer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Washes hands before starting.</td>
<td></td>
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<tr>
<td>2. Takes out mixing bowl, spatula or cooking spoon, measuring cups, cooking spray, oven mitts, scissors, and oven timer.</td>
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<tr>
<td>3. Takes out eggs, brownie mix, and vegetable oil.</td>
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<tr>
<td>4. Preheats oven to 300 degrees.</td>
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<tr>
<td>5. Opens brownie mix box with hands and bag with scissors.</td>
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<tr>
<td>6. Pour brownie mix into bowl.</td>
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<tr>
<td>7. Measure ¼ cup of water.</td>
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<tr>
<td>8. Pour water into the bowl.</td>
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<tr>
<td>9. Measure 2/3 cup of oil.</td>
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<tr>
<td>10. Pours oil into bowl.</td>
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<tr>
<td>11. Cracks 2 eggs and drop into the bowl.</td>
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<td></td>
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<tr>
<td>12. Mixes everything together with spatula.</td>
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<tr>
<td>13. Sprays pan with cooking oil.</td>
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<tr>
<td>14. Pour the brownie mix into the pan using the spatula.</td>
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<tr>
<td>15. Put the pan into the oven.</td>
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<tr>
<td>16. Set the timer for 30 minutes.</td>
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<tr>
<td>17. Take the pan out of the oven when the timer goes off.</td>
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<tr>
<td>18. Turn off the oven.</td>
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Appendix G: MagnusCards© Recipe Instructions

Macaroni and Cheese

Figure G1: Title card of part one for macaroni and cheese instructions.

Figure G2: Step one of part one for macaroni and cheese instructions.

Figure G3: Step two of part one for macaroni and cheese instructions.

Figure G4: Step three of part one for macaroni and cheese instructions.
Figure G5: Step four of part one for the macaroni and cheese instructions.

Measure 4 cups of water.

Figure G6: Step five of part one for the macaroni and cheese instructions.

Pour the water into the pot.

Measure 2 cups of water.

Figure G7: Step six of part one for the macaroni and cheese instructions.

Figure G8: Step seven of part one for the macaroni and cheese instructions.
Put the pot on the stove.

Figure G9: Step eight of part one for the macaroni and cheese instructions.

Turn the temperature to the red dot (high) and wait for the water to boil.

Figure G10: Step nine of part one for the macaroni and cheese instructions.

Go to part 2 of the recipe.

Figure G11: Step ten of part one for the macaroni and cheese instructions.

You did really well on the first part of the recipe. Let's keep going.

Figure G12: Title card of part two for the macaroni and cheese instructions.
Figure G13: Step one of part two for the macaroni and cheese instructions.

When the water is boiling, pour in the macaroni.

Figure G14: Step two of part two for the macaroni and cheese instructions.

Turn the temperature to the orange dot (medium).

Figure G15: Step three of part two for the macaroni and cheese instructions.

Set the timer for 10 minutes.

Figure G16: Step four of part two for the macaroni and cheese instructions.

Stir the macaroni while it is cooking.
When the timer goes off, turn off the stove.

Figure G17: Step five of part two for the macaroni and cheese instructions.

Put the strainer in the sink.

Figure G18: Step six of part two for the macaroni and cheese instructions.

Wearing your oven mitts, pour the macaroni into the strainer.

Figure G19: Step seven of part two for the macaroni and cheese instructions.

Put the macaroni back into the pot.

Figure G20: Step eight of part two for the macaroni and cheese instructions.
Figure G21: Step nine of part two for the macaroni and cheese instructions.

Figure G22: Step ten of part two for the macaroni and cheese instructions.

Figure G23: Title card of part three for the macaroni and cheese instructions.

Figure G24: Step one of part three for the macaroni and cheese instructions.
Figure G25: Step two of part three for the macaroni and cheese instructions.

Measure 1 tablespoon of powdered milk.

Figure G26: Step three of part three for the macaroni and cheese instructions.

Put the powdered milk into the pot with the macaroni.

Figure G27: Step four of part three for the macaroni and cheese instructions.

Measure 1/3 cup of water.

Figure G28: Step five of part three for the macaroni and cheese instructions.

Pour the water into the pot.
Figure G29: Step six of part three for the macaroni and cheese instructions.

Figure G30: Step seven of part three for the macaroni and cheese instructions.

Figure G31: Step eight of part three for the macaroni and cheese instructions.

Figure G32: Step nine of part three for the macaroni and cheese instructions.

Figure G33: Step ten of part three for the macaroni and cheese instructions.
Brownies

Figure G34: Title card of part one for the brownies instructions.

Figure G35: Step one of part one for the brownies instructions.

Figure G36: Step two of part one for the brownies instructions.

Figure G37: Step three of part one for the brownies instructions.
TEACHING MEAL PREPARATION SKILLS

Figure G38: Step four of part one for the brownies instructions.

Figure G39: Step five of part one for the brownies instructions.

Figure G40: Step six of part one for the brownies instructions.

Figure G41: Step seven of part one for the brownies instructions.
Measure two thirds cup of vegetable oil.

Figure G42: Step eight of part one for the brownies instructions.

Pour the vegetable oil into the mixing bowl.

Figure G43: Step nine of part one for the brownies instructions.

Go to part 2 of the recipe.

Figure G44: Step ten of part one for the brownies instructions.

You have just finished part 1 of the recipe.

Figure G45: Title card of part two for the brownies instructions.
Figure G46: Step one of part two for the brownies instructions.

Crack 2 eggs and drop them in the bowl.

Figure G47: Step two of part two for the brownies instructions.

Mix everything together with the spatula.

Figure G48: Step three of part two for the brownies instructions.

Grease the baking pan with the cooking spray or oil.

Figure G49: Step four of part two for the brownies instructions.

Pour the brownie batter into the baking pan with the spatula.
Figure G50: Step five of part two for the brownies instructions.

Figure G51: Step six of part two for the brownies instructions.

Figure G52: Step seven of part two for the brownies instructions.

Figure G53: Step seven of part two for the brownies instructions.
Chicken and Pasta

Figure G54: Title card for part one of chicken and pasta recipe.

Figure G55: Step one for part one of chicken and pasta recipe.

Figure G56: Step two for part one of chicken and pasta recipe.

Figure G57: Step three for part one of chicken and pasta recipe.
Cut the chicken into small pieces. You can use a fork if you don’t like to touch raw meat.

Figure G58: Step four for part one of chicken and pasta recipe.

Put the frying pan on the stove.

Figure G60: Step six for part one of chicken and pasta recipe.

Put the chicken into the frying pan.

Figure G59: Step five for part one of chicken and pasta recipe.

Measure 1 tablespoon of vegetable oil.

Figure G61: Step seven for part one of chicken and pasta recipe.
Figure G62: Step eight for part one of chicken and pasta recipe.

Pour the oil into the frying pan.

Figure G63: Step nine for part one of chicken and pasta recipe.

Turn the temperature to between the red and orange dots (medium high).

Figure G64: Step 10 for part one of chicken and pasta recipe.

Go to part 2 of the recipe.

Figure G65: Title card for part two of chicken and pasta recipe.

You did really well on part 1. Let’s keep going.
Figure G66: Step two for part two of chicken and pasta recipe.

Open the can of cream of mushroom soup with the can opener.

Figure G67: Step three for part two of chicken and pasta recipe.

Pour the can of cream of mushroom soup into a pot.

Figure G68: Step three for part two of chicken and pasta recipe.

Figure G69: Step four for part two of chicken and pasta recipe.
Figure G70: Step five for part two of chicken and pasta recipe.

Figure G71: Step six for part two of chicken and pasta recipe.

Figure G72: Step seven for part two of chicken and pasta recipe.

Figure G74: Step eight for part two of chicken and pasta recipe.
Figure G75: Step nine for part two of chicken and pasta recipe.

Figure G76: Step ten for part two of chicken and pasta recipe.

Figure G77: Title card for part three of chicken and pasta recipe.

Figure G78: Step one for part three of chicken and pasta recipe.
Figure G79: Step two for part three of chicken and pasta recipe.

Pour the pasta into the pot.

Figure G80: Step three for part three of chicken and pasta recipe.

Put the pot on the stove.

Figure G81: Step four for part three of chicken and pasta recipe.

Turn the temperature to the red dot (high) and bring to a boil.

Figure G82: Step five for part three of chicken and pasta recipe.

When the soup is boiling, turn the temperature down to between the red and orange dots (medium high).
Figure G83: Step six for part three of chicken and pasta recipe.

Figure G84: Step seven for part three of chicken and pasta recipe.

Figure G85: Step eight for part three of chicken and pasta recipe.

Figure G86: Step nine for part three of chicken and pasta recipe.
TEACHING MEAL PREPARATION SKILLS

Chili

Figure G88: Title card for part one of chili recipe.

Today, you are going to make chili.

Figure G89: Step one for part one of chili recipe.

First, you need to wash your hands with warm water and soap.

Figure G90: Step two for part one of chili recipe.

Take out a pot, cooking spoon, strainer, oven mitts, can opener, measuring spoons, and kitchen timer.

Figure G87: Step ten for part three of chicken and pasta recipe.

Turn off the stove.

Figure G89: Step one for part one of chili recipe.
Figure G91: Step three for part one of chili recipe.

Take out ground beef, a can of diced tomatoes, a can of kidney beans, and chilli powder.

Figure G92: Step four for part one of chili recipe.

Put the ground beef into the pot.

Figure G93: Step five for part one of chili recipe.

Put the pot on the stove.

Figure G94: Step six for part one of chili recipe.

Turn the temperature to between the red and orange dots (medium high).
Figure G95: Step seven for part one of chili recipe.

Figure G96: Step eight for part one of chili recipe.

Figure G97: Title card for part two of chili recipe.

Figure G98: Step one for part two of chili recipe.
Reduce the heat to the yellow dot (low).

Pour the tomatoes into the pot.

Open the can of tomatoes with the can opener.

Open the can of kidney beans with the can opener.
Figure G102: Step six for part two of chili recipe.

Put a strainer in the sink.

Figure G103: Step seven for part two of chili recipe.

Pour the kidney beans into the strainer.

Figure G104: Step eight for part two of chili recipe.

Rinse the beans with cold water.

Figure G105: Step nine for part two of chili recipe.

Go to part 3 of this recipe.
Figure G106: Title card for part three of chili recipe.

Figure G107: Step one for part three of chili recipe.

Figure G108: Step two for part three of chili recipe.

Figure G109: Step three for part three of chili recipe.
Figure G110: Step four for part three of chili recipe.

Figure G111: Step five for part three of chili recipe.

Figure G112: Step six for part three of chili recipe.

Figure G113: Step seven for part three of chili recipe.
Garlic Chicken

Today, you are going to make garlic chicken.

Figure G114: Title card for part one of garlic chicken recipe.

You will need margarine, chicken breasts, garlic powder, salt, and onion powder.

Figure G116: Step two for part one of garlic chicken recipe.

First, you need to wash your hands with warm water and soap.

Figure G115: Step one for part one of garlic chicken recipe.

You also need to take out a frying pan, small bowl, knife, tongs, measuring spoons, oven mitts and kitchen timer.

Figure G117: Step three for part one of garlic chicken recipe.
Figure G118: Step four for part one of garlic chicken recipe.

Measure 1 teaspoon of garlic powder.

Figure G119: Step five for part one of garlic chicken recipe.

Pour the garlic powder into the bowl.

Figure G120: Step six for part one of garlic chicken recipe.

Measure one half teaspoon of onion powder.

Figure G121: Step seven for part one of garlic chicken recipe.

Pour the onion powder into the bowl.

You have just finished part 1. Way to go! Let’s get started on part 2.
Figure G122: Step eight for part one of garlic chicken recipe.

Figure G123: Title card for part two of garlic chicken recipe.

Figure G124: Step one for part two of garlic chicken recipe.

Figure G125: Step two for part two of garlic chicken recipe.

Figure G126: Step three for part two of garlic chicken recipe.

Figure G127: Step four for part two of garlic chicken recipe.
Figure G128: Step five for part two of garlic chicken recipe.

Figure G129: Step six for part two of garlic chicken recipe.

Figure G130: Step seven for part two of garlic chicken recipe.

Figure G131: Step eight for part two of garlic chicken recipe.
Figure G132: Title card for part three of the garlic chicken recipe.

Figure G133: Step one for part three of the garlic chicken recipe.
Figure G134: Step two for part three of the garlic chicken recipe.

Sprinkle the seasoning on top of the chicken with your fingers.

Figure G135: Step three for part three of the garlic chicken recipe.

Turn the temperature to the orange dot (medium).

Figure G136: Step four for part three of the garlic chicken recipe.

Set the timer for 10 minutes.

Figure G137: Step five for part three of the garlic chicken recipe.

When the timer goes off, turn the chicken over using the tongs.

Figure G138: Step six for part three of the garlic chicken recipe.

Set the timer for another 10 minutes.

Figure G139: Step seven for part three of the garlic chicken recipe.

When the timer goes off this time, cut the chicken with a knife to make sure it is cooked.
Figure G138: Step six for part three of the garlic chicken recipe.

Figure G139: Step seven for part three of the garlic chicken recipe.

Hamburger Helper (Cheeseburger)

Figure G140: Step eight for part three of the garlic chicken recipe.

Figure G141: Title card for part one of the cheeseburger hamburger helper recipe.
Figure G142: Step three for part one of the cheeseburger hamburger helper recipe.

First, you need to wash your hands with warm water and soap.

Figure G143: Step two for part one of the cheeseburger hamburger helper recipe.

Now, you need to take out the package of hamburger helper, ground beef, and powdered milk.

Figure G144: Step three for part one of the cheeseburger hamburger helper recipe.

Take out a pot with a lid, measuring cups, a large spoon, oven mitts, and a kitchen timer.

Figure G145: Step four for part one of the cheeseburger hamburger helper recipe.

Put ground beef in the pot.
Put the pot on the stove.

Figure G145: Step five for part one of the cheeseburger hamburger helper recipe.

Turn the temperature to between the red and orange dots (medium high).

Figure G145: Step six for part one of the cheeseburger hamburger helper recipe.

Cook and stir the ground beef until it is browned.

Figure G146: Step seven for part one of the cheeseburger hamburger helper recipe.

Drain the extra grease into a can with a spoon.

Figure G147: Step eight for part one of the cheeseburger hamburger helper recipe.
Figure 148: Step nine of part one of cheeseburger hamburger helper recipe.

Figure G149: Step ten for part one of the cheeseburger hamburger helper recipe.

Figure G150: Step five for part one of the cheeseburger hamburger helper recipe.
Figure G151: Step one of part two for the cheeseburger hamburger helper recipe.

Figure G152: Step two of part two for the cheeseburger hamburger helper recipe.
Figure G153: Step three of part two for the cheeseburger hamburger helper recipe.  
Measure three and one quarter cups of water.

Figure G154: Step four of part two for the cheeseburger hamburger helper recipe.  
Pour the water in with the ground beef.

Figure G155: Step five of part two for the cheeseburger hamburger helper recipe.  
Measure two thirds of a cup of powdered milk.

Figure G156: Title card of part three for the cheeseburger hamburger helper recipe.  
Go to part 3 of the recipe.

Figure G154: Step six of part two for the cheeseburger hamburger helper recipe.  
Pour the powdered milk into the pot.

Figure G155: Step seven of part two for the cheeseburger hamburger helper recipe.  
Way to go! Let's finish the recipe.
Figure G157: Step one of part three for the cheeseburger hamburger helper recipe.

Pour the uncooked noodles into the pot.

Figure G158: Step two of part three for the cheeseburger hamburger helper recipe.

Stir everything together.

Figure G159: Step three of part three for the cheeseburger hamburger helper recipe.

Turn the temperature to between the red and orange dots (medium high).

Figure G160: Step four of part three for the cheeseburger hamburger helper recipe.

Wait for the sauce to start bubbling.
When the sauce is bubbling, turn the temperature down to the yellow dot (low)

Figure G161: Step five of part three for the cheeseburger hamburger helper recipe.

Put the lid on the pot.

Figure G162: Step six of part three for the cheeseburger hamburger helper recipe.

Set the timer for 10 minutes and let everything simmer.

Figure G163: Step seven of part three for the cheeseburger hamburger helper recipe.

When the timer goes off, turn off the stove.

Figure G164: Step eight of part three for the cheeseburger hamburger helper recipe.
Hamburger Helper (Lasagna)

Figure G165: Title card of part one for the lasagna hamburger helper recipe.

Figure G166: Step one of part one for the lasagna hamburger helper recipe.

Figure G167: Step two of part one for the lasagna hamburger helper recipe.

Figure G168: Step three of part one for the lasagna hamburger helper recipe.
Figure G169: Step four of part one for the lasagna hamburger helper recipe.

Put the ground beef in the pot.

Figure G170: Step five of part one for the lasagna hamburger helper recipe.

Put the pot on the stove.

Figure G171: Step six of part one for the lasagna hamburger helper recipe.

Turn the temperature to between the red and orange dots (medium high).

Figure G172: Step seven of part one for the lasagna hamburger helper recipe.

Cock and stir the ground beef until it is browned.
Drain the extra grease with a spoon into a can.

Figure G173: Step eight of part one for the lasagna hamburger helper recipe.

Open and pour the sauce mix into the pot with the ground beef.

Figure G174: Step nine of part one for the lasagna hamburger helper recipe.

Go to part 2 of the recipe.

Figure G175: Step ten of part one for the lasagna hamburger helper recipe.

You have just finished part 1. Let's finish making Hamburger Helper.

Figure G176: Title card of part two for the lasagna hamburger helper recipe.
Turn on hot water tap and let the water run.

Figure G177: Step one of part two for the lasagna hamburger helper recipe.

Pour the hot water in with the ground beef.

Figure G179: Step three of part two for the lasagna hamburger helper recipe.

Measure three and three quarter cups of hot water.

Figure G178: Step two of part two for the lasagna hamburger helper recipe.

Pour the uncooked noodles into the pot.

Figure G180: Step four of part two for the lasagna hamburger helper recipe.
Figure G181: Step five of part two for the lasagna hamburger helper recipe.

Stir everything together.

Figure G182: Step six of part two for the lasagna hamburger helper recipe.

Wait for sauce to start bubbling.

Figure G183: Step seven of part two for the lasagna hamburger helper recipe.

When the sauce is bubbling, turn the temperature down to the yellow dot (low).

Put the lid on the pot.

Figure G183: Step eight of part two for the lasagna hamburger helper recipe.
Figure G184: Step nine of part two for the lasagna hamburger helper recipe.

Mini Pizzas

Figure G186: Title card of part one for the mini pizza recipe.

Figure G187: Step one of part one for the mini pizza recipe.
Figure G188: Step two of part one for the mini pizza recipe.

Take out a tortilla or bagel, pizza sauce, cheese, and some pizza toppings.

Figure G189: Step three of part one for the mini pizza recipe.

You also need a pizza pan, a spoon, a knife, a cutting board, cheese grater, oven mitts, and kitchen timer.

Figure G190: Step four of part one for the mini pizza recipe.

Preheat the oven to 300 degrees.

Figure G191: Step five of part one for the mini pizza recipe.

If you are using a bagel, cut it in half with a knife.
Figure G192: Step six of part one for the mini pizza recipe.

Figure G193: Step eight of part one for the mini pizza recipe.

Figure G194: Step nine of part one for the mini pizza recipe.
Figure G195: Title card of part two for the mini pizza recipe.

Figure G196: Step one of part two for the mini pizza recipe.

Figure G197: Step two of part two for the mini pizza recipe.

Figure G198: Step three of part two for the mini pizza recipe.
If you want toppings, cut them into small pieces.

Figure G199: Step four of part two for the mini pizza recipe.

Open the oven door and put the pizza inside.

Figure G201: Step six of part two for the mini pizza recipe.

Place the toppings on top of the cheese.

Figure G200: Step five of part two for the mini pizza recipe.

Set the timer for 10 minutes.

Figure G202: Step seven of part two for the mini pizza recipe.
TEACHING MEAL PREPARATION SKILLS

Figure G203: Step eight of part two for the mini pizza recipe.

Sausage and Broccoli Skillet

Figure G205: Title card of part one for the sausage and broccoli recipe.

Figure G204: Step nine of part two for the mini pizza recipe.

Figure G206: Step one of part one for the sausage and broccoli recipe.
Figure G207: Step two of part one for the sausage and broccoli recipe.

Take out a package of sausages, 1 onion, 1 can of cream of broccoli soup, milk, parmesan cheese, 1 bag of frozen broccoli, and pasta.

Figure G208: Step three of part one for the sausage and broccoli recipe.

Take out a large pot, a strainer, a frying pan with a lid, can opener, cooking spoon, sharp knife, cutting board, measuring cups, oven mitts, and a kitchen timer.

Figure G209: Step four of part one for the sausage and broccoli recipe.

Measure 3 cups of water.

Figure G210: Step five of part one for the sausage and broccoli recipe.

Pour the water into the pot.
Figure G211: Step six of part one for the sausage and broccoli recipe.

Put the pot on the stove.

Figure G212: Step seven of part one for the sausage and broccoli recipe.

Turn the temperature to the red dot (high) and bring water to a boil.

Figure G213: Step eight of part one for the sausage and broccoli recipe.

While waiting for water to boil, measure 1 cup of pasta.

Figure G214: Step nine of part one for the sausage and broccoli recipe.

While waiting for water to boil, start cutting the sausage into small pieces.
TEACHING MEAL PREPARATION SKILLS

Figure G215: Step ten of part one for the sausage and broccoli recipe.

Figure G216: Title card of part two for the sausage and broccoli recipe.

Figure G217: Step one of part two for the sausage and broccoli recipe.

Figure G218: Step two of part two for the sausage and broccoli recipe.

Go to part 2 of the recipe.

Let's start on part 2 of the sausage and broccoli recipe.

When the water is boiling, pour in the pasta.

Set the timer for 12 minutes.

Figure G217: Step one of part two for the sausage and broccoli recipe.

Figure G218: Step two of part two for the sausage and broccoli recipe.
Figure G219: Step three of part two for the sausage and broccoli recipe.

Turn down the temperature to the orange dot (medium).

Figure G220: Step four of part two for the sausage and broccoli recipe.

Stir the pasta while it is cooking.

Figure G221: Step five of part two for the sausage and broccoli recipe.

When the timer goes off, turn off the stove.

Figure G222: Step six of part two for the sausage and broccoli recipe.

Put the strainer into the sink.
Figure G223: Step seven of part two for the sausage and broccoli recipe.

Wearing your oven mitts, pour the pasta into the strainer.

Figure G224: Step nine of part two for the sausage and broccoli recipe.

Pour the pasta back into the pot.

Figure G225: Step ten of part two for the sausage and broccoli recipe.

Go to part 3 of the recipe.

Figure G223: Step eight of part two for the sausage and broccoli recipe.

Rinse the pasta with cold water.
Figure G226: Title card of part three for the sausage and broccoli recipe.

Figure G227: Step one of part three for the sausage and broccoli recipe.

Figure G228: Step two of part three for the sausage and broccoli recipe.

Figure G229: Step three of part three for the sausage and broccoli recipe.
Figure G230: Step four of part three for the sausage and broccoli recipe.

Put the onion into the frying pan.

Figure G231: Step five of part three for the sausage and broccoli recipe.

Put the frying pan with sausage and onion on the stove.

Figure G232: Step six of part three for the sausage and broccoli recipe.

Turn the temperature to between the red and orange dots (medium high).

Figure G233: Step seven of part three for the sausage and broccoli recipe.

Cook and stir the sausage and onion until the sausage is brown.
Rinse the pasta with cold water.

Figure G234: Step eight of part three for the sausage and broccoli recipe.

Pour the pasta back into the pot.

Figure G235: Step nine of part three for the sausage and broccoli recipe.

Go to part 4 of the recipe.

Figure G236: Step ten of part three for the sausage and broccoli recipe.

This is the last part of the recipe. You are doing really well.

Figure G237: Title card of part four for the sausage and broccoli recipe.
Pour the frozen broccoli in with the sausage and onions.

Figure G238: Step one of part four for the sausage and broccoli recipe.

Open the can of cream of broccoli soup with the can opener.

Figure G239: Step two of part four for the sausage and broccoli recipe.

Pour the soup into the frying pan.

Figure G240: Step three of part four for the sausage and broccoli recipe.

Measure 1/2 cup of cold water or liquid milk.

Figure G241: Step four of part four for the sausage and broccoli recipe.
Figure G242: Step five of part four for the sausage and broccoli recipe.

Figure G243: Step six of part four for the sausage and broccoli recipe.

Figure G244: Step seven of part four for the sausage and broccoli recipe.

Figure G245: Step eight of part four for the sausage and broccoli recipe.
Measure 1/3 cup of Parmesan cheese.

Figure G246: Step nine of part four for the sausage and broccoli recipe.

Go to part 5 of the recipe.

Figure G247: Step ten of part four for the sausage and broccoli recipe.
Figure G248: Title card of part five for the sausage and broccoli recipe.

Figure G249: Step one of part five for the sausage and broccoli recipe.

Figure G250: Step two of part five for the sausage and broccoli recipe.

Figure G251: Step three of part five for the sausage and broccoli recipe.
Figure G252: Step four of part five for the sausage and broccoli recipe.

Set the timer for 5 minutes.

Figure G253: Step five of part five for the sausage and broccoli recipe.

When the timer goes off, turn off the stove.

Figure G254: Step one of part five for the sausage and broccoli recipe.

Pour the meat and vegetables in with the pasta.

Figure G255: Step one of part five for the sausage and broccoli recipe.

Stir meat and vegetables with pasta.
Appendix H: Original Recipe Instructions

Figure H1: Recipe instructions for macaroni and cheese used to create Card Decks.
Figure H2: Recipe instructions for brownies used to create Card Decks.
**Thirty Minute Chili**

*Recipe By: Jen*

“This is a great recipe for a quick four ingredient chili for those cold nights when the kids have hockey or any sport and you have to run around! Of course, adding cheese and onions if you have time will enhance this meal, as will saltine crackers. Enjoy!”

**Ingredients**

- 1 pound ground beef
- 1 (15 ounce) can kidney beans, drained
- 1 (14.5 ounce) can canned diced tomatoes
- 1 (1.25 ounce) package chili seasoning mix

**Directions**

1. Crumble the beef into a large skillet over medium-high heat. Cook and stir until evenly browned. Drain off grease, and mix in the tomatoes, kidney beans and chili seasoning mix. Reduce heat to medium, and simmer for 15 minutes.

**A Good Easy Garlic Chicken**

*Recipe By: Julia Green*

“Sprinkle chicken breasts with garlic powder, onion powder and seasoning salt - then sautee and enjoy. Couldn’t be easier! Great recipe for quick and easy meal, even for the pickiest eater!”

**Ingredients**

- 3 tablespoons butter
- 4 skinless, boneless chicken breast halves
- 2 teaspoons garlic powder
- 1 teaspoon seasoning salt
- 1 teaspoon onion powder

**Directions**

1. Melt butter in a large skillet over medium high heat. Add chicken and sprinkle with garlic powder, seasoning salt and onion powder. Sauté about 10 to 15 minutes on each side, or until chicken is cooked through and juices run clear.
Figure H5: Sausage and broccoli recipe used to create Card Decks (page 1)
Figure H6: Sausage and broccoli recipe used to create Card Decks (page 2).
Figure H7: Chicken and pasta recipe used to create Card Decks.
Figure H8: Beef noodle hamburger helper recipe used to create Card Decks.
Figure H9: Cheeseburger macaroni hamburger helper recipe used to create Card Decks.
Appendix I: Consent Form to Use MagnusCards©

September 23, 2016

Nadia Hamilton
MagnusMode
181 King Street South
Waterloo, Ontario N2J 1P7

Dear Nadia:

I am in the process of creating/researching a research project, also known as an applied thesis. I would like your permission to use the MagnusCards app in this project as follows:

As part of my applied thesis, I am teaching activities of daily living, specifically meal preparation to an individual with an intellectual disability. The purpose of this study is to determine if MagnusCards will be an effective tool that will allow the participant to gain independence in meal preparation skills.

MagnusCards will be used to teach the participant to make several different meals from a menu that I will be creating with the participant and the primary support worker. The application will be used to break down the steps of meals being prepared into discrete steps for the individual to follow. It will be available to me, the participant, and the primary support worker. As well, parts of what is created using this application may in future be presented as part of a conference, poster gala, and research paper.

Your permission confirms that you hold the right to grant the permission requested here. Permission includes non-exclusive rights to use the material and will not limit any future publications—including future editions and revisions—by you or others authorized by you.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached at: Ntherrien26@student.sl.on.ca or 613-853-4149

A duplicate copy of this request has been provided for your records. If you agree with the terms as described above, please sign the release form below and send one copy electronically with your signature.

Sincerely,

Nicole Therrien
Permission granted for the use of the material as described above:

Agreed to: Nadia Hamilton
Name & Title: Founder & CEO

Company/Affiliation: Magnusmode
Date: 03 Oct 2016
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### Appendix K: Raw Data Sheets of Recipe Steps Performed Independently

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<td>Washes hands before starting.</td>
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<tr>
<td>2</td>
<td>Take out Hamburger Helper and ground beef.</td>
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<td>3</td>
<td>Take out a pot with a lid, measuring cups, large spoon, kettle/extra pot, and a kitchen timer.</td>
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<td>4</td>
<td>Put ground beef in pot.</td>
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<td>5</td>
<td>Put pot on the stove.</td>
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<tr>
<td>6</td>
<td>Turn temperature to between the red and orange dots (medium high).</td>
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<tr>
<td>7</td>
<td>Cook and stir the ground beef with the spoon until it is browned.</td>
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<td>8</td>
<td>Drains extra grease with spoon into can.</td>
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<td>Open and pour the sauce mix into the pot.</td>
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<td>Turn on hot water tap and let water run.</td>
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<td>Measure 3/4 cups of water</td>
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<td>Pour the water in with the ground beef.</td>
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<td>Pour uncooked noodles into the pot.</td>
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<td>Stir everything together.</td>
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<td>Wait for the sauce to start bubbling</td>
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<td>Put the lid on the pot.</td>
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<td>Take out a pot with a lid, measuring cups, measuring spoons, large spoon, kettle/extra pot, and a kitchen timer.</td>
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<td>Put ground beef in pot.</td>
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<td>5</td>
<td>Put pot on the stove.</td>
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<td>6</td>
<td>Turn temperature to between the red and orange dots (medium high).</td>
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<td>Cook and stir the ground beef with the spoon until it is browned.</td>
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<td>Drains extra grease with spoon into can.</td>
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<td>Open and pour the sauce mix into the pot.</td>
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<td>10</td>
<td>Turn on hot water tap and let water run.</td>
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<td>11</td>
<td>Measure 3/4 cups of water</td>
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<td>Pour the water in with the ground beef.</td>
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<td>Measure 2 tablespoons of powdered milk.</td>
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<td>Pour uncooked noodles into the pot.</td>
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<td>Stir everything together.</td>
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<td>When the sauce is bubbling, turn the temperature to the yellow dot (low).</td>
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<td>19</td>
<td>Put the lid on the pot.</td>
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**Number of Independent Steps**

6

**Percentage of Independent Steps**

28.57%
### Description (Cheeseburger Macaroni)

1. Washes hands before starting.
2. Take out Hamburger Helper, powdered milk, and ground beef.
3. Take out a pot with a lid, measuring cups, measuring spoons, large spoon, kettle/extra pot, and a kitchen timer.
4. Put ground beef in pot.
5. Put pot on the stove.
6. Turn temperature to between the red and orange dots (medium high).
7. Cook and stir the ground beef with the spoon until it is browned.
8. Drains extra grease with spoon into can.
9. Open and pour the sauce mix into the pot.
10. Turn on hot water tap and let water run.
12. Pour the water in with the ground beef.
13. Measure 2/3 cup of powdered milk.
14. Pour powdered milk into the pot.
15. Pour uncooked noodles into the pot.
17. Wait for sauce to start bubbling.
18. When the sauce is bubbling, turn the temperature to the yellow dot (low).
19. Put the lid on the pot.
20. Set the timer for 10 minutes and let everything simmer.
21. When the timer goes off, turn off the stove.

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<td>3. Take out a pot, measuring cups, measuring spoons, large spoon, strainer, and kitchen timer.</td>
<td>0</td>
</tr>
<tr>
<td>4. Measure 4 cups of water.</td>
<td>0</td>
</tr>
<tr>
<td>5. Pour the water into the pot.</td>
<td>0</td>
</tr>
<tr>
<td>6. Measure 2 cups of water.</td>
<td>0</td>
</tr>
<tr>
<td>7. Pour the water into the pot.</td>
<td>1</td>
</tr>
<tr>
<td>8. Put the pot on the stove.</td>
<td>1</td>
</tr>
<tr>
<td>9. Turn the temperature to the red dot (high) and wait for the water to boil.</td>
<td>1</td>
</tr>
<tr>
<td>10. When the water is boiling, pour in the macaroni.</td>
<td>0</td>
</tr>
<tr>
<td>11. Turn the temperature to the orange dot (medium).</td>
<td>1</td>
</tr>
<tr>
<td>12. Set the timer for 10 minutes.</td>
<td>1</td>
</tr>
<tr>
<td>13. Stir the pasta while it is cooking.</td>
<td>0</td>
</tr>
<tr>
<td>14. When the timer goes off, turn off the stove.</td>
<td>1</td>
</tr>
<tr>
<td>15. Put a strainer in the sink.</td>
<td>1</td>
</tr>
<tr>
<td>16. Pour the macaroni into the strainer.</td>
<td>0</td>
</tr>
<tr>
<td>17. Pour the macaroni back into the pot.</td>
<td>0</td>
</tr>
<tr>
<td>18. Put the pot back on the stove.</td>
<td>1</td>
</tr>
<tr>
<td>19. Turn temperature to low.</td>
<td>1</td>
</tr>
<tr>
<td>20. Measure 1 tablespoon of powdered milk.</td>
<td>0</td>
</tr>
<tr>
<td>21. Put the powdered milk into the pot with the macaroni.</td>
<td>1</td>
</tr>
<tr>
<td>22. Measure 1/3 cup of water.</td>
<td>0</td>
</tr>
<tr>
<td>23. Pour the water into the pot.</td>
<td>1</td>
</tr>
<tr>
<td>24. Measure 1 tablespoon of margarine.</td>
<td>0</td>
</tr>
<tr>
<td>25. Pour the margarine into the pot.</td>
<td>0</td>
</tr>
<tr>
<td>26. Pour the cheese mix into the pot.</td>
<td>1</td>
</tr>
<tr>
<td>27. Mix everything together until sauce is creamy.</td>
<td>1</td>
</tr>
<tr>
<td>28. Turn off stove.</td>
<td>1</td>
</tr>
<tr>
<td>Number of Independent Steps</td>
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<tr>
<td>Percentage of Independent Steps</td>
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<tr>
<td>Inter-observer Reliability</td>
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</tr>
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<td>Step</td>
<td>Description</td>
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<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Washes hands before starting.</td>
</tr>
<tr>
<td>2</td>
<td>Take out box of macaroni and cheese, powdered milk, and margarine.</td>
</tr>
<tr>
<td>3</td>
<td>Take out a pot, measuring cups, measuring spoons, large spoon, strainer, and kitchen timer.</td>
</tr>
<tr>
<td>4</td>
<td>Measure 4 cups of water.</td>
</tr>
<tr>
<td>5</td>
<td>Pour the water into the pot.</td>
</tr>
<tr>
<td>6</td>
<td>measure 2 cups of water.</td>
</tr>
<tr>
<td>7</td>
<td>Pour the water into the pot.</td>
</tr>
<tr>
<td>8</td>
<td>Put the pot on the stove.</td>
</tr>
<tr>
<td>9</td>
<td>Turn the temperature to the red dot (high) and wait for the water to boil.</td>
</tr>
<tr>
<td>10</td>
<td>When the water is boiling, pour in the macaroni.</td>
</tr>
<tr>
<td>11</td>
<td>Turn the temperature to the orange dot (medium).</td>
</tr>
<tr>
<td>12</td>
<td>Set the timer for 10 minutes.</td>
</tr>
<tr>
<td>13</td>
<td>Stir the pasta while it is cooking.</td>
</tr>
<tr>
<td>14</td>
<td>When the timer goes off, turn off the stove.</td>
</tr>
<tr>
<td>15</td>
<td>Put a strainer in the sink.</td>
</tr>
<tr>
<td>16</td>
<td>Pour the macaroni into the strainer.</td>
</tr>
<tr>
<td>17</td>
<td>Pour the macaroni back into the pot.</td>
</tr>
<tr>
<td>18</td>
<td>Put the pot back on the stove.</td>
</tr>
<tr>
<td>19</td>
<td>Turn temperature to low.</td>
</tr>
<tr>
<td>20</td>
<td>Measure 1 tablespoon of powdered milk.</td>
</tr>
<tr>
<td>21</td>
<td>Put the powdered milk into the pot with the macaroni.</td>
</tr>
<tr>
<td>22</td>
<td>Measure 1/3 cup of water.</td>
</tr>
<tr>
<td>23</td>
<td>Pour the water into the pot.</td>
</tr>
<tr>
<td>24</td>
<td>Measure 1 tablespoon of margarine.</td>
</tr>
<tr>
<td>25</td>
<td>Pour the margarine into the pot.</td>
</tr>
<tr>
<td>26</td>
<td>Pour the cheese mix into the pot.</td>
</tr>
<tr>
<td>27</td>
<td>Mix everything together.</td>
</tr>
<tr>
<td>28</td>
<td>Turn off stove.</td>
</tr>
<tr>
<td></td>
<td><strong>Number of Independent Steps</strong></td>
</tr>
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<td><strong>Percentage of Independent Steps</strong></td>
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<tr>
<td></td>
<td><strong>Inter-observer Reliability</strong></td>
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<tr>
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<td>Chili</td>
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<td>Date</td>
<td>21-Oct-16</td>
</tr>
<tr>
<td>Observer</td>
<td>Ob 1</td>
</tr>
<tr>
<td>1. Washes hands with warm water and soap.</td>
<td>0</td>
</tr>
<tr>
<td>2. Take out a frying pan, scissors, spatula/spoon, oven mitts, strainer, can opener, measuring spoons, and oven timer.</td>
<td>0</td>
</tr>
<tr>
<td>3. Take out ground beef, diced tomatoes, kidney beans, and chili seasoning mix.</td>
<td>0</td>
</tr>
<tr>
<td>4. Places ground beef into frying pan.</td>
<td>0</td>
</tr>
<tr>
<td>5. Puts frying pan on stove.</td>
<td>0</td>
</tr>
<tr>
<td>6. Turn temperature to between red and orange dots (Medium high).</td>
<td>0</td>
</tr>
<tr>
<td>7. Cook and stir the ground beef until it is browned.</td>
<td>0</td>
</tr>
<tr>
<td>8. Drain the extra grease into a can using your spoon.</td>
<td>0</td>
</tr>
<tr>
<td>9. Reduce the heat to the yellow dot (low).</td>
<td>0</td>
</tr>
<tr>
<td>10. Open the can of tomatoes with the can opener.</td>
<td>0</td>
</tr>
<tr>
<td>11. Pour the tomatoes into the frying pan.</td>
<td>0</td>
</tr>
<tr>
<td>12. Open the can of kidney beans with the can opener.</td>
<td>0</td>
</tr>
<tr>
<td>13. Place strainer in sink.</td>
<td>0</td>
</tr>
<tr>
<td>14. Pour the kidney beans into a strainer over the sink.</td>
<td>0</td>
</tr>
<tr>
<td>15. Rinse the beans with cold water.</td>
<td>0</td>
</tr>
<tr>
<td>16. Pour the kidney beans into the frying pan.</td>
<td>0</td>
</tr>
<tr>
<td>17. Measure 1/2 teaspoon of chili powder.</td>
<td>0</td>
</tr>
<tr>
<td>18. Pour the chili powder into the frying pan.</td>
<td>0</td>
</tr>
<tr>
<td>19. Mix everything together.</td>
<td>0</td>
</tr>
<tr>
<td>20. Turn the temperature to the orange dot (medium).</td>
<td>0</td>
</tr>
<tr>
<td>21. Set the timer for 15 minutes and let the chili simmer.</td>
<td>0</td>
</tr>
<tr>
<td>22. When the timer goes off, turn off the stove.</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Number of Independent Steps</th>
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<tr>
<td>Date</td>
<td>26-Oct</td>
<td>04-Nov</td>
</tr>
<tr>
<td>Observer</td>
<td>Ob 1</td>
<td>Ob 2</td>
</tr>
<tr>
<td>1. Washes hands before starting.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Takes out mixing bowl, spatula or cooking spoon, measuring cups, cooking spray, oven mitts, scissors, and oven timer.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Takes out eggs, brownie mix, and vegetable oil.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Make sure nothing is already in oven.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. Preheats oven to 300 degrees.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6. Opens brownie mix box with hands and bag with scissors.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7. Pour brownie mix into bowl.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8. Measure ¼ cup of water.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9. Pour water into the bowl.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10. Measure 2/3 cup of oil.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11. Pours oil into bowl.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12. Cracks 2 eggs and drop into the bowl.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13. Mixes everything together with spatula.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14. Sprays pan with cooking oil.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15. Pour the brownie mix into the pan using the spatula.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16. Put the pan into the oven.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17. Set the timer for 30 minutes.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18. Take the pan out of the oven when the timer goes off.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>19. Turn off the oven.</td>
<td>0</td>
<td>0</td>
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</table>

**Number of Independent Steps**

<table>
<thead>
<tr>
<th></th>
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<th>Ob 1</th>
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**Percentage of Independent Steps**

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<th>Ob 1</th>
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**IOA**

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<tr>
<td>100%</td>
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</tr>
<tr>
<td>Chicken and Pasta</td>
<td>Baseline</td>
<td>Intervention</td>
</tr>
<tr>
<td>--------------------------------------------</td>
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</tr>
<tr>
<td>Date</td>
<td>26-Oct</td>
<td>02-Nov-16</td>
</tr>
<tr>
<td>Observer</td>
<td>Ob 1</td>
<td>Ob 1</td>
</tr>
<tr>
<td>1. Washes hands before starting.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. Takes out package of chicken breasts (normally 2-3 inside), cooking oil, a can of mushroom soup, pasta, frozen vegetables, and parmesan cheese.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Take out a frying pan, a pot, measuring spoons, measuring cups, a sharp knife, a cutting board, oven mitts, and a kitchen timer.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Cut the chicken into small pieces (with fork and knife, if desired).</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. Put the chicken into the frying pan.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6. Put the frying pan on the stove.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7. Measure 1 tablespoon of cooking oil.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8. Pour oil into the frying pan.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9. Turns the temperature to between the red and orange dots (medium high).</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10. Set the timer for 10 minutes.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11. Stir the chicken while it is cooking.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12. Turn off the stove when the chicken is done and set aside.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>13. Set the frying pan of chicken aside.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14. Open the can of cream of mushroom soup with the can opener.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>15. Pour the cream of mushroom soup into the pot.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>16. Measure 1 1/2 cups of water.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>17. Pour the water into the pot.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>18. Measure 1 cup of frozen vegetables.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>19. Add the frozen vegetables into the pot.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20. Measure 1 cup of pasta.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>21. Pour pasta into the pot.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>22. Put pot on stove.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23. Turn the temperature to the red dot (high) and bring to a boil.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24. Set the timer for 10 minutes.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>25. Stir the ingredients while they cook.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>26. When the timer goes off, pour chicken into pot.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>27. Stir everything together.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>28. Turn off the stove.</td>
<td>0</td>
<td>1</td>
</tr>
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**Number of Independent Steps**

|                     | 0 | 15 | 16 |

**Percentage of Independent Steps**

|                     | 0.00% | 53.57% | 57.14% |

**IOA**

|                     | 89.29% | 89.29% |
## Sausage and Broccoli Skillet

<table>
<thead>
<tr>
<th>Date</th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
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<tbody>
<tr>
<td>26-Oct</td>
<td>Ob 1</td>
<td>Ob 1</td>
</tr>
<tr>
<td>04-Nov</td>
<td>Ob 2</td>
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<table>
<thead>
<tr>
<th>Observer</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ob 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ob 2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1. Washes hands before starting.  
2. Takes out sausage, onion, cream of broccoli soup, powdered milk, frozen broccoli (or other vegetable), and pasta.  
3. Takes out a large pot, strainer, small pot, can opener, cooking spoon, sharp knife, cutting board, measuring cups, oven mitts, and kitchen timer.  
4. Pour 3 cups of water into the pot.  
5. Place the small pot on the stove.  
6. Turn the temperature to high and bring the water to a boil.  
7. While waiting for water to boil, measures 1 cup of pasta.  
8. If still waiting for water to boil, start cutting sausage into small pieces.  
9. If water not boiled yet, peel the onion.  
10. While still waiting for water, cut onion into small pieces.  
11. After water has boiled, pour pasta into the small bowl.  
12. Let the water come to a boil again.  
13. Set the timer for 12 minutes when water is boiling.  
14. Turn down temperature to the orange dot (medium).  
15. Stir the pasta while it is cooking.  
16. Put sausage into large pot.  
17. Put onion into large pot.  
18. When the timer goes off, turn off the stove.  
19. Put the strainer into the sink.  
20. Pour the pasta into the strainer.  
21. Rinse the pasta with cold water.  
22. Pour the noodles back into the small pot.
### Sausage and Broccoli Skillet

<table>
<thead>
<tr>
<th>Date</th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Oct</td>
<td>Ob 1</td>
<td>Ob 1</td>
</tr>
<tr>
<td>04-Nov</td>
<td>Ob 1</td>
<td>Ob 2</td>
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<table>
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<tr>
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<th>Baseline</th>
<th>Intervention</th>
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<td>Ob 1</td>
<td>Ob 2</td>
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<table>
<thead>
<tr>
<th>Step</th>
<th>Baseline</th>
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<tbody>
<tr>
<td>23.</td>
<td>Set noodles aside.</td>
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</tr>
<tr>
<td>24.</td>
<td>Put large pot on element.</td>
<td>0</td>
</tr>
<tr>
<td>25.</td>
<td>Turn temperature to between the red and orange dots (medium high).</td>
<td>0</td>
</tr>
<tr>
<td>26.</td>
<td>Cook the sausage and onion until the sausage is brown.</td>
<td>0</td>
</tr>
<tr>
<td>27.</td>
<td>Turn down temperature to the yellow dot (low).</td>
<td>0</td>
</tr>
<tr>
<td>28.</td>
<td>Measure 1 cup of frozen broccoli.</td>
<td>0</td>
</tr>
<tr>
<td>29.</td>
<td>When sausage is fully cooked, pour the frozen broccoli (or other vegetable) into the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>30.</td>
<td>Open the can of cream of broccoli soup with the can opener.</td>
<td>0</td>
</tr>
<tr>
<td>31.</td>
<td>Pour the broccoli soup into the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>32.</td>
<td>Measure 1/4 cup of cold water.</td>
<td>0</td>
</tr>
<tr>
<td>33.</td>
<td>Measure 1 tablespoon of powdered milk.</td>
<td>0</td>
</tr>
<tr>
<td>34.</td>
<td>Pour 1 tablespoon of powdered milk into the water.</td>
<td>0</td>
</tr>
<tr>
<td>35.</td>
<td>Mix the powdered milk and water together.</td>
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</tr>
<tr>
<td>36.</td>
<td>Pour the milk into the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>37.</td>
<td>Measure 1/4 cup of parmesan cheese.</td>
<td>0</td>
</tr>
<tr>
<td>38.</td>
<td>Pour the parmesan cheese into the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>39.</td>
<td>Stir everything together.</td>
<td>0</td>
</tr>
<tr>
<td>40.</td>
<td>Put the lid on the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>41.</td>
<td>Set the timer for 5 minutes.</td>
<td>0</td>
</tr>
<tr>
<td>42.</td>
<td>When the timer goes off, turn off the stove.</td>
<td>0</td>
</tr>
<tr>
<td>43.</td>
<td>Pour pasta in with the meat and vegetables in the large pot.</td>
<td>0</td>
</tr>
<tr>
<td>44.</td>
<td>Stir everything together.</td>
<td>0</td>
</tr>
</tbody>
</table>

**Number of Independent Steps**

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>7</td>
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</tbody>
</table>

**Percentage of Independent Steps**

<table>
<thead>
<tr>
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<th>Intervention</th>
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<tbody>
<tr>
<td>2.27%</td>
<td>34.09%</td>
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<tr>
<td>15.91%</td>
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**IOA**

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Intervention</th>
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<tbody>
<tr>
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<td>79.55%</td>
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