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Can't Stop: The Effects of High-P Sequencing on Fluency and Retention

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CAN'T STOP: THE EFFECTS OF HIGH-P SEQUENCING ON FLUENCY
AND RETENTION

by

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Precision teaching has led to successful outcomes in both training and education. Past research has shown that by using flashcard techniques such as SAFMEDS in rate-building exercises, one can expect expert levels of performance and retention of learned material by practicing for a minute a day. Fluency training using SAFMEDS could prove invaluable in businesses that wish to train their employees using cost and time efficient methods. However, recent research has shown that the SAFMEDS sequence may not quickly build accurate rates of responding in earlier sessions, or reliably lead to high levels of retention. High probability (high-p) sequences can lead to reduced latencies to respond, resistance to extinction, and retention. Using high-p sequencing in SAFMEDS may increase performance and retention. The purpose of the present study was to compare the effects of SAFMEDS, high-p SAFMEDS, and self-study on performance and retention using flashcards. Subjects were randomly assigned to one of thirty counterbalanced sequences. The results showed that high-p SAFMEDS led to higher retention and performance in posttests than in SAFMEDS. However, posttests were not significantly different and self-study led to the highest retention and performance during sessions. Additional research is needed to determine a more efficient flashcard training method. Suggestions to improve the SAFMEDS methodology are discussed.

ACKNOWLEDGEMENTS

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INTRODUCTION

Employers have consistently increased the amount of time and money spent on learning for almost a decade (Ho, 2017; Miller, 2013; 2017). The Association for Talent Development reported that learning hours per employee have increased from 31.9 in 2008 to 34.1 hours in 2017, and learning costs per employee have increased from $1,081 to $1,273 in as much time (Miller, 2013; 2017). Learning hours may be spent training skills that increase employees' performance on the job. However, trainings vary in their effectiveness (Reed & Henley, 2015; Van Oorsouw, Embregts, Bosman, & Jahoda, 2009). Specifically, trainings differ in the amount of learning that takes place, transfer of skills to the job, and how the training affects business outcomes (Arthur, Bennett, Edens, & Bell, 2003; Taylor, Russ-Eft, & Chan, 2005). Ineffective staff training can have negative effects on both an organization's consumers (Reed & Henley, 2015), as well as its trainees (Shapiro, Kazemi, & Kavner 2015), and many publications have emphasized the importance of training effectiveness by calling for increased transfer of skills to the job (Parsons, Rollyson, & Reid, 2013; Reed & Henley, 2015; Reid & Parsons, 2000; Sarokoff & Sturmey, 2004; Van Oorsouw, Embregts, Bosman, & Jahoda, 2009; Wilder & Atwell, 2006).

The process of training employees could be enhanced using various behavioral teaching strategies. A methodology for training that uses repeated practice with feedback, prioritizes mastery, and has demonstrated success in teaching as well as vocational training is Precision Teaching (Binder, 1996, 2010; Binder & Bloom, 1989; Binder & Sweeney, 2002; Pampino, Wilder, & Binder, 2005). In this methodology, mastery is defined as the rate of accurate performance where trainees engage in a sufficient degree

of deliberate practice to ensure generalization to the target environment (Binder & Bloom, 1989). One of the benefits of defining mastery in such a way is that it allows for the standardization of instructional methodology (Binder, 1988). Another benefit of basing mastery on rate rather than accuracy alone is that this reflects the features of behavior typically seen in expert performance (Binder, 1988). That is, the automaticity of performance distinguishes true mastery from novice-level performance (Binder, 1988, 2003). This type of mastery is known as fluency, which is defined as competent performance comprised of a combination of accuracy and speed (Binder, 1996). Therefore, organizations can determine the quality of a worker's performance based on the accurate rate of responding and rate-building exercises can be used to train skills to fluency through repeated timed practice (Binder & Sweeney, 2002; Graf & Auman, 2005).

Traditional trainings do not inherently establish mastery criteria to match the needs of work environments, but the Precision Teaching approach bases mastery on the goals of the organization in order to train the dimensions of behaviors that are essential to achieving them (Binder & Bloom, 1989; Binder, 1993). This means that an organization that trains to fluency specifies the required performance standards and can expect the retention of skills and the generalization of performance to the work environment (Binder, 1993; Binder & Sweeney, 2002). Some studies that implemented Precision Teaching in applied settings were conducted by Binder and Bloom (1989), Binder and Sweeney (2002), Pampino, Wilder, and Binder (2008), and Kubina, Yurich, Durica, and Healy (2016).

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In Binder and Sweeney (2002), fluency training increased the performance of call center employees who were slow and inaccurate when completing work tasks, particularly when looking up and using service codes. New hires were responsible for knowing 100 service codes but took about 20-30 minutes per day looking them up before engaging in the work tasks. To address this, researchers identified the critical tasks for the call-center job by talking to managers and subsequently creating a fluency-based training that was focused on combining performance feedback with specific behaviors. During the training, the behaviors were targeted for acquisition through learning channels. These specified the sensory modality for the input and output of each task, as well as all the behaviors needed to complete the tasks to a fluency criterion (Binder & Sweeney, 2002). For example, the authors created a task using a see/say channel for *see*ing a written situation on a flash card and *say*ing the corresponding code at a rate of 60-80 codes per minute without errors. Subsequent performance was measured and shown to participants by performance coaches in order to provide feedback. The resulting training provided the prerequisites for the job's tasks, such as the component skill for correctly reporting a code during a phone call with a customer without needing to find codes in a manual. At its conclusion, fluency training resulted in increased performance and generalization to the work environment while reducing the total training time from three weeks to two weeks as well as reducing the costs associated with training. By devoting about half the training time to practicing skills through learning channels, the authors had reduced the proportion of training time spent lecturing from 75% to 25% and created a training that was predominantly focused on behaviors of the trainees. The resulting performance for new hires surpassed the company's previous benchmark by 1.6 times, thus changing

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expectations for performance and causing the company's previous expert-level employees to request taking the fluency training for themselves. This study also indicated that practicing skills to fluency via learning channels can have significant effects on training outcomes. The results of training with Precision Teaching exceeded the outcomes of the more traditional forms of training which required additional resources to train skills to novice levels of performance.

In the study by Binder and Bloom (1989), accuracy-only criterions, materials that do not provide opportunities for practice, and a lack of fluency leading to difficulty learning skills or applying them to the workplace were identified as factors that hinder performance. Traditional trainings can contain materials and procedures that hinder or prevent fluency, called fluency blockers (Binder, 1996). Due to most employers using traditional trainings, it is reasonable to expect that many real-world trainings contain fluency blockers that are unaccounted for (Binder, 2010). This issue may not be discussed when creating trainings and could remain unaddressed until an organization updates its trainings in order to adapt to new demands. Once discovered, the trainers will need to expend additional resources to address them. This scenario is what led Binder and Sweeney (2002) to restructure trainings for the call center.

Binder and Bloom (1989) created a fluency training for banks that were beginning to offer non-credit products and services for the first time. In this study, the authors explained that a heavy reliance on numerous job aids, lectures, demonstrations, and ineffective usage of technology does not result in job performance. These techniques produce employees who are not fluent in the skills that are necessary to reach the organization's desired goals. Instead, sales trainings that target the component skills for a

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product's features, the customer's needs, and how to respond to customer questions led to fluency for desirable composite skills.

Accordingly, the skills targeted by authors were product information and soft skills for sales, which were complex behavior chains that were broken down into smaller component skills for practice using flashcards. These skills were later combined into composite skills during sales roleplay. The researchers distributed a pretest and developed a training for the 27 non-credit products and services the bank was beginning to offer, which corresponded to a timed multiple-choice post-test based on the training. Participants spent a total of 10-15 hours in the fluency-based training studying the products and practicing with timed fluency exercises before taking a timed post-test. By training component skills to fluency and practicing composite skills in role-play, the sales representatives at two banks were able to perform at much higher accuracies and rates. Accuracy was increased by 19.5 times and speed was increased by 2.78 times at one bank. Similarly, accuracy increased by 15.61 times and speed increased by 3.47 times at the other bank. The results of Binder and Bloom (1989) and Binder and Sweeney (2002) indicated that deliberate practice with inexpensive textual materials such as flashcards can promote the practice of vocational skills to reach mastery criteria.

In flashcard-based trainings, it is reasonable to assume that there will need to be effective sequences of flashcards in order to maximize training outcomes. Poorly chosen sequences can cause order effects (Eshleman, 2000; Potts, Eshleman, & Cooper, 1993), fail to provide adequate practice (Adams, Cihon, Urbina, & Goodhue, 2018), or be inappropriate for the target audience (Quigley, Peterson, Frieder, & Peck, 2017). By presenting all flashcards in sequences that build rates of responding to meet performance

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goals, an organization can ensure that every trainee will become fluent. A common

fluency technique for teaching new information using text-based materials is a learning

sequence called SAFMEDS, which stands for Say All Fast a Minute Every Day Shuffled

(Potts, Eshleman, & Cooper, 1993). In it, information is typically presented on flashcards

using a see/say channel in random orders until the learner verbally responds to the entire

sequence within twenty to sixty seconds (Eshleman, 2000; Graf & Auman, 2005;

Stockwell & Eshleman, 2010).

In Quigley (2014), the SAFMEDS procedure is described as follows:

1) Learner holds the deck

2) Shuffle the cards

3) Start the timer (different options for time length but typically 1-min)

4) "See" front and out loud "say" the back (although other learning channels can

be used)

5) Turn the card over and check answer for immediate feedback (not checking

answers during the timing is also advocated)

6) Sort correct and incorrect responses into piles

7) After the time expires, count the number of responses per pile

8) Chart performance for review and instructional changes

9) Utilize various strategies for additional practice/instruction in conjunction

with the 1-min timing (additional practice/instruction can be before and/or

after the timing) (p. 5)

Flashcards can be presented multiple times in a day (Stockwell & Eshleman, 2010) or once a day over consecutive days (Quigley, 2014). This is done until the learner can respond without error to all flashcards within a specified amount of time resulting in fluency (Graf & Auman, 2005). SAFMEDS has recently been used to teach many skills, with recent examples showing success for teaching adults writing (Dermer, Lopez, & Messling, 2009), statistics (Beverly, Hughes, & Hastings, 2015), Tagalog (Togade, Ormandy, & Stockwell, 2012-2013), and dermatology diagnoses (McGrath, McCourt, Gormley, Dillenburger, Dounavi, & Corry, 2016). However, an overarching theme for contemporary research is that few studies use the SAFMEDS sequence to train vocational skills.

Kubina, Yurich, Durica, and Healy (2016) implemented a SAFMEDS sequence for training in-service professionals movement cycles to assist the completion of work tasks involving individuals diagnosed with developmental disabilities. Each participant had obtained a master's degree and were employed at a private school where the researchers implemented the flashcard-based training during work hours. The flashcards consisted of pictures and were answered by using the corresponding verb-object relationship. During the study the participants were exposed to a pre-test, baseline, and a week-long intervention consisting of self-practice with self-feedback. They trained for about two minutes per day, which lasted until seventeen correct responses were made within twenty-seconds for two consecutive days. Once the performance goals were achieved, participants were exposed to a generalization test comprised of a novel deck of fifty cards. Following this test were twenty-second maintenance trials conducted once a week for four weeks.

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Compared to baseline, accuracy and speed improved during intervention, generalization, and maintenance. The majority of participants showed increases in the proportion of correct responses to incorrect responses and greater magnitudes of performance change during the intervention phase. The generalization test showed increases in the percentage of accuracy when using the novel deck, and all subjects maintained responding a month after the intervention phase. Additionally, the total time spent in training during the treatment phase was on the order of minutes rather than hours, providing evidence that SAFMEDS can be effectively used in the workplace.

In this study, the performance goals set by the organization were achieved, participants demonstrated retention on maintenance tests, and they applied their skills during the generalization test. However, celeration data showed that the number of incorrect responses did not reliably decrease during initial sessions and would sometimes increase throughout the intervention. It appears that performance can be maintained once a trainee has repeatedly engaged with the materials or mastered them, but there does not appear to be a component in the SAFMEDS sequence that evokes and maintains the accurate rate of responding in earlier training sessions. Therefore, the initial drops in performance from baseline suggest that the SAFMEDS sequence may initially punish responding. This could be due to the randomized presentation of flashcards that could lead to infrequent rates of reinforcement when practicing with novel material (Kupyzk, Daly, & Andersen, 2011).

Behavioral momentum may provide solutions to increase the initial performance in trainees using flashcards. A critical difference from the traditional SAFMEDS sequencing method is that behavioral momentum learning sequences are structured based

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on the probability of a response in order to increase the rate of responding, reinforcement, and momentum for compliance generalized to all demands (Mace, Hock, Lalli, West, Belfiore, & Pinter, 1988). Sequences that are likely to evoke compliant responding are high-probability sequences (high-p) and the converse are low-probability sequences (low-p) (Mace et al., 1988). This also applies to academic demand, where demands in a high-p sequence can be prompts or questions that the learner already has competency for and therefore an answering behavior is likely to be reinforced (Belfiore, Basile, Lee, 2008; Lee Belfiore, Scheeler, Hua, & Smith, 2004; Lee, 2006). Conversely, unmastered questions may be less likely to evoke responding due to a lack of fluency as demonstrated in Vostal and Lee (2015), similar to low-p questions that are often placed after a sequence of high-p questions (Belfiore, Basile, Lee, 2008; Lee, et al., 2004).

By using the momentum established from the rate of responding for previous high-p questions as an antecedent for low-p questions, the sequence can rapidly increase compliance to low-p questions as well (Axelrod & Zank, 2012; Belfiore, Basile, Lee, 2008; Lee, 2005; Lee, 2006). These benefits could be combined with SAFMEDS to remove a potential fluency blocker when first introducing non-fluent learning material. On its own, the traditional SAFMEDS sequence may be a low-p sequence that can be improved by using high-p sequencing to increase and maintain rates of responding. Using randomized high-p flashcards to precede low-p flashcards could reduce response latencies and increase momentum for responding in addition to fluency. As discovered by Kupzyk, Daly, and Andersen (2011), the structuring of flashcards in presentation sequences can result in performance losses if they do not effectively build upon mastered material.

A criticism of flashcard sequencing in Kupzyk, Daly, and Andersen (2011) is that it is difficult to present effective combinations of both mastered and unmastered material in effective and time-efficient sequences. Despite using sequences that accumulate mastered material, opportunities to respond to the unmastered material can still be drastically reduced. This is important because unmastered material should be presented more often to attain mastery. In the study by Kupyzk, Daly, & Andersen, Incremental Rehearsal was compared to Strategic Incremental Rehearsal. Both sequences accumulated new flashcards to present as questions were mastered, but each sequence presented response opportunities for unmastered material differently.

In Incremental Rehearsal, nine mastered flashcards were presented with three unmastered flashcards in a terminal accumulating sequence. A single unmastered flashcard was presented followed by a mastered flashcard. Then the sequence restarted and added one more mastered flashcard. This continued a total of nine times, at which point the unmastered flashcard was replaced with another one and the accumulating sequence was repeated. This resulted in a sequence where the response opportunities for unmastered material became increasingly limited. However, in Strategic Incremental Rehearsal, ten unmastered flashcards were presented one after the other once they had become mastered. As flashcards became mastered they were sequenced in random orders before an unmastered flashcard was presented, and this continued until all ten flashcards were mastered. Both sequences accumulated flashcards, but Strategic Incremental Rehearsal was found to be more effective.

Correct responses increased under this condition, and the authors concluded that it was the response opportunities to unmastered flashcards and the sequencing of previously

mastered material that led to these results. Strategic Incremental Rehearsal had also saved more time than Incremental Rehearsal. To further address the issues of response opportunities for efficiently attaining mastery, it is also important to consider the length of a sequence and its presentation. The time spent learning in either sequence may have been elongated by their incremental growth of new flashcards. Instead of introducing flashcards in this manner, repeated presentations of an entire deck may eliminate both the loss of response opportunities per unit of time and the additional time expended in incremental sequencing methods. Therefore, presenting a deck's mastered flashcards before its unmastered ones in a whole deck procedure could maximize training resources.

Recent high-p research also show crossover with SAFMEDS concepts and applications. Flashcards have been used in high-p exercises investigating response latency reduction (Lee, Belfiore, Scheeler, Hua, & Smith, 2004), reading a list of 100 words to oral fluency has been improved by placing all high-p words before remaining low-p words (Bruns, Ardoin, Parker, Hodgson, Klingbeil, & Scholin, 2009), and sequences of low-p questions preceded by randomized high-p questions resulted in greater performance than low-p questions preceded by high-p questions that were presented in the same order (Davis & Reichle, 1996). These findings further imply that performance in the traditional see/say SAFMEDS could be made faster and more accurate with high-p sequences while avoiding serial-order effects.

Hence, incorporating mastered flashcards as a high-p sequence in a whole-deck SAFMEDS procedure may reliably evoke accurate rates of responding earlier than SAFMEDS alone. Due to momentum promoting persistence, resistance to extinction, and maintaining responding when reinforcement is not present (Grace, Bedell, & Nevin,

2002), it could not only engender higher rates of responding but also promote retention. The initial presentations may establish momentum as the number of flashcards become mastered and are used to precede unmastered flashcards. Then, this momentum could carry to unmastered flashcards resulting in performance increases.

Given the benefits of Precision Teaching and the versatility of flashcards, implementing fluency techniques through flashcard sequences may add value to trainings in the workplace. SAFMEDS on its own or combined with high-p sequences may lead to improved training outcomes and lower cost to organizations. The present study hopes to contribute to the literature by creating a whole-deck flashcard strategy that incorporates previous Precision Teaching literature and high-p sequencing to further reduce and maximize the resources used during trainings. Specifically, three conditions were compared based on rate-building during sessions, performance in posttests, and retention in order to determine which condition led to the greatest improvements in performance.

METHOD

Subjects and Experimental Settings

6 undergraduate students were recruited through in-class recruitment (see Appendix A and Appendix J) and a recruitment flyer (see Appendix B and Appendix K). Sessions were conducted in a laboratory in Wood Hall and over WebEx due to the COVID-19 pandemic.

Materials and Experimental Task

Ninety laminated opaque flashcards with Portuguese and single-syllable English words were used. Each condition contained one corresponding deck of thirty flashcards. The flashcards depicted a Portuguese word on one side of the flashcard, its corresponding

English word on the other side of the flashcard, and a colored dot corresponding to the specific condition (see Appendix C). Portuguese words were selected for the study if their corresponding English word was one syllable and the Portuguese word did not look like an English word. Flashcards were used during a see/say task. The study's investigators presented the Portuguese side of flashcards to subjects, who were instructed to say each corresponding English word as quickly and accurately as possible.

Dependent Variables

The dependent variables included the rate of correct flashcard answers for each condition during pretests, the pre-session and experimental sessions, posttests, and delayed posttests. Frequencies of error types were collected as well during pretests, the pre-session and experimental sessions, posttests, and delayed posttests. Error types were classified as no answer, hesitation, vocal stereotypy, incorrect answer, pass, and repeated incorrects for the same flashcard.

Independent Variable and Experimental Design

The independent variable in this study was the flashcard study method, consisting of the conditions of SAFMEDS, high-p SAFMEDS, or unstructured flashcard self-study. An alternating treatments within-subject design (Cooper, Heron, & Heward, 2007) was used given prior behavioral momentum research that was conducted using alternating-treatment designs (Lee, 2005; Nevin & Shahan, 2011). The present study's design involved the presentation of randomized sequences of conditions in sessions conducted once daily for five consecutive days. There were three conditions in a day's session, and each condition was presented a single time in any sequence. Conditions had an initial thirty second pre-test and flashcard review, one thirty-second pre-session, four thirty-

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second experimental sessions, five post-tests, and a delayed posttest that occurred two to three weeks after the fifth posttests had been completed. The orders for how conditions were sequenced was determined by randomly assigning a number to each condition and counterbalancing their orders. Subjects were randomly assigned to each sequence using a random number generator.

SAFMEDS incorporated see/say flashcards with feedback in order to give subjects adequate practice (Binder & Sweeney, 2002; Quigley, 2014). The investigator or research assistant presented flashcards in a randomized order for about one second each, provided immediate affirmative feedback for correct responses by saying "good", and provided corrective feedback for incorrect responses by stating the correct response. After feedback had been delivered, the flashcard was placed into a stack of correct or incorrect flashcards depending on the subject's response. An investigator counted these and entered them into a data sheet before concluding the condition.

High-p was identical to SAFMEDS, but the investigator presented the flashcards using a high-p sequence in which the presentation of correctly answered flashcards preceded incorrectly answered or new flashcards. If the subject had yet to answer any flashcards correctly an investigator continued to present flashcards in a random order until one was scored correct. At the end of the condition, any flashcards not yet placed in the correct stack were counted as incorrect. Both stacks of correct and incorrect flashcards were shuffled independently and combined with the correct flashcards placed at the top of the stack. Correct flashcards continued to be accumulated and presented over experimental sessions.

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Unstructured flashcard self-study involved subjects studying flashcards in a non-directed manner of their choosing. The researcher did not present flashcards, provide feedback, or score correct or incorrect responses during the session. The only instructions were for the subject to study the flashcards as they normally would as long as it was not an experimental condition such as SAFMEDS as usual, cease studying after thirty seconds had been reached or they finished beforehand, and to self-sort the flashcards into correct and incorrect stacks. Corrects were scored based on the presence of a verbal response, the observer's ability to see a flashcard, and which pile the subject placed the flashcard. When an answer was spoken aloud and the flashcard was visible, an observer could determine if the answer was correct. However, in the event answers were not spoken aloud and the flashcard was not visible, the number of corrects was based on the number of flashcards the subject had placed in the correct pile by the end of the session.

Informed Consent and Research Procedures

When responding to email queries about potential participation, the experimenter contacted the potential subjects using the script provided in Appendix D. The experimenter met with the potential subjects in a Wood Hall university laboratory, completed the informed consent process, answered any questions, and scheduled subsequent sessions. This informed consent form can be found in Appendix E. Due to the COVID-19 pandemic, consent was also obtained digitally through Qualtrics (see Appendices P, Q, and R).

Upon completion of the informed consent process, the experimenter explained and demonstrated the task according to a script (Appendix F or Appendix N), which was used to explain how sessions were conducted as well as correct and incorrect responses.

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The script included explanations of the pretest, pre-session and sessions, posttest, and delayed posttest

     Pretests. After obtaining permission to begin the experiment, the investigator or research assistant prepared the condition's pretest. The investigator or research assistant shuffled the respective condition's deck of flashcards and presented each flashcard to the subject for one second without feedback. When any flashcard was not answered within about one second or was answered incorrectly, an investigator immediately presented the next flashcard. While the subject answered, an investigator created two decks for correct and incorrect responses on the table until all flashcards were placed into either the correct or incorrect stack. After the pretest was finished an investigator counted the number of correct and incorrect responses and entered them into a data sheet. A flashcard that was not answered in time or was answered incorrectly was included in the total for incorrects. The investigator informed the subject when the pretest ended.

     Reviews. The investigator or research assistant allowed the subject to review each of the flashcards at his or her own pace in an initial flashcard review prior to beginning condition, as was the case with prior research (Kubina, Yurich, Durica, & Healy, 2016; Quigley, 2014; Stockwell & Eshleman, 2010). Similar to the supplemental SAFMEDS procedures used by Quigley (2014), subjects were given a time-limit of five minutes for the review. An investigator held each flashcard, said the English word that corresponds to each Portuguese word, and allowed the subject to repeat after them. The subject could request to proceed to the next flashcard or ask to practice a previous flashcard until the time-limit was reached.

Pre-sessions and experimental sessions. In pre-sessions and experimental sessions, subjects studied Portuguese words for thirty seconds in each of the three conditions as previously specified. The investigator or research assistant began a timer for thirty seconds and either delivered the appropriate flashcard training method and feedback or instructed the subject to self-study. The investigator ended the session once the timer sounded.

Posttests. The posttests were conducted immediately following the final experimental session in the sequence. The order of each condition's posttest was identical to the order they appeared in the sequence for experimental sessions. Each posttest was conducted in the same manner as the pretest, but the investigator would not progress until an answer was given. Subjects could request to pass flashcards.

Delayed posttests and debriefing. The delayed posttest was scheduled for approximately 2-3 weeks after the final posttest. The procedure for the delayed posttests was identical to the pretest procedure. Upon completion of the delayed posttest, the researcher thanked the subject and conducted the debriefing as specified in the debriefing script (see Appendix G and Appendix O). Afterwards, the subject received $50.00 USD for completing the study.

Duration of Study

The total time commitment for each subject spanned from three to four weeks and required approximately three and a half to four hours. Review of the informed consent document and explanation of the task took approximately thirty minutes each. Afterwards, the first day's pre-sessions took place. These were followed by a total of four consecutive daily experimental sessions with posttests. Both pre-sessions and sessions

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lasted approximately thirty minutes each. This included reviews and posttests as well as each pre-session's pretest. After the fifth day, posttests and debriefing took place two to three weeks later. The delayed posttests and debriefing combined took approximately thirty minutes.

Interobserver Agreement

Interobserver agreement was conducted for corrects/incorrects and error types in recorded sessions. This was calculated by taking the number of each condition's items in agreement, dividing by the total number of agreements plus disagreements, and multiplying by 100. Each session was video-coded by the primary observer and two independent observers.

Social Validity Survey

A Qualtrics survey was distributed to subjects after their time in the experiment had ended (see Appendix U). Subjects were asked if they would like to take the survey and subsequently had their consent obtained (see Appendix S and Appendix T). The survey contained Likert-scale questions and free response lines about the conditions of the study and their awareness of conditions during sessions.

<div align="center">RESULTS</div>

Data and Analysis

Individual subject performance in figures 1-6 show the effects of SAFMEDS, high-p SAFMEDS, and self-study on the accurate rate of answers during pretests, sessions, posttests, and delayed posttests. Across all participants' sessions, self-study had the highest rate of accurate answers for twenty-eight of thirty sessions (93.33%), and consistently had the highest rate of accurate answers for four of six subjects (66.66%).

Two of six subjects (33.33%) had one session where the frequency of high-p SAFMEDS correct answers were the same or higher than self-study. When comparing which condition evoked accurate responding in sessions before other conditions, self-study evoked correct answers first in five of six subjects (83.33%). Three of six subjects (50%) correctly answered flashcards in SAFMEDS before high-p SAFMEDS, while two of six subjects (33.33%) correctly answered flashcards in high-p SAFMEDS before SAFMEDS. One subject did not correctly answer flashcards in either condition. The grand mean for the accurate rate of answers was the highest in self-study at 8.63 correct answers within thirty seconds. The grand means for both SAFMEDS and high-p SAFMEDS were .56 correct answers within thirty seconds.
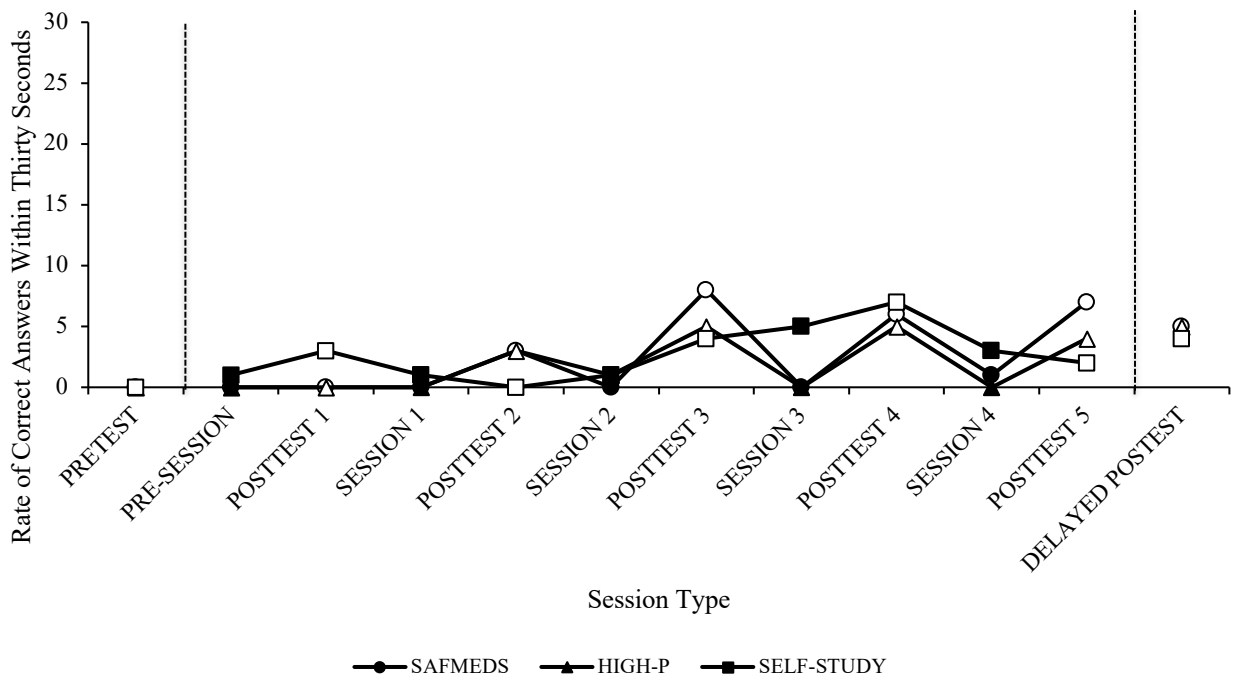
Figure 1. Accurate Rate of Answers (Jordan). Open data points are pretests or posttests. Closed data points are sessions.
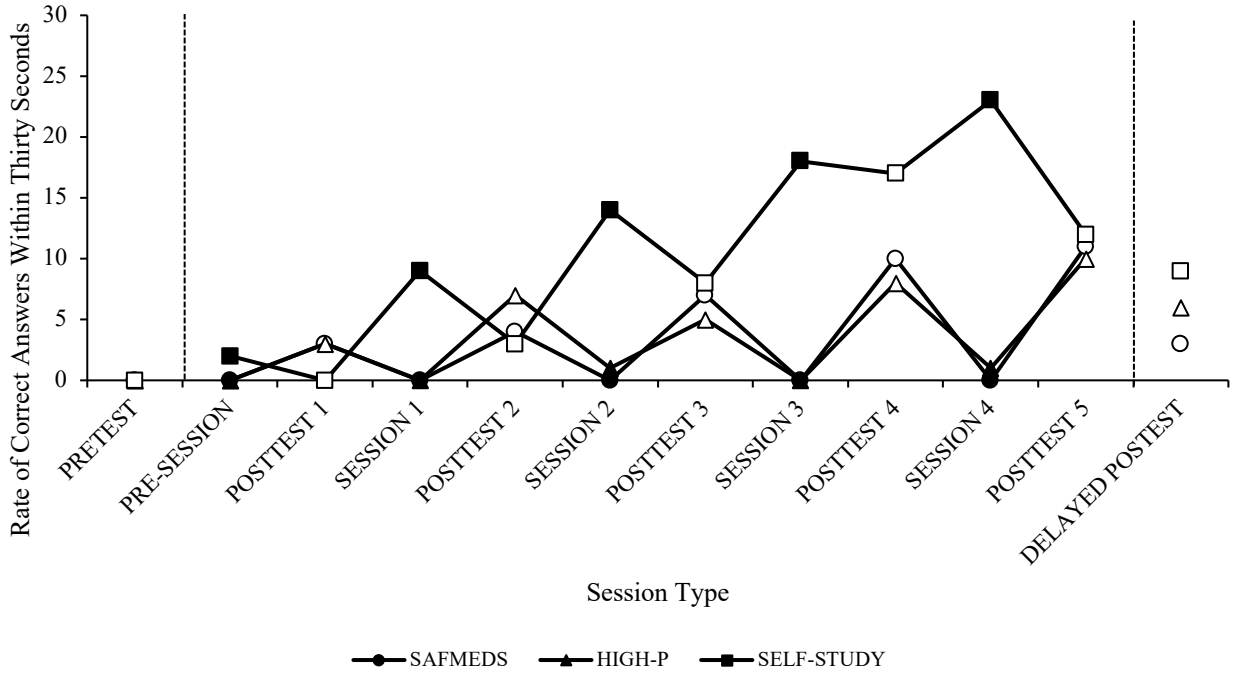
Figure 2. Accurate Rate of Answers (Coby). Open data points are pretests or posttests.
Closed data points are sessions.
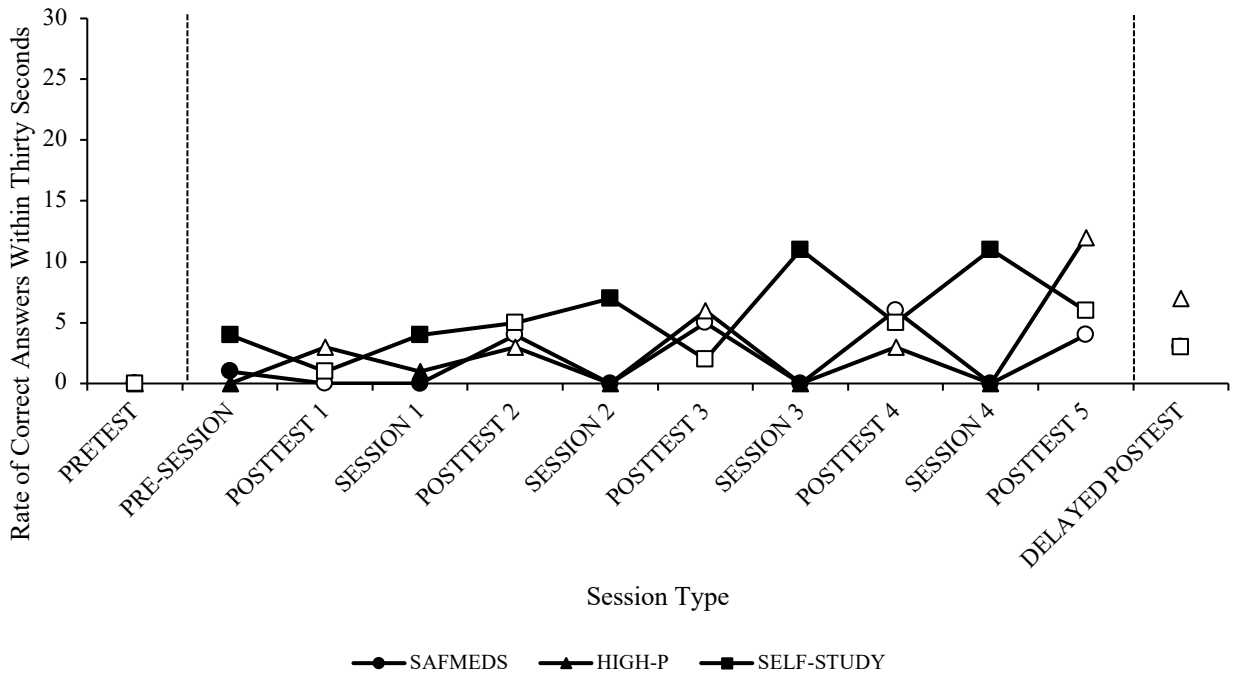
Figure 3. Accurate Rate of Answers (Harper). Open data points are pretests or posttests.
Closed data points are sessions.

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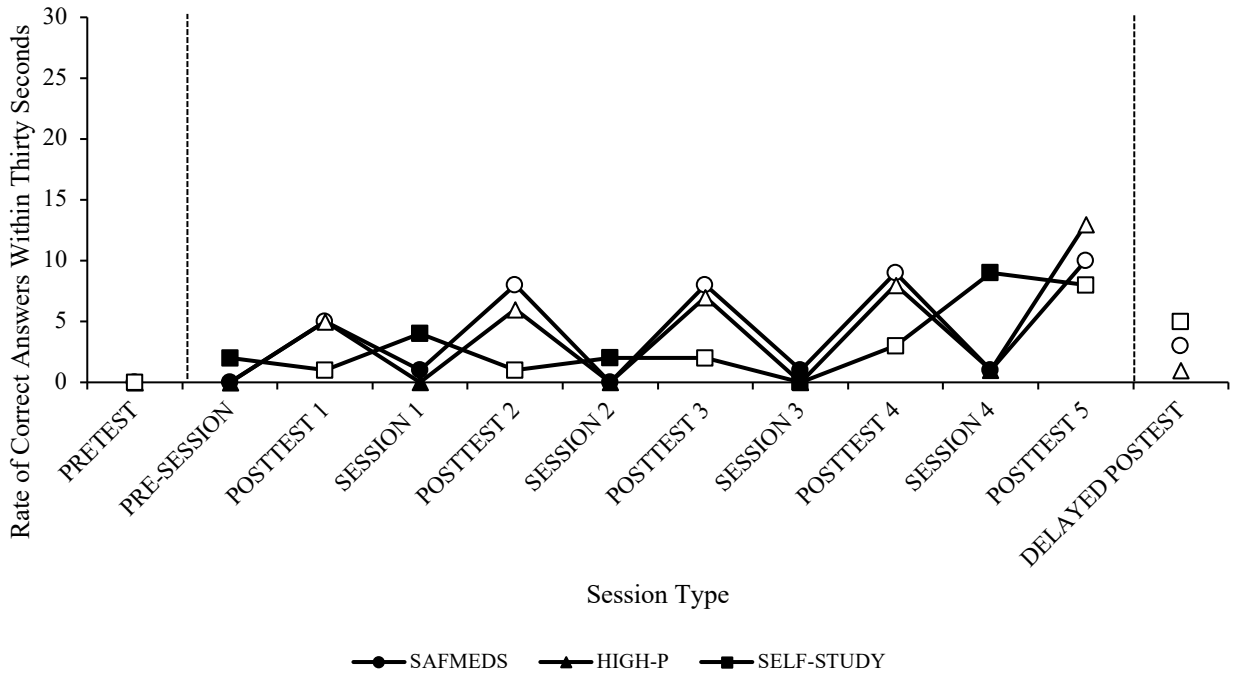
Figure 4. Accurate Rate of Answers (Taylor). Open data points are pretests or posttests. Closed data points are sessions.
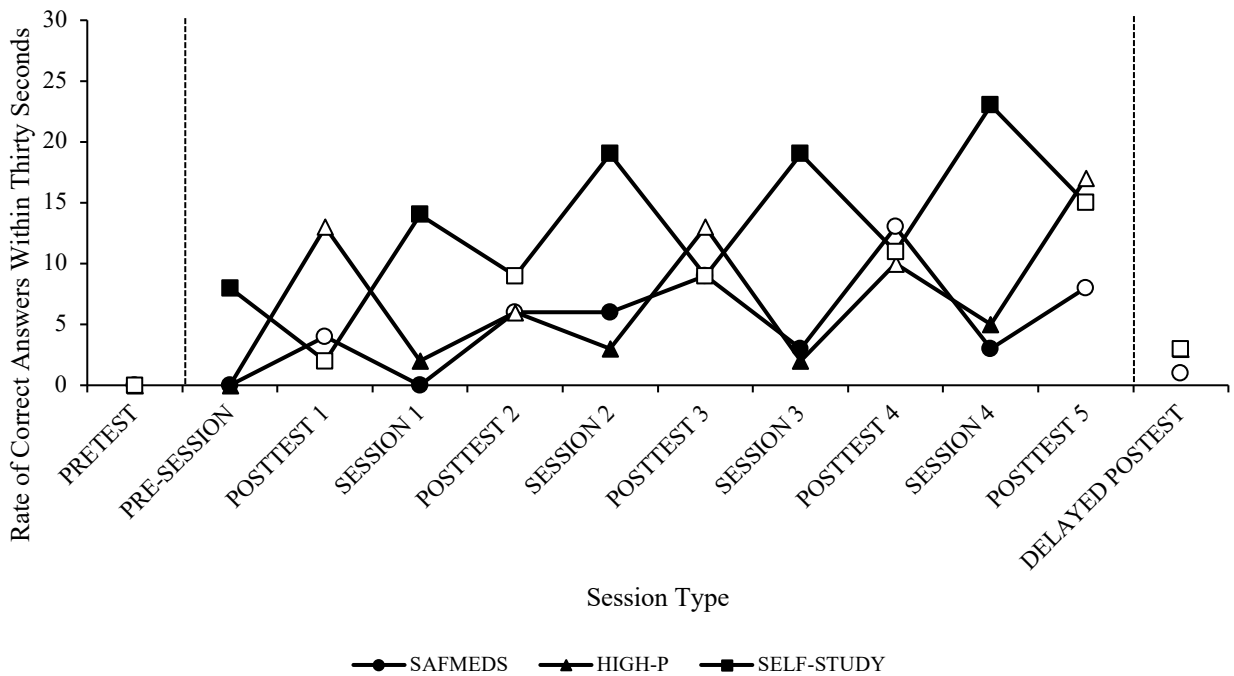
Figure 5. Accurate Rate of Answers (Dakota). Open data points are pretests or posttests. Closed data points are sessions.

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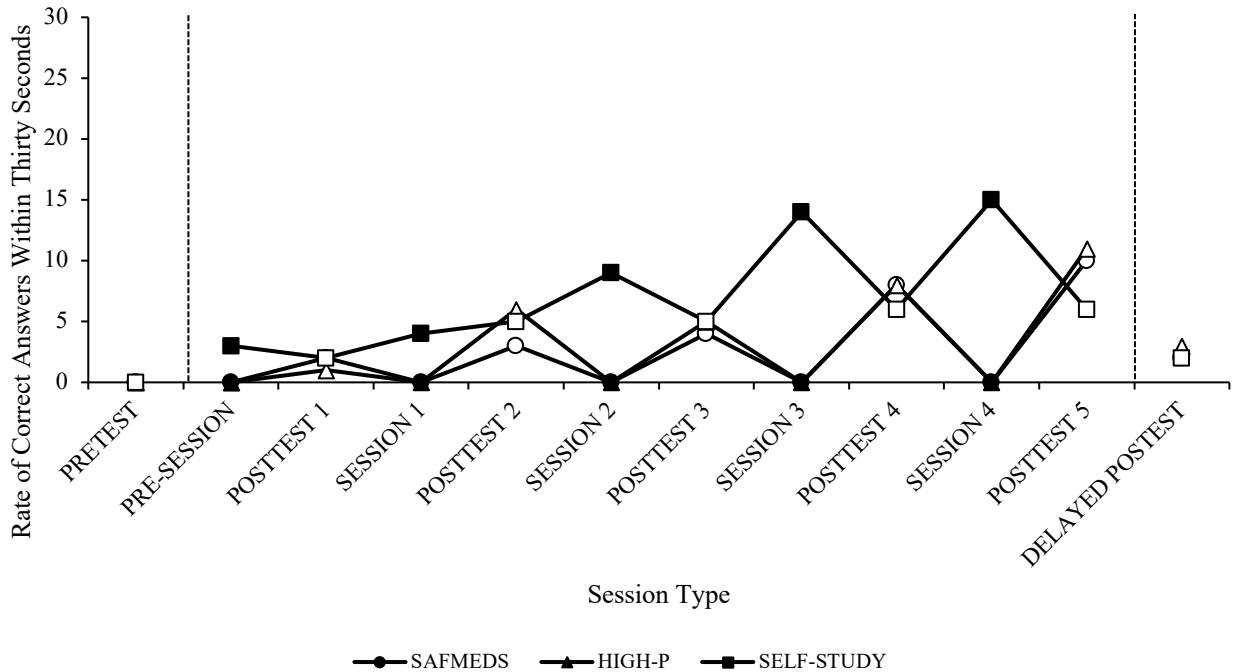
Figure 6. Accurate Rate of Answers (Morgan). Open data points are pretests or posttests. Closed data points are sessions.

Figures 7-10 show grand means for the frequencies of correct answers in sessions and posttests, as well as the mean frequencies of correct answers in delayed posttests. Figure 7 displays the grand means for correct answers during sessions. Overall, self-study had the highest grand mean correct answers during sessions at 8.63 corrects within thirty seconds. Figure 8 shows the grand means for correct answers during posttests. High-p SAFMEDS had the highest grand mean correct answers during posttests at 6.86 corrects within thirty seconds, followed by SAFMEDS and self-study, which were 6.16 and 5.33 respectively. Across subjects, high-p SAFMEDS had the highest rate of accurate answers for ten of thirty posttests (33.33%), followed by self-study and SAFMEDS, each of which were the highest for seven of thirty (23.33%) posttests. The rest were ties. The ties between high-p SAFMEDS and SAFMEDS were highest for four of thirty posttests (13.33%). High-p SAFMEDS had the highest rate of accurate answers in four of six

subjects (66.66%), and SAFMEDS had the highest rate of accurate answers in two of six

subjects (33.33%). In the fifth posttests, high-p SAFMEDS resulted in the highest rate of

accurate answers in four of six subjects (66.66%), with SAFMEDS and self-study being

highest in one subject each.
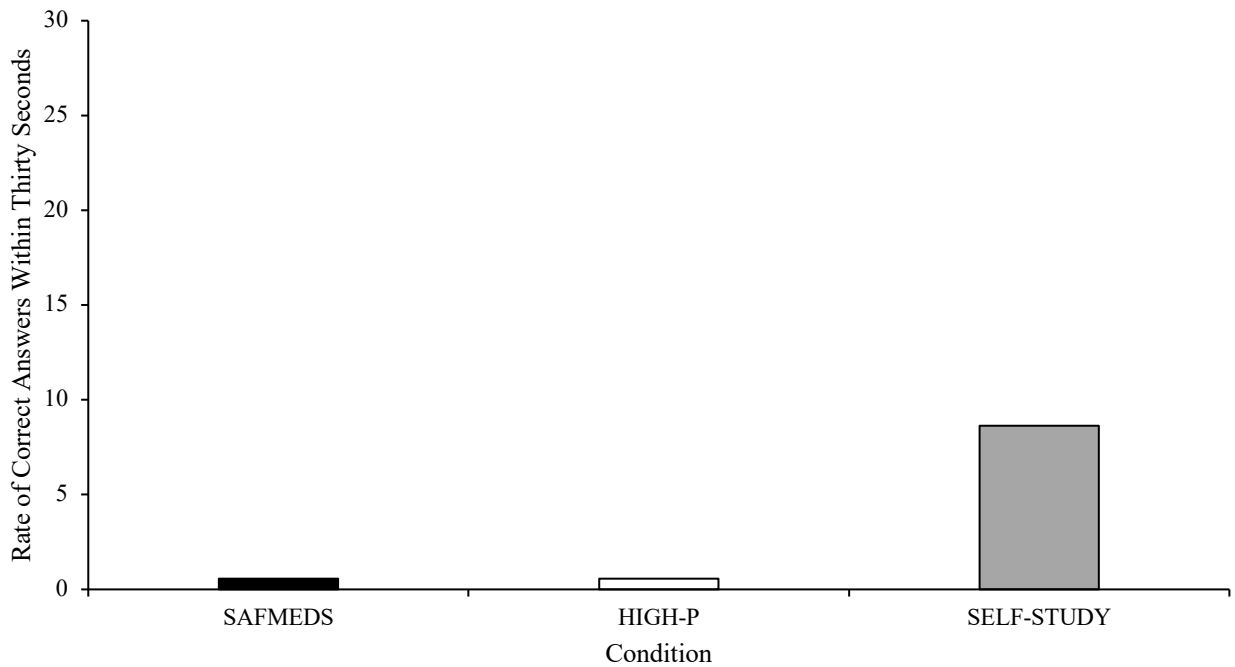
Figure 7. Session Grand Mean Correct Answers

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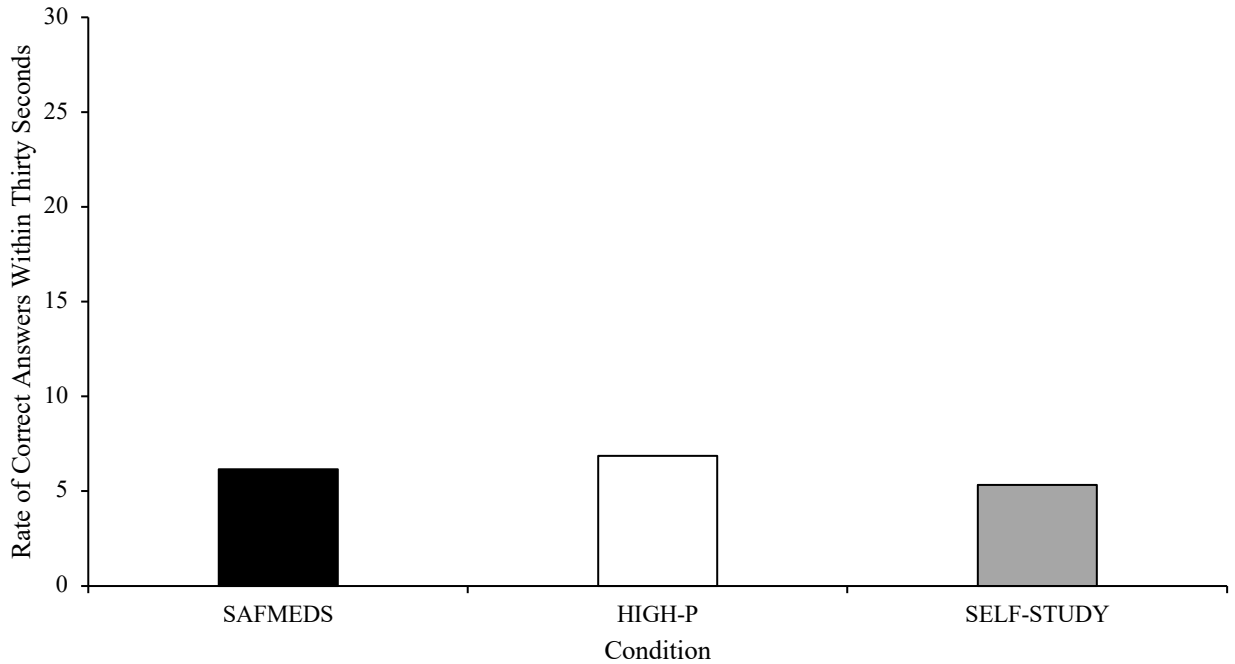
Figure 8. Posttest Grand Mean Correct Answers

Figure 9 shows mean correct answers during delayed posttests. Self-study resulted in the highest mean correct answers during delayed posttests at 4.8 corrects within thirty seconds, followed by high-p SAFMEDS and SAFMEDS, which were 4.4 and 4 respectively. During delayed posttests, high-p SAFMEDS and self-study attained the highest rate of correct answers during high-p SAFMEDS in two out of six subjects (33.33%) each. The rest were ties. When comparing the grand means of correct answers in posttests to the means of correct answers in delayed posttests, decreases of 10%, 35.92%, and 51.35% were seen in self-study, high-p SAFMEDS, and SAFMEDS respectively. Complications related to the COVID-19 pandemic caused one subject to complete delayed posttests after a three-week retention period and necessitated three subjects to complete their delayed posttests over WebEx. Morgan completed the delayed posttests three weeks after the fifth posttests, and Taylor, Dakota, and Morgan completed

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delayed posttests over WebEx. Figure 9 does not include data for Morgan. Figure 10 includes Morgan's data.
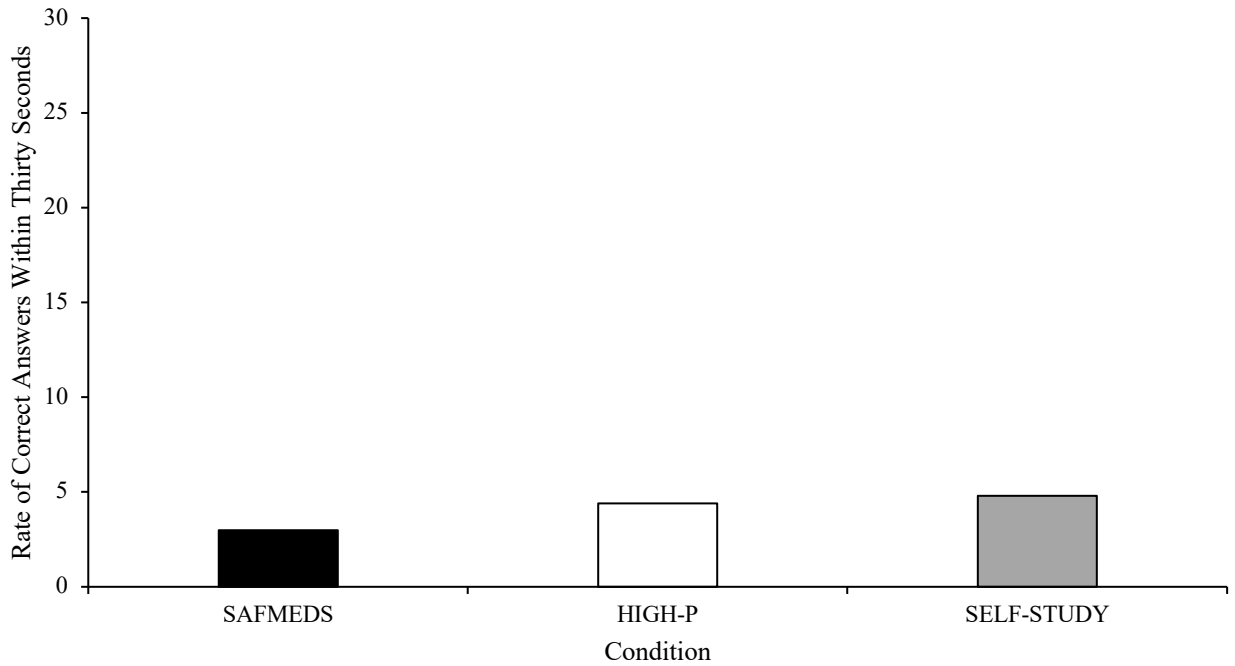
Figure 9. Delayed Posttest Mean Correct Answers
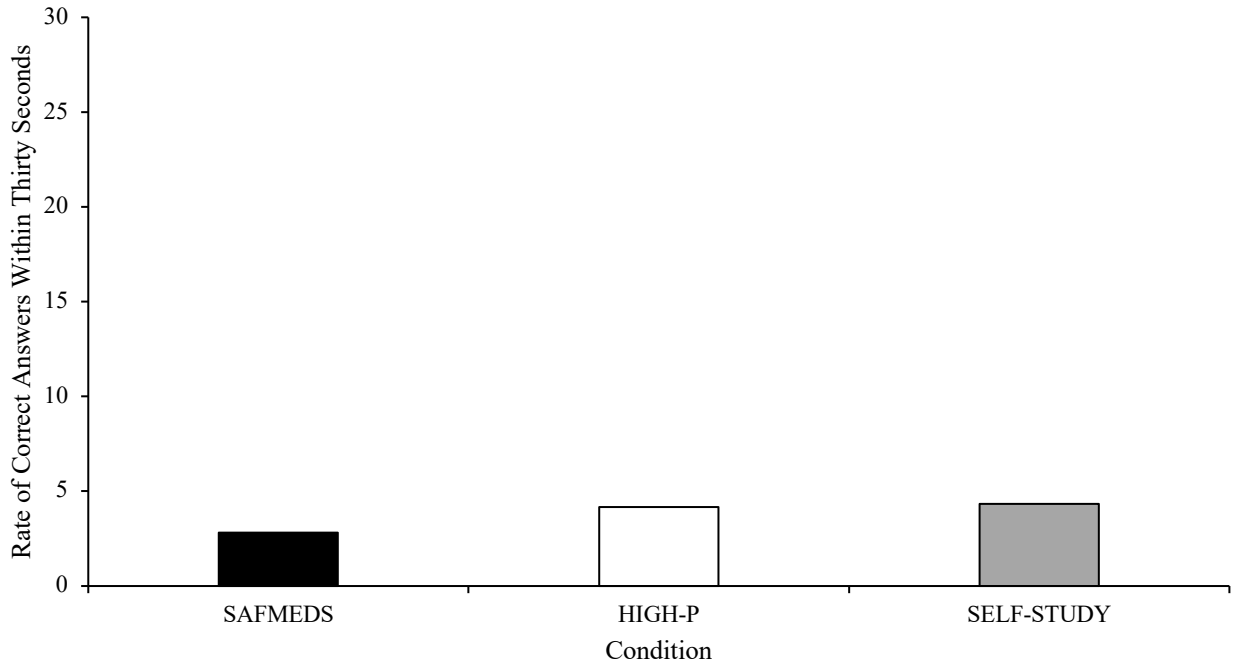
Figure 10. Delayed Posttest Mean Correct Answers (All Subjects)

Figures 11-29 show individual subject error types during pretests, sessions, posttests and delayed posttests. There are few discernible patterns when using visual analysis of the error types. As time in the study increased, no answer typically decreased while hesitation increased. In four of six subjects (66.66%), passes were consistently more frequent in the posttests for the self-study condition than SAFMEDS or high-p SAFMEDS. In five of six subjects (83.33%), passes were more frequent in SAFMEDS than in high-p SAFMEDS.
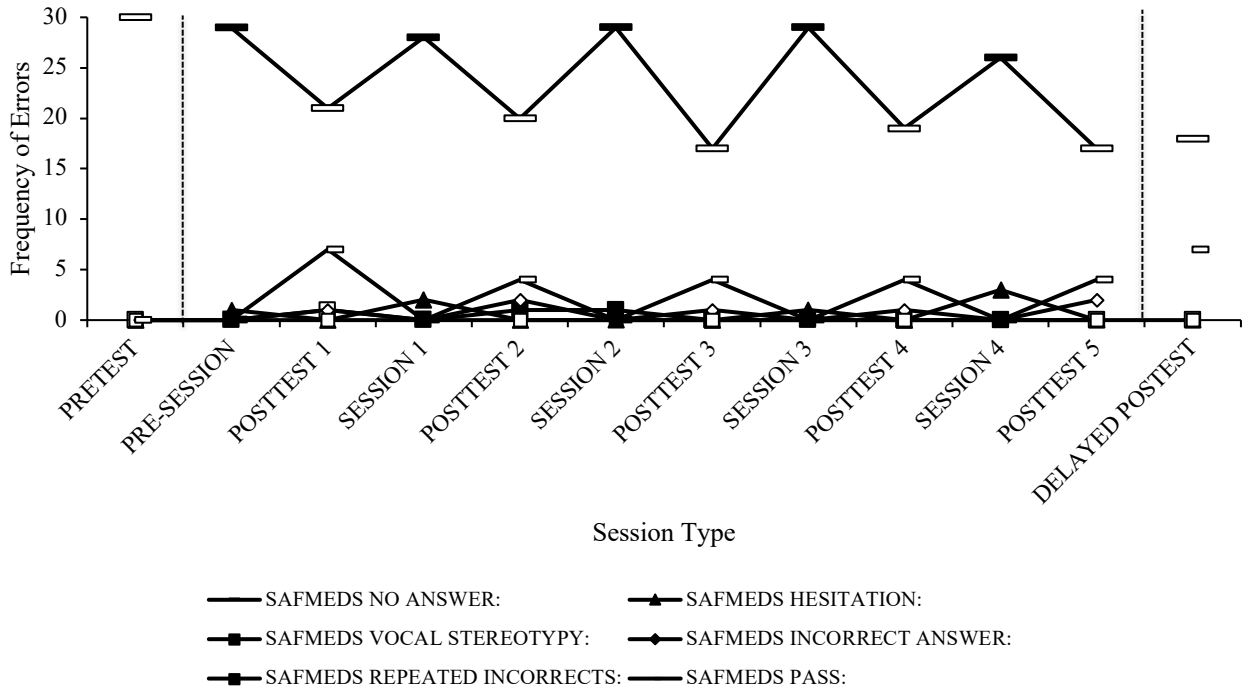
Figure 11. SAFMEDS Error Type Frequencies (Jordan). Open data points are pretests or posttests. Closed data points are sessions.
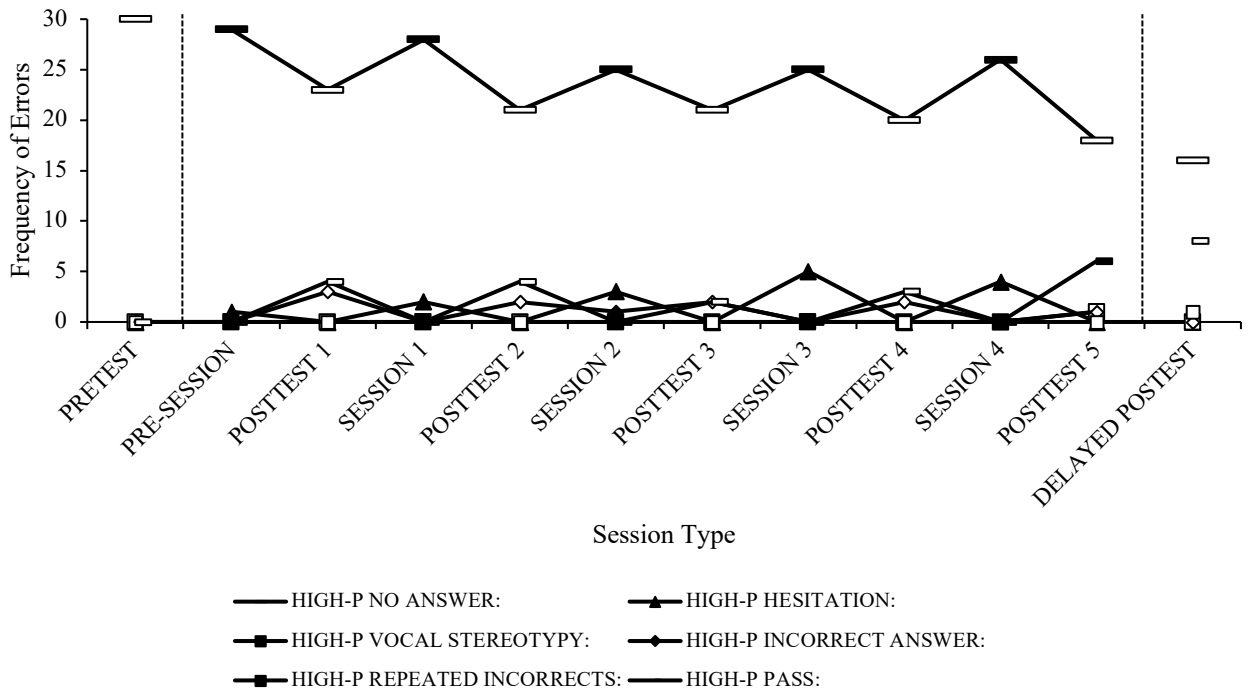
Figure 12. High-P SAFMEDS Error Type Frequencies (Jordan). Open data points are pretests or posttests. Closed data points are sessions.
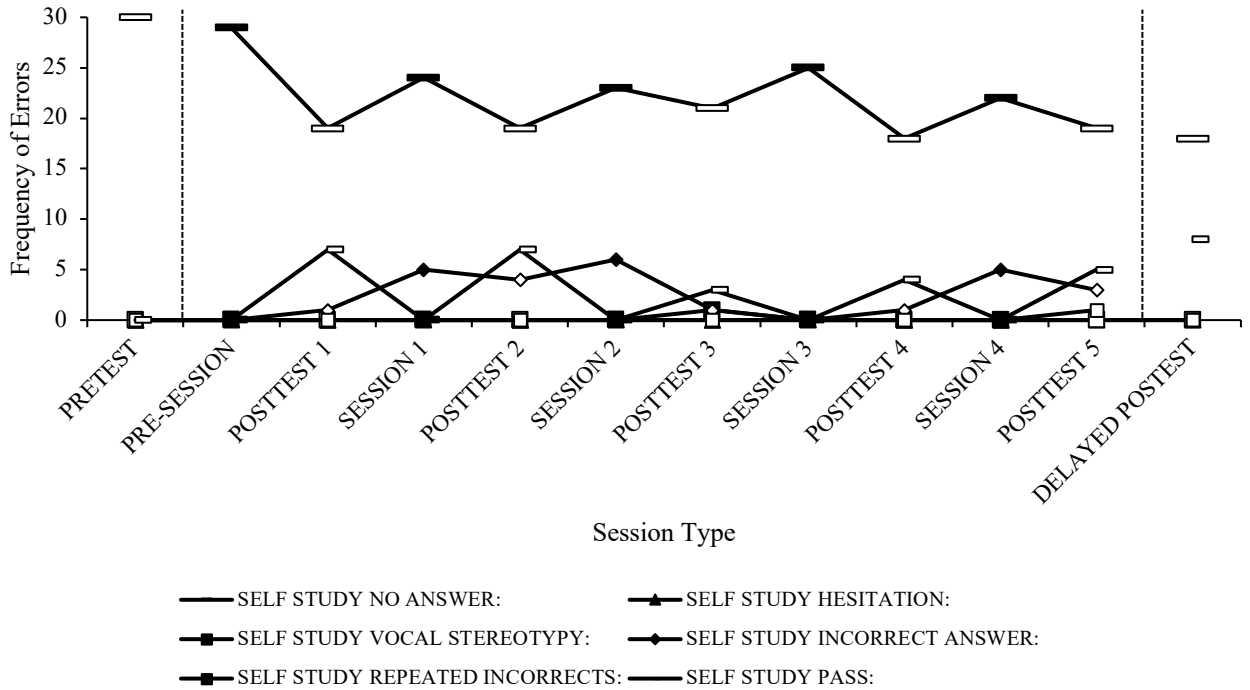
Figure 13. Self-Study Error Type Frequencies (Jordan). Open data points are pretests or posttests. Closed data points are sessions.
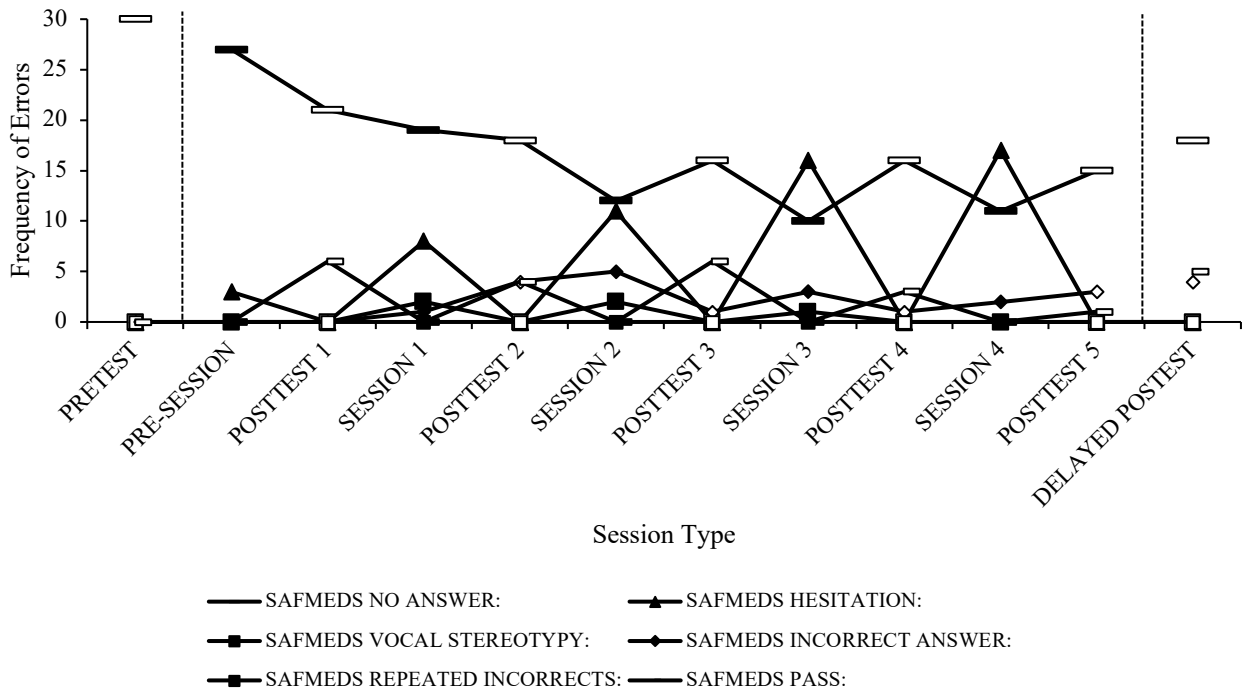
Figure 14. SAFMEDS Error Type Frequencies (Coby). Open data points are pretests or posttests. Closed data points are sessions.

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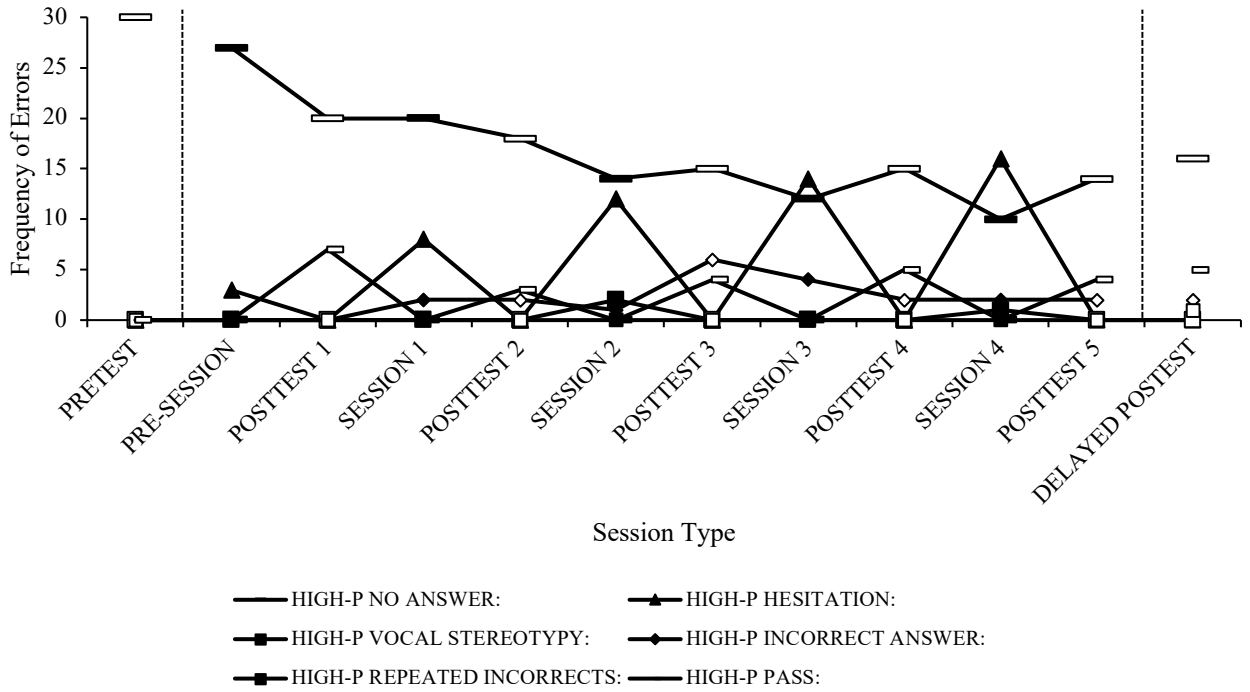
Figure 15. High-P SAFMEDS Error Type Frequencies (Coby). Open data points are pretests or posttests. Closed data points are sessions.
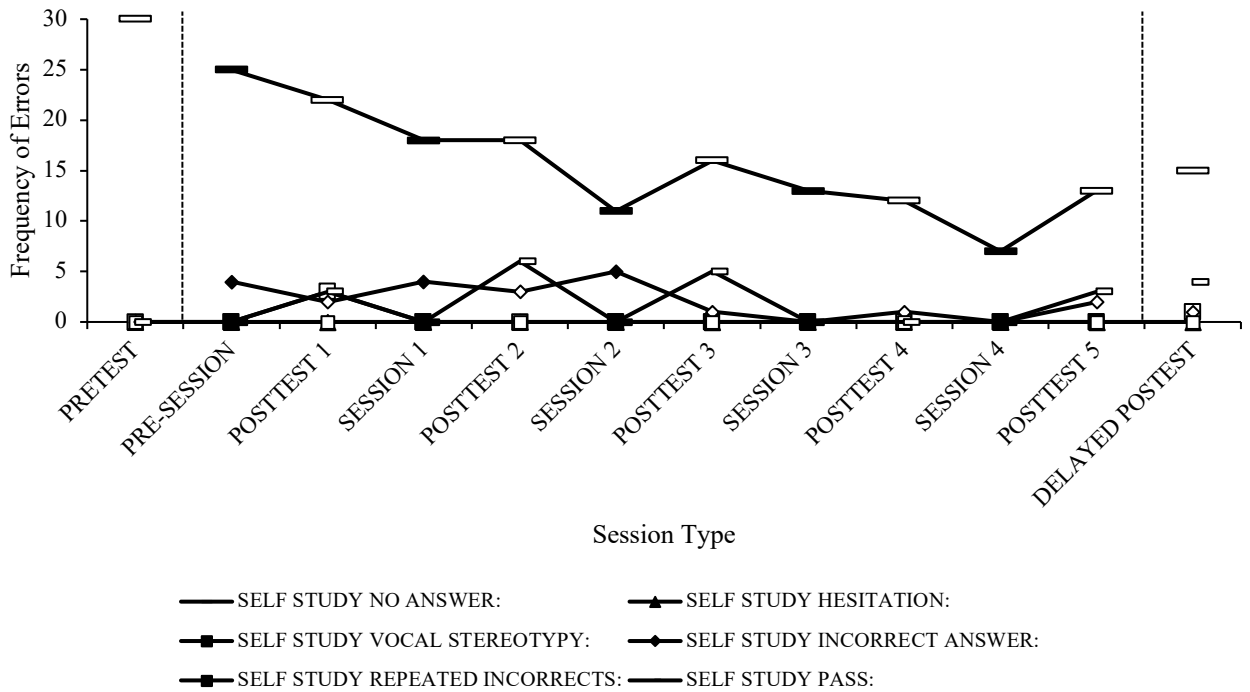
Figure 16. Self-Study Error Type Frequencies (Coby). Open data points are pretests or posttests. Closed data points are sessions.

29
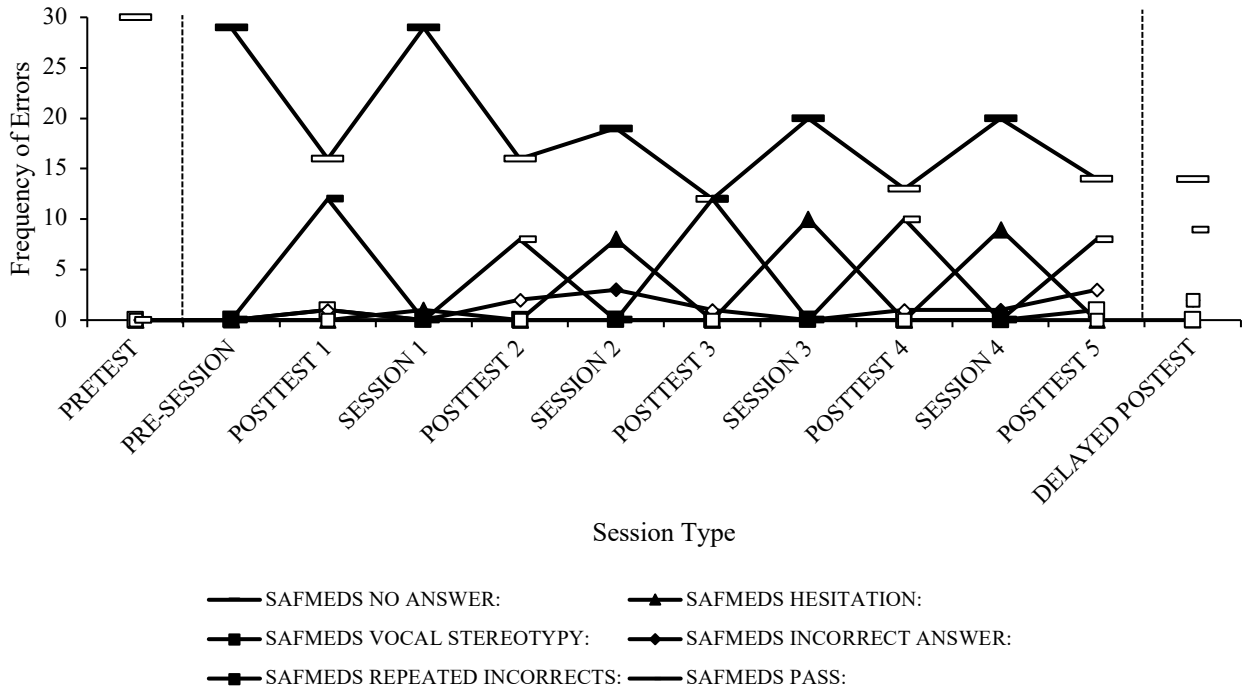
Figure 17. SAFMEDS Error Type Frequencies (Harper). Open data points are pretests or posttests. Closed data points are sessions.
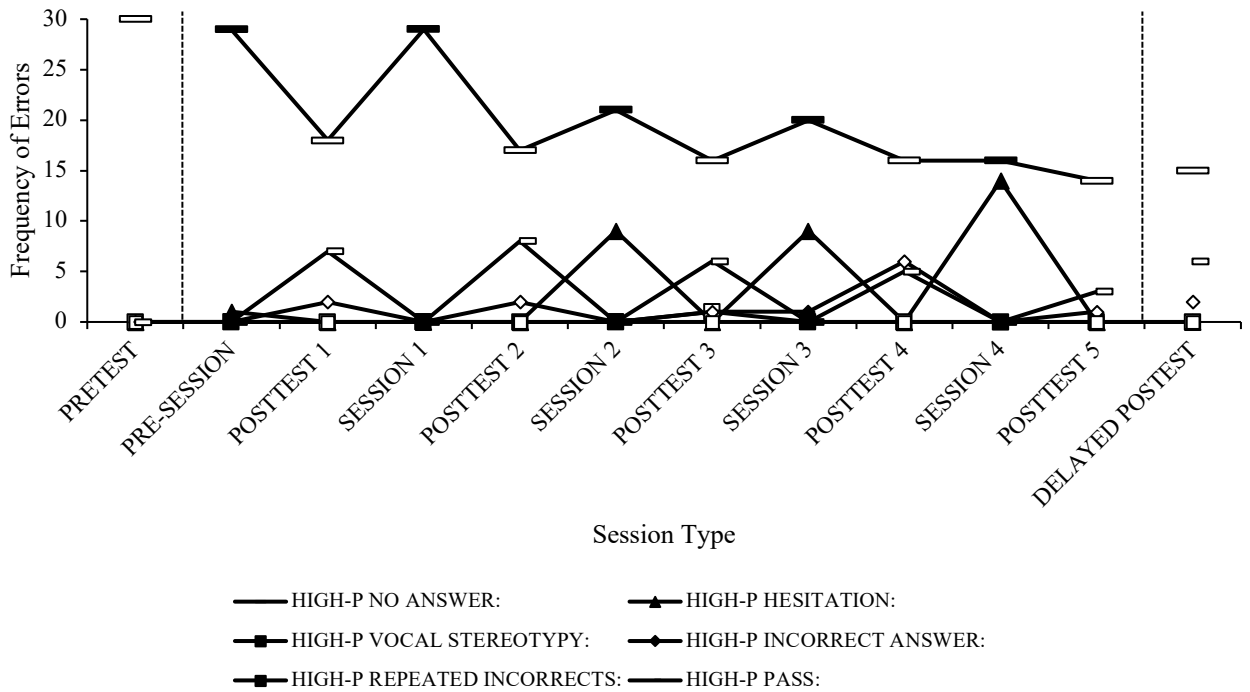
Figure 18. High-P SAFMEDS Error Type Frequencies (Harper). Open data points are pretests or posttests. Closed data points are sessions.
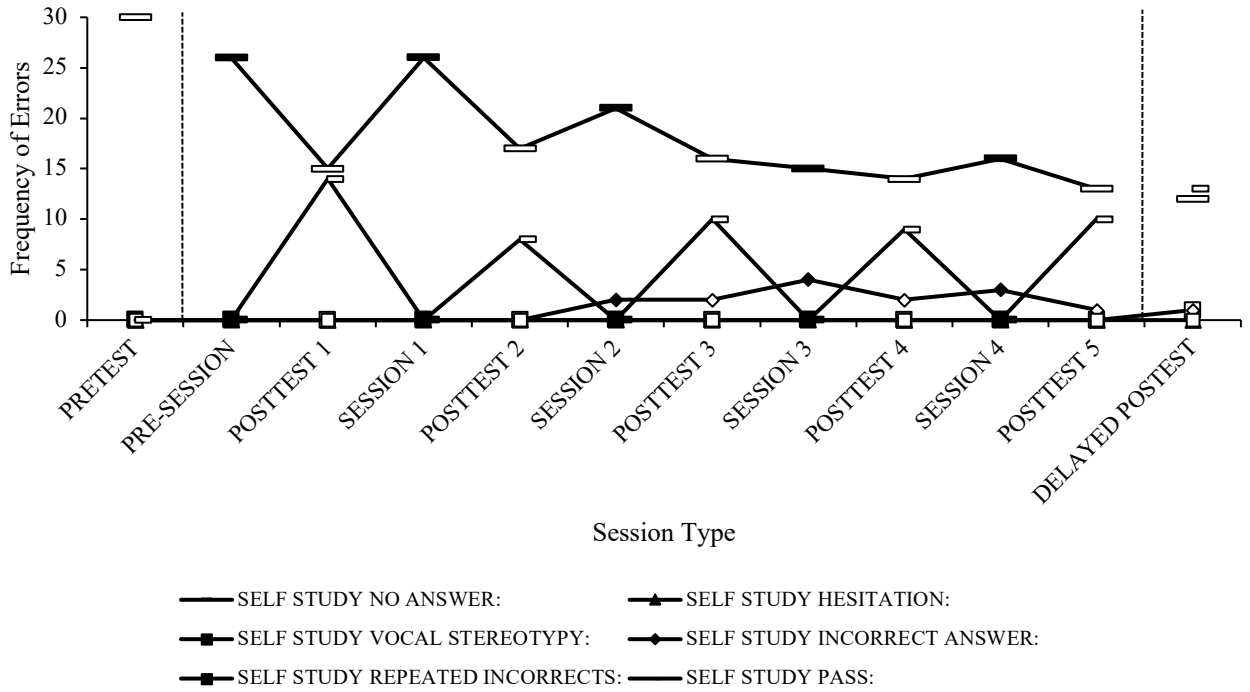
Figure 19. Self-Study Error Type Frequencies (Harper). Open data points are pretests or posttests. Closed data points are sessions.
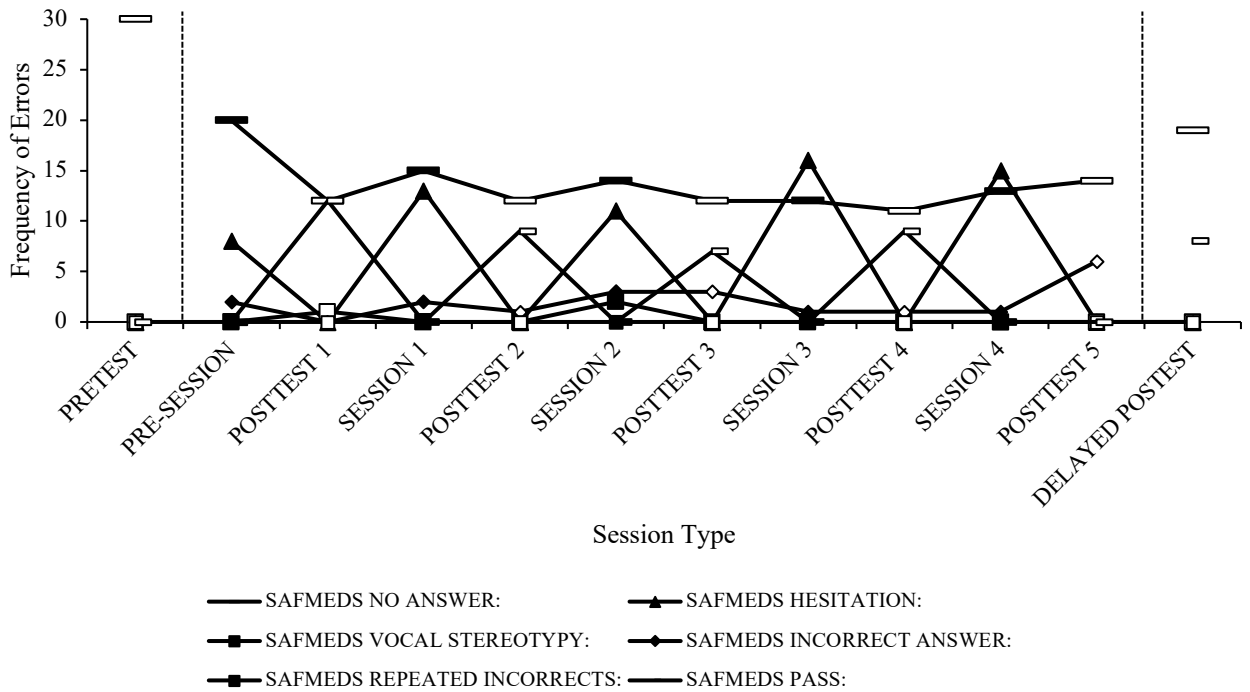
Figure 20. SAFMEDS Error Type Frequencies (Taylor). Open data points are pretests or posttests. Closed data points are sessions.

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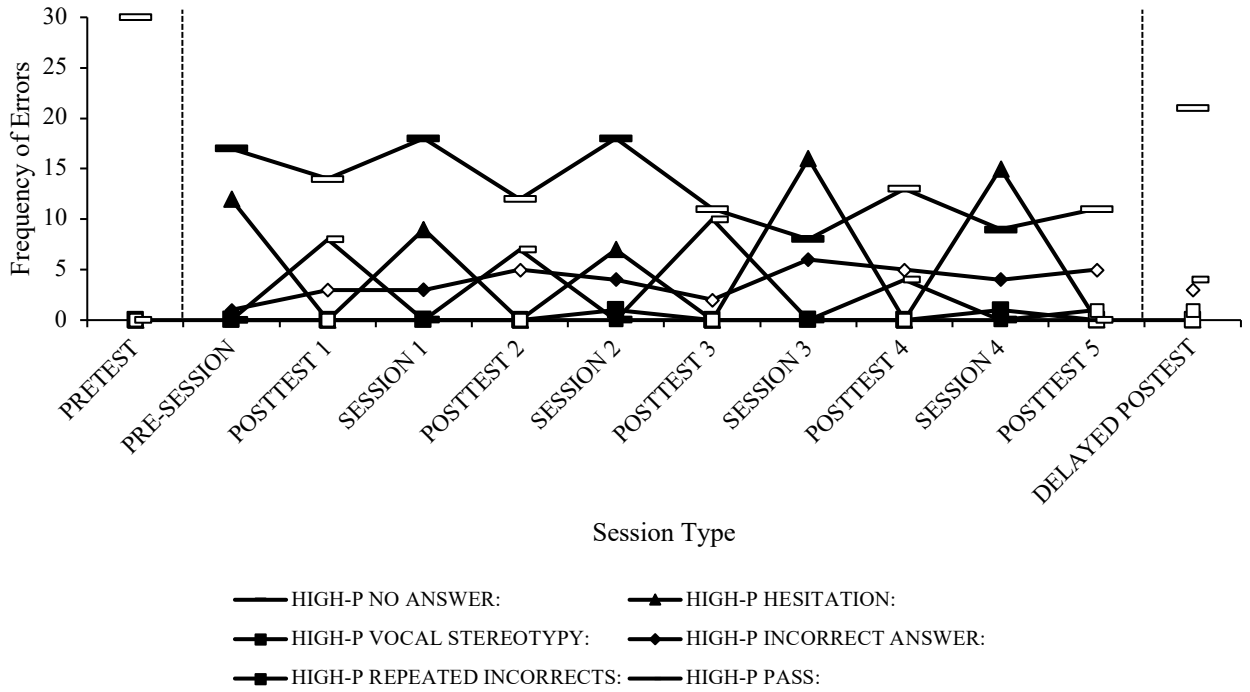
Figure 21. High-P SAFMEDS Error Type Frequencies (Taylor). Open data points are pretests or posttests. Closed data points are sessions.
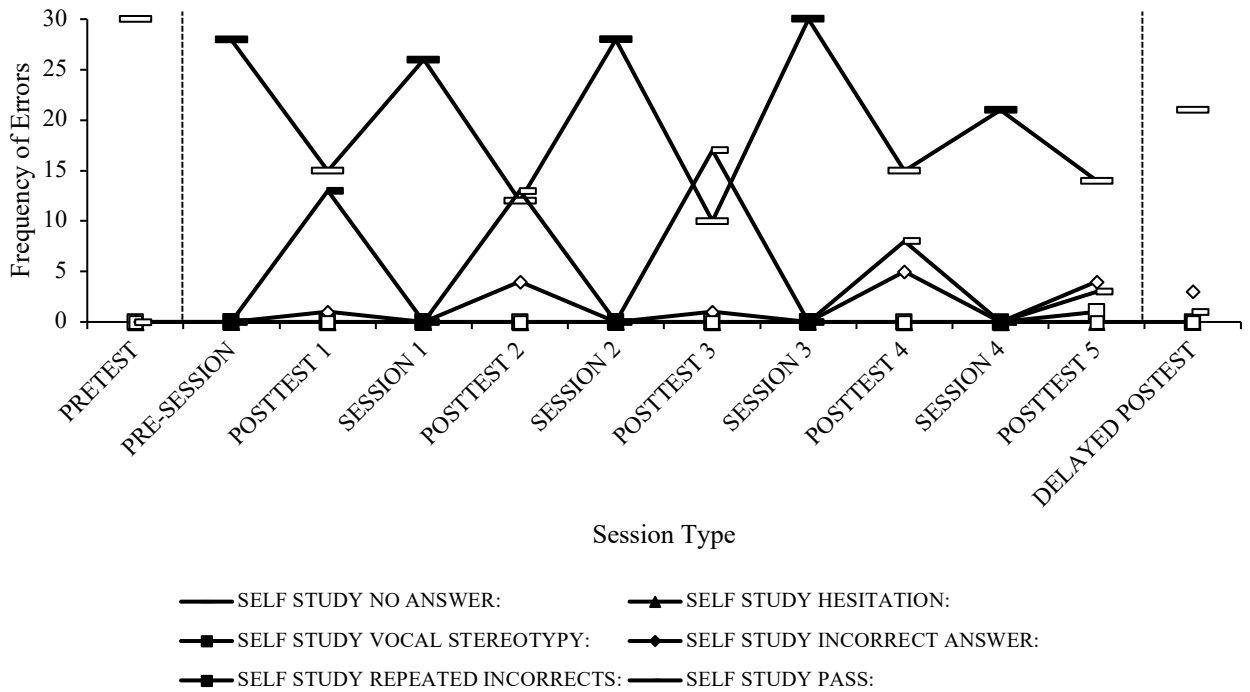
Figure 22. Self-Study Error Type Frequencies (Taylor). Open data points are pretests or posttests. Closed data points are sessions.

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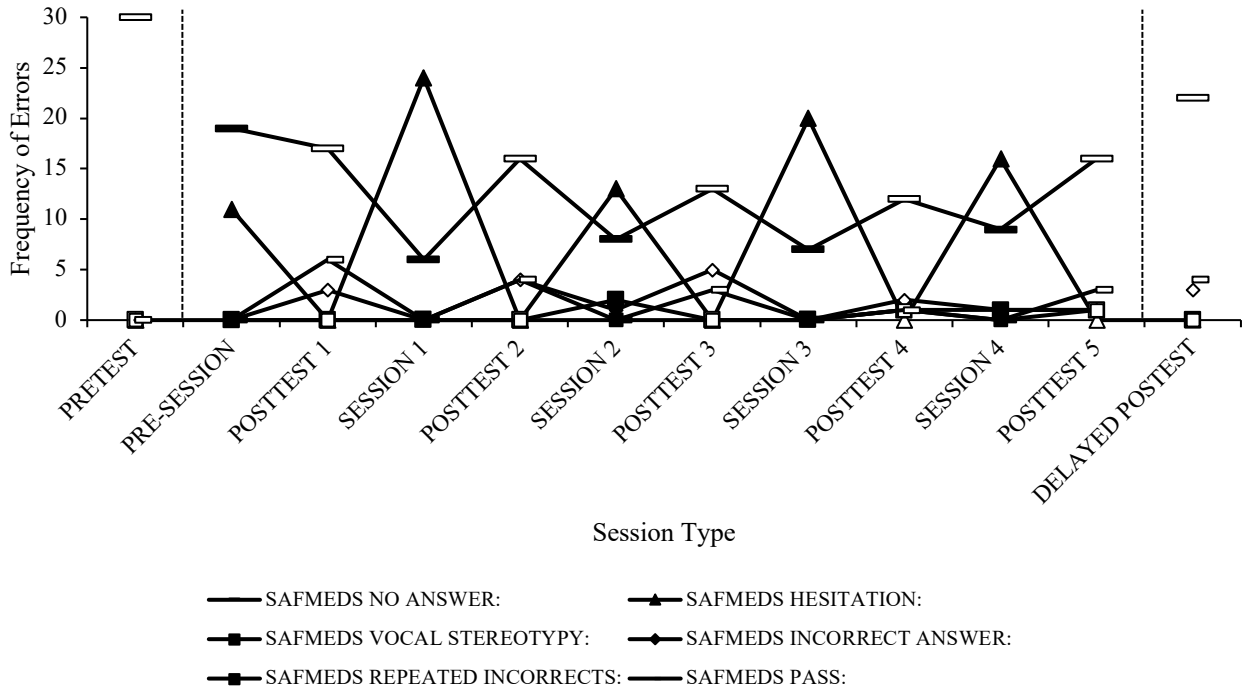
Figure 23. SAFMEDS Error Type Frequencies (Dakota). Open data points are pretests or posttests. Closed data points are sessions.
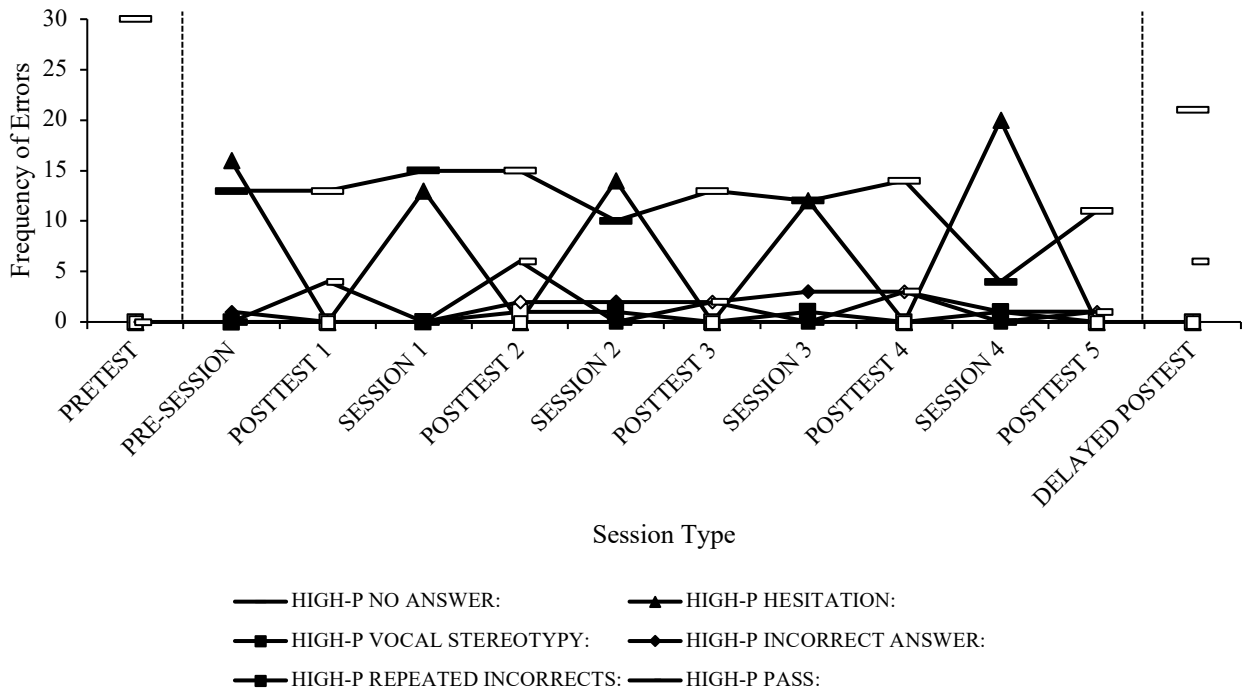
Figure 24. High-P SAFMEDS Error Type Frequencies (Dakota). Open data points are pretests or posttests. Closed data points are sessions.

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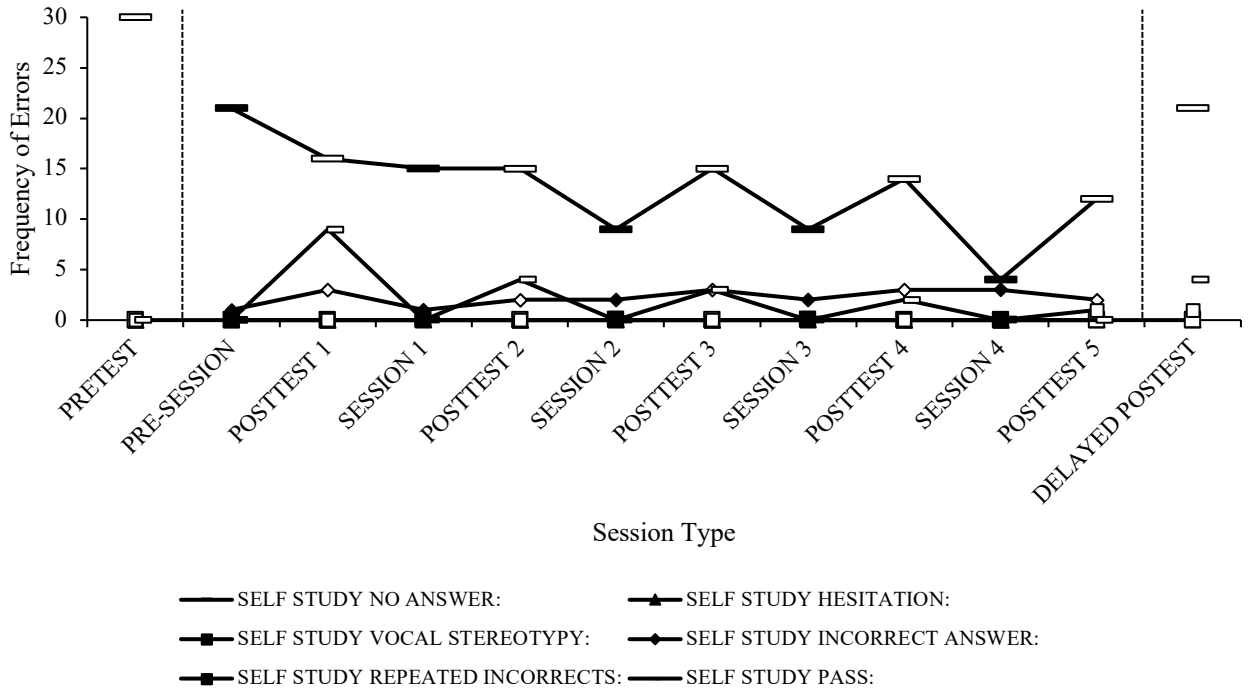
Figure 25. Self-Study Error Type Frequencies (Dakota). Open data points are pretests or posttests. Closed data points are sessions.
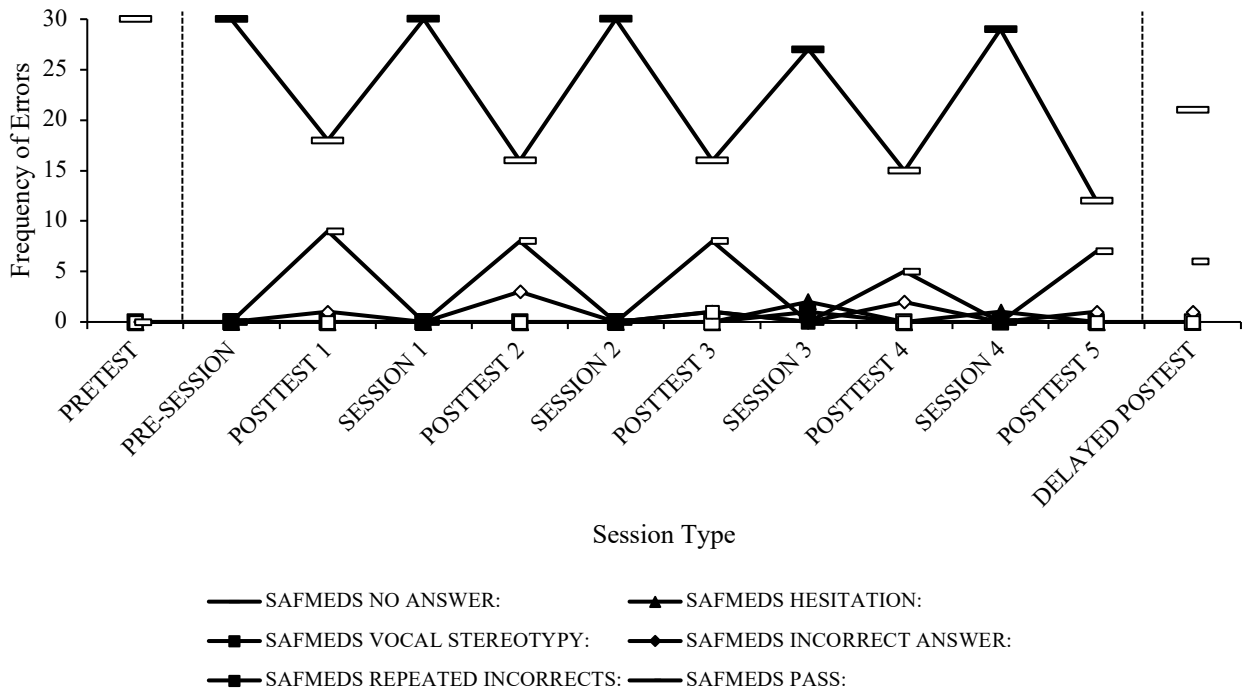
Figure 26. SAFMEDS Error Type Frequencies (Morgan). Open data points are pretests or posttests. Closed data points are sessions.

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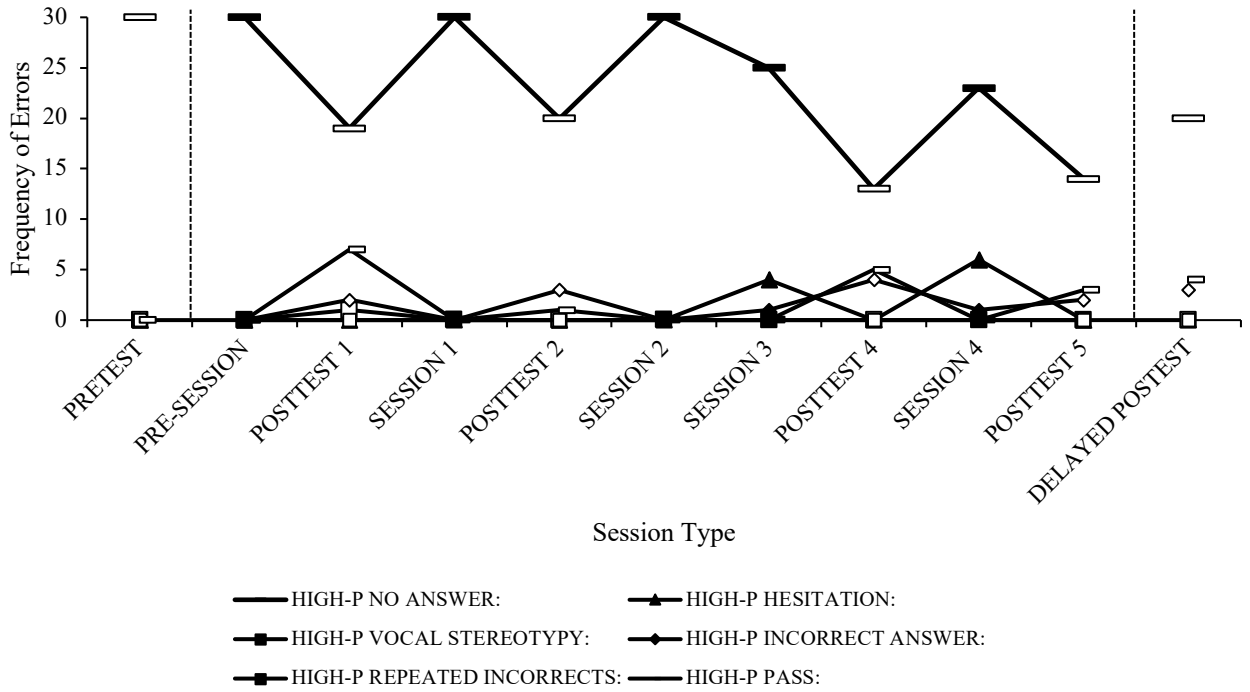
Figure 27. High-P SAFMEDS Error Type Frequencies (Morgan). Open data points are pretests or posttests. Closed data points are sessions.
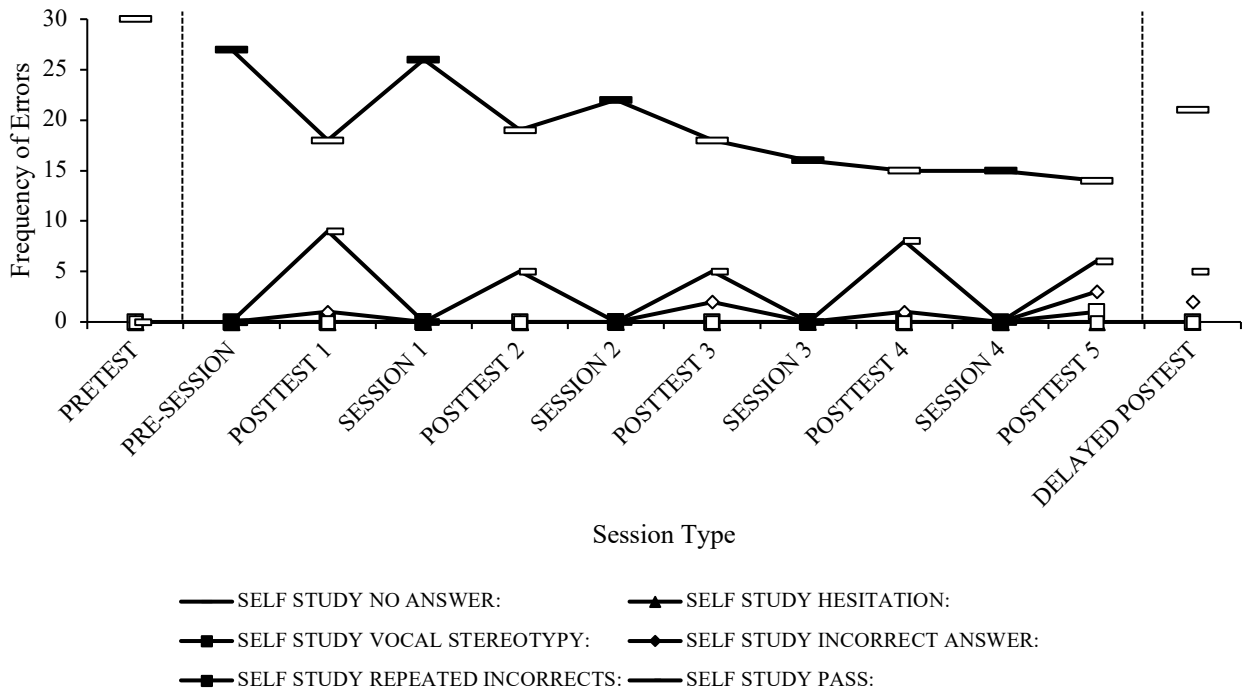
Figure 28. Self-Study Error Type Frequencies (Morgan). Open data points are pretests or posttests. Closed data points are sessions.

Figures 29-33 show grand means for the frequencies of error types in sessions and posttests, as well as the mean frequencies of correct answers in delayed posttests. Figure 29 displays the grand means for error types during sessions. No answer and hesitation errors were the most frequent. No answer errors occurred for all three conditions while hesitation errors only occurred in SAFMEDS and high-p SAFMEDS. No answer was about the same across conditions while hesitation was slightly higher in high-p SAFMEDS than SAFMEDS. Incorrect answer errors occurred at lower frequencies but were highest in self-study followed by high-p SAFMEDS and SAFMEDS. Vocal stereotypy only occurred in SAFMEDS and high-P SAFMEDS and occurred at the lowest frequency of all error types.
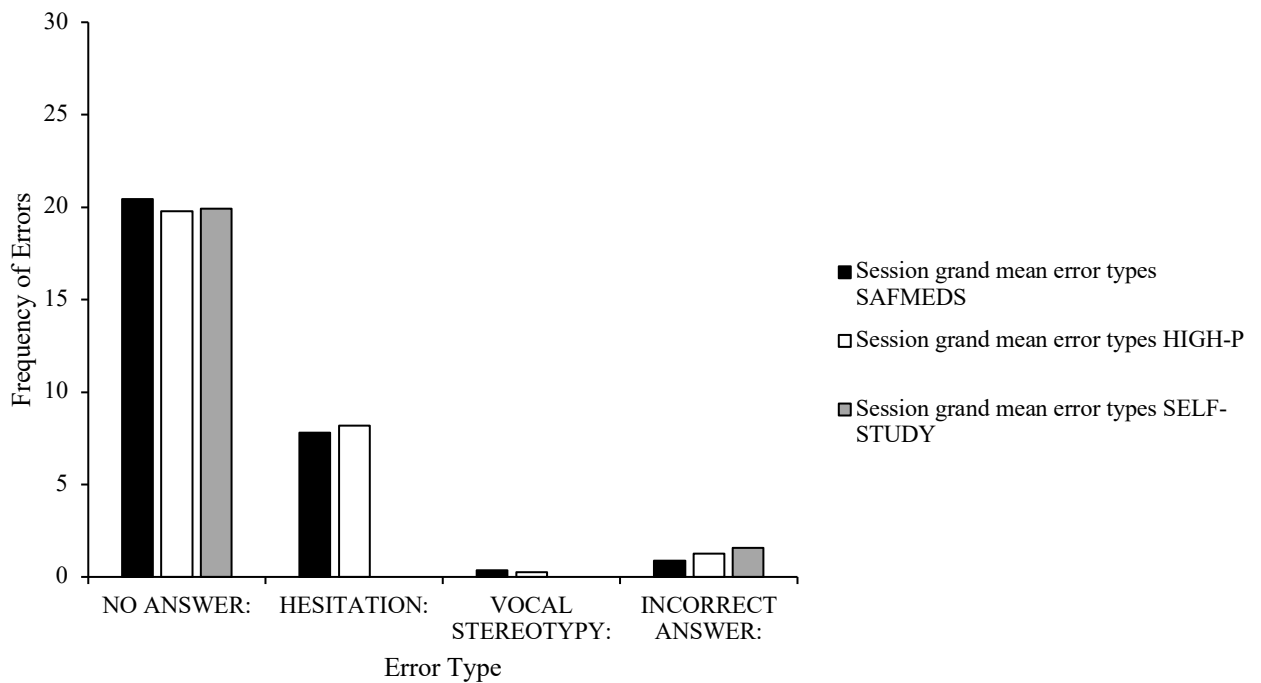
Figure 29. Session Grand Mean Error Types

Figure 30 shows the grand means of error types during posttests. No answer was the most frequent error type and occurred at about the same frequency across all three

conditions. Pass was the next most frequent error type and occurred most in self-study followed by SAFMEDS and high-p SAFMEDS. Incorrect answer and vocal stereotypy errors occurred at the lowest frequencies. Incorrect answer errors were most frequent in high-p SAFMEDS and were about the same for SAFMEDS and self-study. Vocal stereotypy was the same for all three conditions.
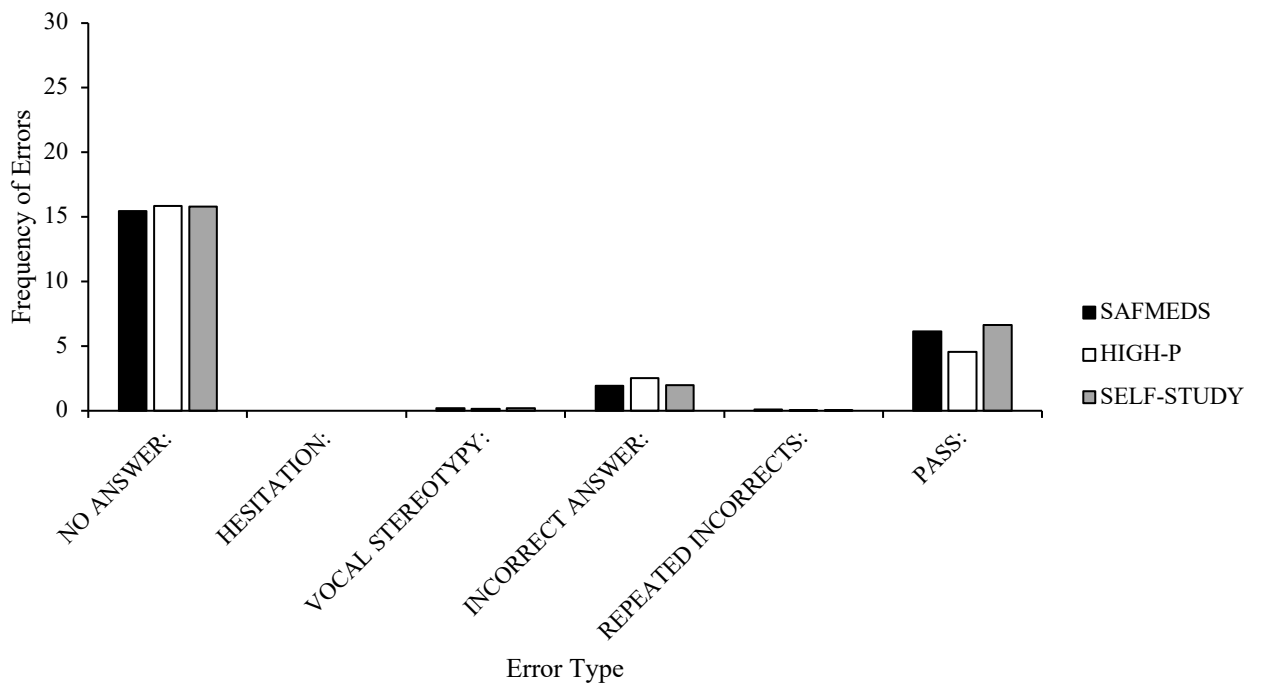
Figure 30. Posttest Grand Mean Error Types

Figure 31 shows mean correct answers during delayed posttests. No answer was the most frequent error type and was highest in SAFMEDS followed by high-p SAFMEDS and self-study. Pass was the next most frequent error type and occurred most in SAFMEDS followed by self-study and high-p SAFMEDS. Incorrect answer, repeated incorrects, and vocal stereotypy errors occurred at the lowest frequencies. Repeated incorrects and incorrect answer errors were about the same across all three conditions, and vocal stereotypy errors only occurred in self-study. Figure 31 does not include the

data for Morgan, who completed the delayed posttests after a three-week period. Figure

32 includes Morgan's data.
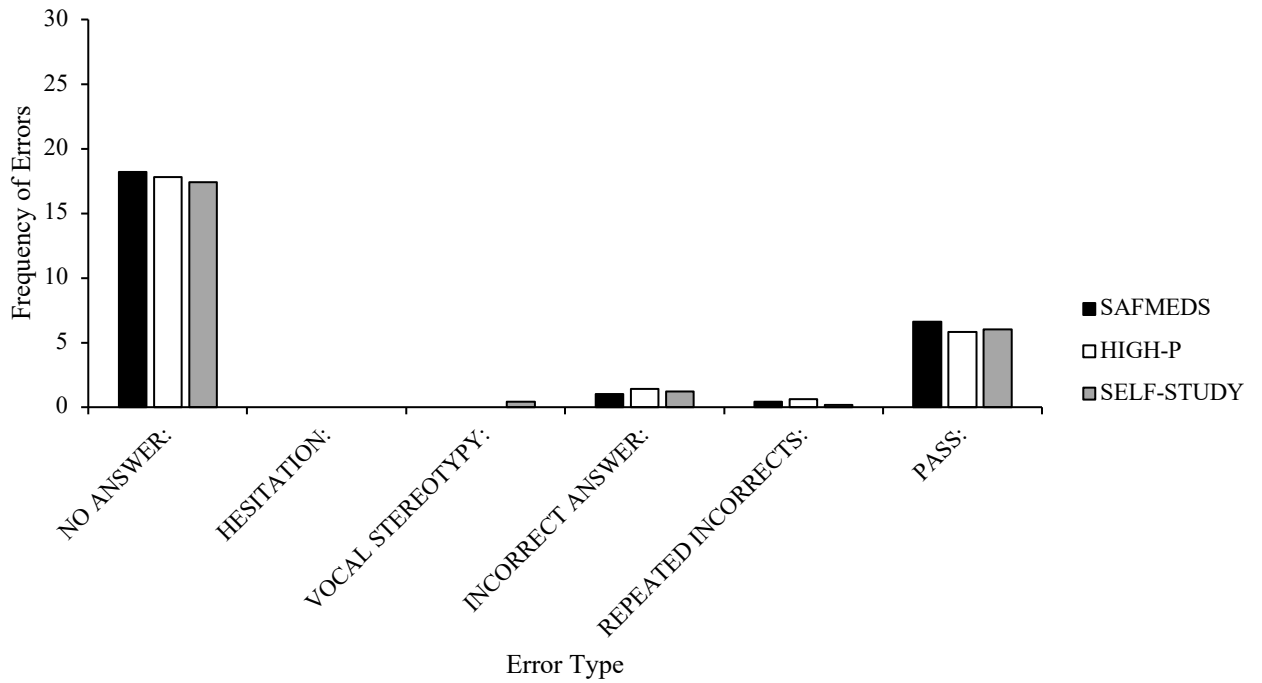
Figure 31. Delayed Posttest Mean Error Types
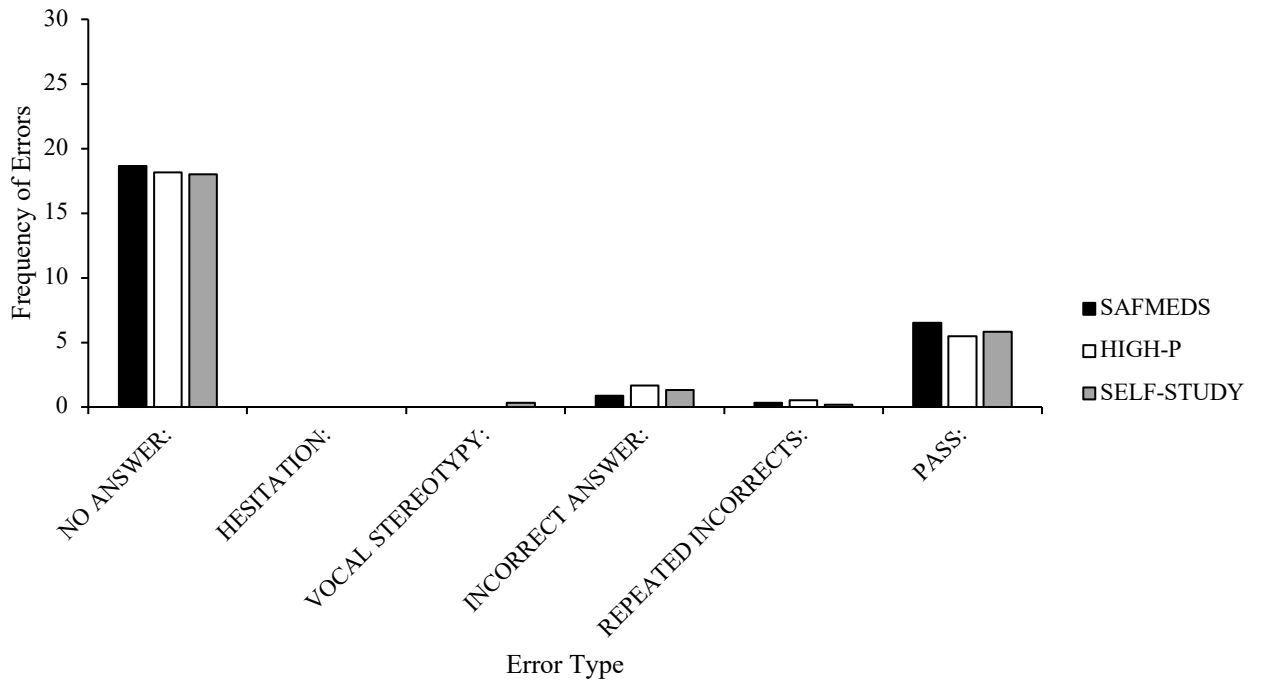
Figure 32. Delayed Posttest Mean Error Types (All Subjects)

Table 1 shows the responses of survey participants. Three of six (50%) participants filled out the survey. All participants had a neutral preference for SAFMEDS and high-p SAFMEDS sessions, and two of three (66.66%) indicated they did not like self-study sessions. Two of three participants (66.66%) indicated that high-p SAFMEDS was the easiest condition, and two of three (66.66%) indicated that they felt their answering behaviors were most likely to be reinforced in SAFMEDS. All participants indicated that they could tell they were doing better at one condition's flashcards than the others during posttests, and two of three (66.66%) indicated that they could tell during delayed posttests.

Table 1. Social Validity Survey

#	Question					
		Social Validity Survey				
		Answers				
Q1	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I could tell that the two conditions that were not self-study were conducted differently (1-5).	2 - Disagree	3 - Neutral	5 - Strongly Agree	2 - Disagree	
Q2	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the SAFMEDS condition the best (1-5).	3 - Neutral	3 - Neutral	3 - Neutral		
Q3	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the high-p condition the best (1-5).	3 - Neutral	3 - Neutral	3 - Neutral		
Q4	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the self-study condition the best (1-5).	1 - Strongly Disagree	2 - Disagree	3 - Neutral		
Q5	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought SAFMEDS was the easiest condition (1-5).	4 - Agree	3 - Neutral	3 - Neutral		
Q6	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought high-p was the easiest condition (1-5).	2 - Disagree	4 - Agree	4 - Agree		
Q7	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought self-study was the easiest condition (1-5).	3 - Neutral	2 - Disagree	4 - Agree		
Q8	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the SAFMEDS condition (1-5).	4 - Agree	3 - Neutral	4 - Agree		
Q9	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the high-p condition (1-5).	2 - Disagree	3 - Neutral	4 - Agree		
Q10	During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the self-study condition (1-5).	2 - Disagree	3 - Neutral	4 - Agree		
Q11	For the session posttests (not the delayed posttests), I could tell I was definitely doing better at one condition's flashcards than the others (1-5).	4 - Agree	5 - Strongly Agree	4 - Agree		
Q12	If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?	SAFMEDS	Not applicable	High-p		
Q13	For the delayed posttests, I could tell I was definitely doing better at one condition's flashcards than the others (1-5).	4 - Agree	4 - Agree	3 - Neutral		
Q14	If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?	SAFMEDS	Not applicable	Not applicable		
Q15	I would use one of the same methods in one of the conditions for studying (1-5).	4 - Agree	1 - Strongly Disagree	1 - Strongly Disagree	3 - Neutral	
Q16	If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?	SAFMEDS	Not applicable	Not applicable		

Integrity

Previous research relied on subjects or students to correctly implement SAFMEDS procedures. To ensure the integrity of the independent variable, SAFMEDS and high-p SAFMEDS were conducted using a mediator and all conditions were recorded. In the present study, issues with equipment/technology led to three instances where one flashcard was presented twice during two experimental sessions and one posttest. In these same instances, times for sessions deviated by one second. Two sessions were finished at either thirty-one seconds or twenty-nine seconds, and one posttest was finished within thirty-one seconds. In sixteen other sessions "good" was not immediately stated by the primary observer and flashcards were not immediately put in the correct pile. Some flashcards were also presented for less than about a second in two separate sessions. In addition to sessions and posttests, not all pretests were not conducted with 100% procedural integrity. In one pretest, three flashcards were initially presented backwards and then were later re-presented. In five other pretests, corrective feedback was given for some initial flashcards. Therefore, there was a total count mean procedural integrity of about 87% throughout all conditions.

Approximately 95% of all sessions were scored by both a primary observer and the first independent observer, and about 94% were double coded by a second independent observer. Means across all conditions were generated for each subject. Agreement with the primary observer's corrects/incorrects across conditions ranged from 86%-100% with a mean of 91% and agreement for error types ranged from 90%-97% with a mean of 92%. Agreement between the first observer and the double coder's

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corrects/incorrects across conditions ranged from 78%-96% with a mean of 88% and agreement for error types ranged from 84%-97% with a mean of 92%.

DISCUSSION

Previous studies have shown that SAFMEDS can build fluency by practicing for a minute every day. However, there have been variations of SAFMEDS procedures that allowed for additional review or practice. In the study by Quigley (2014), results showed that adding reviews or additional practice increased performance compared to the basic SAFMEDS method, and researchers in Kubina, Yurich, Durica, and Healy (2016) used additional practice for training staff. Studies using other flashcard methods have also shown the effects of additional practice. Van Houten and Rolider (1989) increased performance using a mediator to present sets of flashcards multiple times back to back. This was implemented in both a sequential presentation method and a rapid re-presentation method where an incorrect flashcard was presented again after the next flashcard.

The present study contributes to the research by building evidence for the benefits of modifying the SAFMEDS method and the need for efficient methods of repeated flashcard practice. In this study, SAFMEDS was modified by introducing a mediator and high-p sequencing. The mediator was included to verify the integrity of SAFMEDS procedures, and high-p sequencing was used to increase performance. High-p SAFMEDS led to higher performance than SAFMEDS during posttests and delayed posttests and also led to increased retention. However, none of the present study's conditions led to fluency and the mediated conditions experienced the greatest losses in retention. Therefore, several conclusions can be made. First, mediated flashcard presentations can

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be used to verify the integrity of a study method and increase performance in posttests. Second, self-study can lead to higher performance during sessions and greater retention but may not be as effective as mediated conditions during posttests. Third, practicing once a day may not be a sufficient strategy to build fluency.

Trends were also seen in error types. As shown in figures 29-32, the frequencies for hesitation and incorrect answer were slightly higher in high-p SAFMEDS than SAFMEDS and pass was lower in high-p SAFMEDS as well. Given that the accurate rate of answers was the same for these conditions during sessions and slightly higher for high-p SAFMEDS during posttests, these results suggest that subjects were more likely to answer flashcards in high-p SAFMEDS than SAFMEDS. This could be due to the effect of high-p sequencing. Momentum may have been established and increased the probability of answering. However, it may not have increased the probability of a fluent answer. As shown in figures 11-28, hesitation during sessions increased to frequencies that were similar to or greater than no answer. Due to the overall high rate of errors, the increases in hesitation indicate that subjects' answers became more accurate as the number of sessions increased, but answers were not given fast enough to be fluent.

Survey results and performance during sessions showed that high-p SAFMEDS may not increase accurate rates of responding due to increased rates of reinforcement. The majority of subjects indicated that they felt reinforcement was more likely in SAFMEDS during sessions, and more subjects correctly answered flashcards in SAFMEDS first before high-p SAFMEDS than the converse. It should also be noted that the majority of correct answers occurred during self-study sessions. This may be due to four things. One, there could have been higher rates of reinforcement when the learner

controlled the cards than during mediated conditions. Second, control over the cards could have reduced latencies between presenting, answering, and placing cards in correct/incorrect piles. Third, some flashcards may have been incorrectly placed in the correct pile. Fourth, a learner may have modified the learning channel by engaging in see/sort or covert behaviors. Rather than seeing the front of the card and saying the back out loud, a learner could have engaged in covert behavior after seeing the flashcard. The higher accurate rate of responding in self-study sessions may have also led to the more stable retention seen in delayed posttests. This would indicate that control over the cards is a vital component of SAFMEDS methods used in previous research.

Though trends were identified, there were not clear differences between all conditions. There were no significant differences for correct answers between SAFMEDS, high-p SAFMEDs, and self-study during posttests. This could be due to the lack of repeated practice every day. Significant differences were seen during sessions for correct answers between self-study sessions and mediated conditions. However, there was a lack of differences between mediated conditions. This could be due to their flashcard presentation procedures. Answers needed to be made before the presentation of a flashcard ended, which could have led to the high number of hesitation errors and the low frequency of correct answers.

Limitations of this study include human error, issues related to technology and equipment, and the COVID-19 pandemic. Primary observers found that presenting a flashcard, providing feedback, and sorting the flashcard within about a second was difficult and stressful even with the assistance of a metronome. These factors may have affected the procedural integrity of the study. Equipment and technology issues led to the

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lack of interobserver agreement for two posttests for a subject and reduced the quality of recordings. The COVID-19 pandemic created limitations as well. There were reduced opportunities for training, data collection, and subject recruitment. Changes to the study's protocol due to the pandemic further delayed Morgan's posttest by another week, and caused Taylor, Dakota, and Morgan to take delayed posttests over WebEx.

Findings from this study show that future research could be conducted on additional practice, self-directed flashcard methods, automated flashcard presentations, and contingency adduction. Investigating the effects of repeated incremental rehearsal or the number of daily practice sessions in adult populations could lead to a more efficient flashcard method for trainings. Self-directed practice could lead to improvements as well. Verifying the integrity of self-directed methods and comparing them to mediated methods could give further insight on how many staff members are required to build fluency. Additionally, the integrity and efficiency of learning channel trainings may be further increased by delivering them in computer-based trainings, and costs could be further reduced by structuring sequences to promote adduction as shown in the study by Pampino, Wilder, and Binder (2005).

REFERENCES

Adams, O., Cihon, T. M., Urbina, T., & Goodhue, R. J. (2018). The comparative effects of cumulative and unitary SAFMEDS terms in an introductory undergraduate behavior analysis course. *European Journal of Behavior Analysis, 19*(2), 176-194. doi:10.1080/15021149.2017.14043494

Arthur, W., Bennett, W., Edens, P.S., & Bell, S. T. (2003). Effectiveness of training in organizations: A meta-analysis of design and evaluation features. *Journal of Applied Psychology, 88*(2), 234-245. doi:10.1037/0021-9010.88.2.234

Axelrod, M. I., Amber, Z. J. (2012). Increasing classroom compliance: Using a high-probability command sequence with noncompliant students. *Journal of Behavioral Education, 21*(2), 119-133. doi:10.1007/s10864-011-9145-6

Belfiore, P. J., Basile, S. P., Lee, D. L. (2008). Using a high probability command sequence to increase classroom compliance: The role of behavioral momentum. *Journal of Behavioral Education, 17*(2), 160-171. doi:10.1007/s10864-007-9054-x

Beverley, M., Hughes, J. C., & Hastings, R. P. (2009). What's the probability of that? Using SAFMEDS to increase undergraduate success with statistical concepts. *European Journal of Behavior Analysis, 10*(2). doi:10.1080/15021149.2009.11434321

Binder, C. (1988). Precision teaching: Measuring and attaining academic achievement. *Youth Policy. 10*(7), 12-15.

Binder, C. (1993). Behavioral fluency: A new paradigm. *Educational Technology, 33,* 8–14.

Binder, C. (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst, 19*(2), 163–197. doi:10.1007/bf03393163

Binder, C. (2003, March). Doesn't Everybody Need Fluency? *Performance Improvement,*
42(3), 14-20. doi:10.1002/pfi.4930420304

Binder, C. (2010). Building Fluent Performance: Measuring Response Rate and Multiplying
Response Opportunities. *Behavior Analyst Today, 11*(4), 214-225.
doi:10.1037/h0100702

Binder, C., & Sweeney, L. (2002). Building fluent performance in a customer call center.
Performance Improvement, 41(2), 17-21. doi:10.1002/pfi.4140410207

Binder, C., & Bloom, C. (1989). Fluent product knowledge: Application in the financial
services industry. *Performance Instruction, 28*(2), 17-21.
doi:10.1002/pfi.4170280205

Burns, M., Ardoin, S., Parker, D., Hodgson, J., Klingbeil, D., & Scholin, S. (2009).
Interspersal technique and behavioral momentum for reading word lists. *School*
Psychology Review, 38(3), 428-434.

Cooper, J. O., Heron, T. E., & Heward, W. L., (2007). *Applied behavior analysis* (2nd ed.).
Upper Saddle River, NJ: Prentice Hall.

Davis, C., & Reichle, J. (1996). Variant and invariant high-probability requests: Increasing
appropriate behaviors in children with emotional-behavioral disorders. *Journal of*
Applied Behavior Analysis, 29(4), 471-482. doi:10.1901/jaba.1996.29-471

Dermer, M. L., Lopez, S. L., & Messling, P. A., III. (2009). Fluency training a writing skill:
Editing for concision. *Psychological Record, 59*(1), 3-20. doi:10.1007/bf03395646

Eshleman, J. E. (2000). SAFMEDS on the web: Guidelines and considerations for
SAFMEDS. (Retrieved June 28, 2018 from
http://standardcelerationcharttopics.pbworks.com/SAFMEDS-on-the-web)

Grace, R., Bedell, M., & Nevin, J. (2002). Preference and resistance to change without constant- and variable-duration terminal links: Independence of reinforcement rate and magnitude. *Journal of the Experimental Analysis of Behavior, 77*(3), 233-255. doi:10.1901/jeab.2002.77-233

Graf, S. A., & Auman, J. (2005). SAFMEDS: A tool to build fluency. Poland, OH: Graf Implements.

Ho, M. (2017). Learning investment & hours are on the rise. *Talent Development, 71*(12), 38-43.

Kubina Jr., R. M., Yurich, K. L., Durica, K. C., & Healy, N. M. (2016). Developing behavioral fluency with movement cycles using SAFMEDS. *Journal of Behavioral Education 25*(1), 120-141. doi:10.1007/s10864-015-9232-1

Kupzyk, S., Daly, E. J., III, & Andersen, M. N. (2011). A comparison of two flash-card methods for improving sight-word reading. *Journal of Applied Behavior Analysis, 44*, 781–792. doi:10.1901/jaba.2011.44-781

Lee, D. L. (2005). Increasing compliance: A quantitative synthesis of applied research on high-probability request sequences. *Exceptionality, 13*(3), 141–154. doi:10.1207/s15327035ex1303_1

Lee, D. L. (2006). Facilitating transitions between and within academic tasks: An application of behavioral momentum. *Remedial and Special Education, 27*, 312–317. doi:10.1177/07419325060270050601

Lee, D. L., Belfiore, P. J., Scheeler, M., Hua, Y., & Smith, R. (2004). Behavioral momentum in academics: Using embedded high-p sequences to increase academic productivity. *Psychology in the Schools, 41*(7), 789-801. doi:10.1002/pits.20014

Mcgrath, C., Mccourt, G., Gormley, K., Dillenburger, A., Dounavi, C., & Corry, G. (2016). Does precision teaching enhance dermatology diagnostic skills in medical students? *British Journal of Dermatology, 175*, 199-200.

Miller, L. (2013). ASTD 2013 state of the industry. American Society for Training & Development, Alexandria, VA.

Miller, L. (2017). ASTD 2017 state of the industry. American Society for Training & Development, Alexandria, VA.

Nevin, J., & Shahan, T. (2011). Behavioral momentum theory: equations and applications. *Journal of Applied Behavior Analysis, 44*(4), 877-895. doi:10.1901/jaba.2011.44-877

Pampino, R. N., Wilder, D. A., & Binder, C. (2005). The use of functional assessment and frequency building procedures to increase product knowledge and data entry skills among foremen in a construction organization. *Journal of Organizational Behavior Management, 25*(2), 1-36. doi:10.1300/j075v25n02_01

Parsons, M. B., Rollyson, J. H., & Reid, D. H. (2013). Teaching practitioners to conduct behavioral skills training: A pyramidal approach for training multiple human service staff. *Behavior Analysis in Practice, 6*, 4-16. doi:10.1007/bf03391798

Potts, L., Eshleman, J. W., & Cooper, J. O. (1993). Ogden R. Lindsley and the historical development of precision teaching. *The Behavior Analyst, 16*(2), 177-89. doi:10.1007/bf03392622

Quigley, S., (2014). *An evaluation of various SAFMEDS procedures* (unpublished doctoral dissertation) Western Michigan University, Kalamazoo, MI.

Quigley, S. P., Peterson, S. M., Frieder, J. E., & Peck, K. M. (2017). A review of
SAFMEDS: Evidence for procedures, outcomes and directions for future research.
Perspectives on Behavior Science, 41(1), 283-301. doi:10.1007/s40614-017-0087-8

Reed, F., & Henley, D. (2015). A Survey of Staff Training and Performance Management
Practices: The Good, the Bad, and the Ugly. *Behavior Analysis in Practice, 8*(1), 16-
26. doi:10.1007/s40617-015-0044-5

Reid, D. H., & Parsons, M. B. (2000). Organizational behavior management in human
service settings. In J. Austin & J. E. Carr (Eds.), *Handbook of applied behavior
analysis* (pp. 275– 294). Reno, NV: Context Press.

Sarokoff, R., & Sturmey, P. (2004). The effects of behavioral skills training on staff
implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis,
37*(4), 535-538. doi:10.1901/jaba.2004.37-535

Shapiro, M., Kazemi, E., & Kavner, A. (2015). Predictors of intention to turnover in behavior
technicians working with individuals with autism spectrum disorder. *Research in
Autism Spectrum Disorders, 17*, 106-115. doi:10.1016/j.rasd.2015.06.012

Stockwell, F., & Eshleman, J. (2010). A case study using SAFMEDS to promote fluency
with skinner's verbal behavior terms. *Journal of Precision Teaching and Celeration,
26*, 33–40.

Taylor, P. J., Russ-Eft, D. F., & Chan, D. W. L. (2005). A meta-analytic review of behavior
modeling training. *Journal of Applied Psychology, 90*(4), 692-709.
doi:10.1037/e5186112013-051

Togade, D., Ormandy, S., & Stockwell, F. (2012-2013). Fluency: skill acquisition of

common Tagalog words and symbols. *Journal of Precision Teaching and Celeration,*

26, 33-40

Van Houten, R., Rolider, A. (1989). An analysis of several variables influencing the efficacy

of flash card instruction. *Journal of Applied Behavior Analysis, 22*(1), 111-118.

doi:10.1901/jaba.1989.22-111

Van Oorsouw, W., Embregts, P., Bosman, A., Jahoda, B., & Burford, W. (2012). Same view

but different language: Perceptions of staff-client interactions. *Journal of Intellectual*

Disability Research, 56(7-8), 772. doi:10.5176/2315-4330_wnc15.107

Vostal, B. R., & Lee, D. L. (2015). Effects of oral reading fluency on students with emotional

and behavioral disorders' latency to continue reading. *Reading Improvement, 52*(3),

112-125.

Wilder, D. A., & Atwell, J. (2006). Evaluation of a guided compliance procedure to reduce

noncompliance among preschool children. *Behavioral Interventions, 21*(4), 265-272.

doi:10.1002/bin.222

Appendix A

In-Class Recruitment Script

Hello everyone and thank you [instructor's title and/or name] for inviting me to your class to discuss participation in research! I am [*a research assistant/the principal investigator/the graduate student investigator*] for the study, and my name is [*say your name*]. We are taking participants for a study in Wood Hall on study methods using flashcards. In this study you will be shown flashcards containing study-materials, say your answers based on the flashcards shown to you, and take tests. Your participation will expose you to different methods of studying that could be used in your academic career as well as build evidence for study methods that use flashcards.

When taking participants, we schedule experimental sessions for five consecutive days according to your availability. We also schedule tests that are delayed by two weeks depending on the day in the study and your performance in the experimental sessions. The time commitment for participation over the entire study is approximately one hundred and nine minutes. This will include the first five days of daily experimental sessions, reviews, pretests, and posttests, as well as the delayed posttest(s) two weeks after the fifth posttest or mastery of any conditions have taken place. Briefing and the included review of informed consent will take approximately thirty minutes. Afterwards, there will be a total of five consecutive daily experimental sessions with posttests. The first experimental session including its pretests, reviews, and posttest will last approximately twenty-five minutes, and the other four experimental sessions with their posttests will last approximately six minutes each. The delayed posttests and debriefing combined will take approximately thirty minutes. In the event that mastery is reached for one or more conditions their delayed posttests will be scheduled two weeks after mastery has been reached. Therefore, the number of visits to testing rooms may increase from six to eleven depending on when mastery is reached.

Your compensation for completing the study in its entirety will be fifty US dollars in cash. If you do not complete the entire study including all delayed tests, you will not receive the compensation. You can decline the compensation if you wish to do so. Your instructor may provide you extra credit for participating in research, however, this is dependent upon whether they offer extra credit and the rules created for it.

You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA, grade in this class, or grade in any other class will not be affected. Your participation in this study is purely voluntary and at your discretion.

If you are interested in this study and would like to find out more, please contact the graduate student investigator, Andrew Smith, at andrew.r.smith@wmich.edu [*if there is a whiteboard and a marker available, say "I will now write the graduate student investigator's email on the board" then write the email on the board*]. Are there any questions or parts that you would like me to repeat [*Answer any questions and/or repeat any parts as necessary. If there are questions you do not know how to answer, ask them to email their question to the graduate student investigator, Andrew Smith.*]? Thank you.

Appendix B

Recruitment Flyer

GET PAID TO STUDY

Participants needed for a psychological research study on studying methods.

CONTACT ANDREW SMITH (andrew.r.smith@wmich.edu)

The purpose of this study is to compare the effects of different studying methods on performance. These methods will be explained to you by an investigator.

Participants will receive:

- Monetary compensation.
- Extra credit for participating classes.
- Knowledge of new study techniques.

Location and Time

- Testing rooms in Wood Hall
- Appointments are based on your schedule
- Testing occurs for up to five consecutive days for one week. A final session will occur up to two weeks after.

Are you eligible?

- Must be able to read and understand the English language.
- Can speak without a stutter.
- Cannot have knowledge of Romance languages.

Andrew Smith andrew.r.smith@wmich.edu
Andrew Smith andrew.r.smith@wmich.edu
Andrew Smith andrew.r.smith@wmich.edu
Andrew Smith andrew.r.smith@wmich.edu
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Andrew Smith andrew.r.smith@wmich.edu

Appendix C

Examples of Experimental Materials

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Formiga

Appendix D

Email Scripts

Hello [*insert name here*],

Thank you for inquiring about participation in our study. In this email you are being provided a list of initial steps that take place before you begin the experiment:

1. You will meet for approximately thirty minutes with an investigator and/or research assistant (CCd), who will go over the study with you and ask if you would like to participate. You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.
2. Should you decide to participate in the study the investigator and/or research assistant will schedule a pre-session and four experimental sessions on five consecutive days, as well as delayed posttests that occur two weeks* later. You can choose to begin the experiment immediately after scheduling.
3. In the event you choose not begin the experiment immediately, you may ask additional questions or leave after scheduling has taken place. Otherwise, the investigator and/or research assistant will begin the experiment.

* The delayed posttests may be scheduled two weeks after the pre-session or one or more of the four experimental sessions. The investigator and/or research assistant you meet with will explain this in-person.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. Please come meet with me on [*day of the week*] at [*time of day*] at room [*insert room number here*] in Wood Hall. There will be a sign on the door that reads "experimental sessions are not in progress. Please come in!". You will be greeted by an investigator and/or research assistant, who will go over the study with you, and you may begin the study immediately or on another day. At any point you may decline to participate in the study regardless if you have or have not met with an investigator or research assistant. You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name of investigator or research assistant here*],

Thank you for expressing interest in our study. By declining to meet or participate you have not and will not receive any consequences or penalties.

Have a great day.

Sincerely,
[*insert name of investigator or research assistant here*]

Appendix E

Informed Consent Form

Informed Consent Document
Western Michigan University
Department of Psychology

Principal Investigator: Dr. Douglas Johnson
Student Investigator: Andrew Smith
Title of Study: Can't stop: The effects of high-p sequencing on fluency and retention

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to compare the effects of different flashcard procedures on accurate answers and retention. If you take part in the research, you will be asked to look at foreign words on flashcards and say their corresponding English words, take session tests, and take a retention test two weeks after each condition's respective final session test. You will be recorded in this study, both audio and video will be recorded. We also want to request that you keep all the information about the study confidential and refrain from sharing it with others.

Who can participate in this study?
The inclusionary criteria for the study is the ability to read, understand, and speak the English language without a stutter. Exclusionary criteria include any knowledge of Romance languages and current or previous enrollment in PSY3844 at Western Michigan University.

Where will this study take place?
The study will take place On Western Michigan University's Kalamazoo campus in Wood Hall. Only in these rooms will the data collection for the study take place.

What is the time commitment for participating in this study?
The time commitment for participation over the entire study is approximately 2 hours over the course of three weeks.

What are the benefits of participating in this study?
The benefits of participating in this study are learning study methods that can aid you in your academic career.

Are there any costs associated with participating in this study?
The cost for participating in this study is your time, which will total approximately 2 hours over the course of three weeks.

Is there any compensation for participating in this study?

Upon completion of the study you will receive compensation in the form of $50.00 USD in cash. If you do not complete the study for any reason you will not receive any compensation. You may decline compensation upon request.

Who will have access to the information collected during this study?
Participants' names and information will be de-identified by assigning each participant a randomized 8-digit serial-number. These will be used on data forms that only investigators and research assistants have access to and whenever investigators or research assistants communicate about participants. To further protect participants, all physical copies of data sheets will be locked in cabinets that are only accessible to investigators and research assistants. Video files of participants and data entered into Excel sheets/Word documents will be protected by using a cloud service that only investigators and research assistants have access to. In the event the study is published and/or its contents presented, participants will be given pseudonyms that do not sound or look like participants' actual names.

What will happen to my information or biospecimens collected for this research after the study is over?
After information that could identify you has been removed, the de-identified information collected for this research may be used by or distributed to investigators for other research (with written permission from Andrew Smith, the graduate student investigator) without obtaining additional informed consent from the participant.

What if you want to stop participating in this study?
You can choose to stop participating in the study at any time for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study. If you do not complete the study for any reason you will not receive any compensation.

<u>*An investigator can also decide to stop your participation in the study without your consent.*</u>

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at [Type phone number here] or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531 or andrew.r.smith@wmich.edu. You may also contact the Chair of the Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to the subject except as otherwise stated in the consent form.

This consent document has been approved for use for one year by the Western Michigan University Institutional Review Board (WMU IRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I have read this informed consent document. The risks and benefits have been explained to me. I agree to take part in this study.

_____

Please Print Your Name

_____

Participant's signature

Appendix F

Explanation of Experimental Task Script

The study's investigators or research assistants will present you flashcards during pre-tests, experimental sessions, posttests, and delayed posttests. First I will explain the flashcard task that you will participate in. The side of the flashcard facing you will display a single foreign word, like this one [*using a dummy-flashcard show the participant a foreign word for one second, then say "demonstration over" and put the card in your lap*], and each foreign word will correspond to an English word, like this one [*flip the same dummy-flashcard and show the English word for one second, then say "demonstration over" and put the card in your* lap]. When you see the foreign word you should say the corresponding English word as fast as possible, like this [*show the participant the foreign-word for same dummy-flashcard and say the English word as fast as you can, then say "demonstration over" and put the card back in your lap*]. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the order you will go through when participating in the study. There are five consecutive days and delayed posttests. This will be the order of events on the first day, which is called the pre-session:

1. The pretest for the first condition.
2. Up to five minutes of flashcard review for the first condition.
3. The thirty second experimental session for the first condition.
4. The pretest for the second condition.
5. Up to five minutes of flashcard review for the second condition.
6. The thirty second experimental session for the second condition.
7. The pretest for the third condition.
8. Up to five minutes of flashcard review for the third condition.
9. The thirty second experimental session for the third condition.
10. The thirty second posttest for the first condition.
11. The thirty second posttest for the second condition.
12. The thirty second posttest for the third condition.
13. The first day will end.

Days two through five will be identical but there will no longer be pretests or flashcard reviews. Instead, you will immediately begin experimental sessions and complete the posttests at the end. The delayed posttests will occur depending on your performance and the day of the study. Regardless of what day you are at in the study, if you get all thirty flashcards for a condition's posttest correct within thirty seconds you will have mastered that condition's flashcards. The experimental sessions and posttests for that condition will cease and you will schedule a delayed posttest with an investigator or research assistant. The delayed posttest will occur two weeks after the day you mastered the condition. Alternately, in the event you do not master a condition's flashcards within the five days or if you reach mastery on the fifth day, the delayed posttest(s) will occur two weeks after the fifth day. Do you have any questions [*answer all the participant's questions*]?

Now I will explain what you will do in the pretests, reviews, the pre-session and experimental sessions, posttests, and delayed posttests because the rules will vary slightly. I will start by explaining the pretests. In each pretest the investigator or research assistant will present you a condition's thirty flashcards within thirty seconds without feedback. The investigator or research assistant will ask you to say the English word that

corresponds to the foreign word for each of the thirty flashcards within thirty seconds, start the timer, and begin the pretest. You will have one second to answer a flashcard before the next flashcard is displayed. So if you say an incorrect answer, which is any verbal utterance other than the correct answer, or do not respond within one second, the investigator or research assistant will put the card in the incorrect pile and move on to the next flashcard. It will look like this [Say "In this example the incorrect English word is coffee. The correct English words are (say the correct English words) for the two flashcards I am about to show you.", s*how the same dummy-flashcard's foreign word and immediately say "coffee", put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word without saying anything for one second, put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word then say "demonstration over" and put both cards in your lap"*]. If you say the correct answer the investigator or research assistant will move on to the next flashcard. It will look like this [*Say "In this example the correct English word is (say the correct English word).", show the same dummy-flashcard's foreign word and immediately say the correct English word, put it on the table in the correct pile, show the participant another dummy-flashcard's foreign word then say "demonstration over" and put both cards in your lap"*]. As you give your answers, the investigator or research assistant will sort these flashcards into piles of correct and incorrect answers and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the reviews. During reviews you will be given up to five minutes to review the flashcards with the investigator or research assistant. They will hold each card in front of you so you can see each foreign word and they will say their corresponding English words. You may repeat after them during this process, request to proceed to the next flashcard, or ask to see a previous flashcard as you see fit. You may also request to end the review at any time. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the pre-session and experimental sessions. In these sessions, thirty flashcards will be presented to you within thirty seconds just like the pretest, but there will be three different sets of flashcards corresponding to the three different conditions of the study, and you will receive feedback for correct and incorrect answers. Flashcards that are not answered within one second and without error will be considered incorrect. The investigator or research assistant will give you feedback by telling you what the correct answer was before moving on to the next flashcard. So if you say an incorrect answer, which is any verbal utterance other than the correct answer, or do not respond within one second, it will look like this [Say "In this example the incorrect English word is coffee. The correct English words are (say the correct English words) for the two flashcards I am about to show you.", *show the same dummy-flashcard's foreign word and immediately say "coffee", say the flashcard's correct English word, put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word without saying anything for one second, say the flashcard's correct English word, put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"*]. If you say the correct answer the investigator or research assistant will say "good!" and move on to the next flashcard. It will look like this [*Say "In this example the correct English word is*

(say the correct English word).", show the same dummy-flashcard's foreign word and immediately say the correct English word, say "good!", put the flashcard on the table in the correct pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"]. As you give your answers, the investigator or research assistant will sort these flashcards into piles of correct and incorrect answers and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the posttests. There will be three different posttests corresponding the study's three conditions. In posttests you will be presented a condition's flashcards within thirty seconds, feedback will not be provided, and the investigator or research assistant will not move on until you answer or request to pass. So if you request to pass, it will look like this [*Show the same dummy-flashcard's foreign word, say "pass", put it on the table in the pass pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"*]. As you give your answers, the investigator or research assistant will sort these flashcards into piles of passes, correct answers, incorrect answers, and unanswered flashcards and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the delayed posttests. These are identical to posttests but either occur two weeks after a condition has been mastered or two weeks after the fifth day. In the delayed posttests you will be presented flashcards within thirty seconds, feedback will not be provided, and the investigator or research assistant will not move on until you answer or request to pass. As you give your answers, the investigator or research assistant will sort these flashcards into piles of passes, correct answers, incorrect answers, and unanswered flashcards and enter these into a data sheet at the end. Once all delayed posttests are completed debriefing will be conducted and then your time in the study will end. Do you have any questions [*answer all the participant's questions*]? This concludes the explanation of the experimental task.

Appendix G

Research Media Records Release Form

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Research Media Records Release Form

As part of this project we will make photographic, audio, and/or video recordings of you while you participate in the research. Please indicate below by initialing or placing your personal mark next to the uses of these records you consent to. This is completely up to you. We will only use the records in the way(s) that you agree to. In any use of these records, your name will not be identified. Your voice and image may be identifiable however.

1. The records can be studied by the research team for use in the research project.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

2. The records can be shown to subjects in other experiments.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

3. The records can be used for scientific publications, including a published multimedia book. There are not usually proceeds. If any net income is obtained, a minimum of 50% of the net will be donated to the communities of participants for health and education.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

4. The records can be shown at meetings of scientists interested in this area of study.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

5. The records can be shown in classrooms to students.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

6. The records can be shown in public presentations to non-scientific groups.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

7. The records can be used on television and radio.

   Photo _____ Audio _____ Video _____
       initials   initials   initials

I have read this form and give my consent for use of the records as indicated above.

_____   _____
Signature of Subject   Date

_____   _____
Signature of Witness for Non-Literate Subject   Date

Appendix H

Data Sheets

Scored by:_____   Date:_____ / _____ / _____

Subject ID:_____   Role: Primary ☐ IOA ☐

Type: Pretest ☐ Pre-session ☐ Experimental session ☐ Posttest ☐ Delayed posttest ☐

Day # (1-5):___ N/A: ☐   If delayed posttest, what was 5th day/mastery date:___/___/__

SAFMEDS	English	Portuguese	Correct	Incorrect	Error Type
1	Bag	Bolsa			
2	Burn	Queimar			
3	Can	Poder			
4	Deck	Baralho			
5	Dull	Maçante			
6	Edge	Beira			
7	Elf	Duende			
8	Eye	Olho			
9	Face	Cara			
10	Fun	Divertimento			
11	Game	Jogos			
12	Ghost	Fantasma			
13	Hill	Colina			
14	How	Quão			
15	Ice	Gelo			
16	Is	É			
17	Join	Juntar			
18	Lead	Conduzir			
29	Off	Fora			
20	One	Um			
21	Pane	Vidraça			
22	Plum	Ameixa			
23	Prompt	Incitar			
24	Quest	Busca			
25	Quilt	Colcha			
26	Sick	Doente			
27	Tax	Imposto			
28	Vane	Cata			
29	Wall	Parede			
30	Wolf	Lobo			

Number of correct answers:____Number of incorrect answers:____Completion time:___

IOA ONLY

Originally scored by:_____ Original date:_____ / _____ / _____

IOA Calculation: Total corrects agreement _____ / 30 x 100 = _____%

IOA Error Type Calculation: Total error type agreement ____ / 30 x 100 = ____%

Scored by:_____   Date:_____ / _____ / _____
Subject ID:_____   Role: Primary ☐ IOA ☐
Type: Pretest ☐ Pre-session ☐ Experimental session ☐ Posttest ☐ Delayed posttest
☐

Day # (1-5):___ N/A: ☐   If delayed posttest, what was 5th day/mastery date:___/___ /__

High-P	English	Portuguese	Correct	Incorrect	Error Type
1	Ant	Formiga			
2	Bread	Pão			
3	Cheap	Barato			
4	Down	Baixo			
5	Ear	Orelha			
6	Fix	Consertar			
7	Gone	Ido			
8	Guess	Adivinhar			
9	Hand	Mão			
10	If	Se			
11	In	Em			
12	Jail	Cadeia			
13	Jump	Saltar			
14	Key	Chave			
15	Know	Conhecer			
16	Lunch	Almoço			
17	Mint	Hortelã			
18	Numb	Entorpecido			
19	Oak	Carvalho			
20	Peel	Descasca			
21	Pick	Escolher			
22	Run	Correr			
23	Sad	Triste			
24	Screen	Tela			
25	Set	Conjunto			
26	Skate	Patinar			
27	Up	Acima			
28	Vest	Colete			
29	Yard	Jarda			
30	Yell	Grito			

Number of correct answers:____Number of incorrect answers:____Completion time:___

IOA ONLY

Originally scored by:_____   Original date:_____ / _____ / _____
IOA Calculation: Total corrects agreement _____ / 30 x 100 = _____%
IOA Error Type Calculation: Total error type agreement ____ / 30 x 100 = ____%

Scored by:_____   Date:_____ / _____ / _____

Subject ID:_____   Role: Primary ☐ IOA ☐

Type: Pretest ☐ Pre-session ☐ Experimental session ☐ Posttest ☐ Delayed posttest ☐

Day # (1-5):___ N/A: ☐ If delayed posttest, what was 5ᵗʰ day/mastery date:___/___/__

Self-Study	English	Portuguese	Correct	Incorrect	Error Type
1	Ape	Macaco			
2	Arm	Braço			
3	Ask	Perguntar			
4	Bed	Cama			
5	Box	Caixa			
6	Call	Ligar			
7	Come	Venha			
8	Dry	Secar			
9	Foam	Espuma			
10	Hunt	Caçar			
11	I	Eu			
12	Jerk	Empurrão			
13	Kick	Chutar			
14	Knee	Joelho			
15	Lamp	Luminária			
16	Lie	Mentira			
17	Melt	Fundição			
18	Nail	Unha			
19	Near	Perto			
20	Nice	Agradável			
21	Quail	Codorna			
22	Queue	Fila			
23	Rain	Chuva			
24	Roam	Vaguear			
25	Their	Seus			
26	Tip	Gorjeta			
27	Trip	Viagem			
28	Urge	Impulso			
29	Vine	Videira			
30	Yolk	Gema			

Number of correct answers:____ Number of incorrect answers:____ Completion time:___

IOA ONLY

Originally scored by:_____ Original date:_____ / _____ / _____

IOA Calculation: Total corrects agreement _____ / 30 x 100 = _____%

IOA Error Type Calculation: Total error type agreement ____ / 30 x 100 = ____%

Appendix I

Session Sequences

1 - SAFMEDS
2 - High-P
3 - Self-Study

1. 3/1/2 – 1/3/2 – 3/2/1 – 2/1/3 – 2/3/1
2. 1/3/2 – 2/3/1 – 1/2/3 – 3/1/2 – 3/2/1
3. 2/1/3 – 3/1/2 – 1/3/2 – 1/2/3 – 2/3/1
4. 2/3/1 – 3/2/1 – 2/1/3 – 2/3/1 – 1/2/3
5. 3/2/1 – 2/1/3 – 3/2/1 – 2/3/1 – 1/2/3
6. 3/1/2 – 1/2/3 – 2/3/1 – 2/1/3 – 1/3/2
7. 1/2/3 – 1/3/2 – 3/2/1 – 1/2/3 – 3/1/2
8. 1/3/2 – 3/1/2 – 1/2/3 – 3/2/1 – 2/3/1
9. 1/2/3 – 2/1/3 – 3/2/1 – 2/3/1 – 1/3/2
10. 3/2/1 – 3/1/2 – 1/3/2 – 1/2/3 – 2/3/1
11. 2/3/1 – 3/1/2 – 1/3/2 – 2/1/3 – 1/2/3
12. 1/3/2 – 2/3/1 – 3/2/1 – 2/1/3 – 1/2/3
13. 1/3/2 – 2/1/3 – 1/3/2 – 2/3/1 – 3/1/2
14. 1/3/2 – 3/1/2 – 2/1/3 – 3/2/1 – 2/3/1
15. 2/1/3 – 2/3/1 – 1/3/2 – 1/2/3 – 3/2/1
16. 3/1/2 – 3/2/1 – 1/2/3 – 1/3/2 – 2/1/3
17. 2/3/1 – 2/1/3 – 3/2/1 – 3/1/2 – 1/3/2
18. 1/2/3 – 3/1/2 – 2/3/1 – 1/3/2 – 3/2/1
19. 1/3/2 – 1/2/3 – 3/1/2 – 3/2/1 – 2/1/3
20. 2/3/1 – 1/3/2 – 3/1/2 – 1/3/2 – 3/1/2
21. 3/1/2 – 1/3/2 – 2/3/1 – 2/1/3 – 1/2/3
22. 2/3/1 – 2/1/3 – 3/1/2 – 1/2/3 – 3/2/1
23. 3/1/2 – 2/1/3 – 1/3/2 – 2/3/1 – 3/2/1
24. 1/2/3 – 3/1/2 – 1/2/3 – 1/3/2 – 2/3/1
25. 1/2/3 – 2/3/1 – 2/1/3 – 3/2/1 – 1/2/3
26. 3/2/1 – 1/2/3 – 2/3/1 – 2/1/3 – 1/3/2
27. 3/1/2 – 2/3/1 – 1/2/3 – 3/2/1 – 3/1/2
28. 2/3/1 – 1/2/3 – 2/3/1 – 3/2/1 – 2/1/3
29. 2/1/3 – 1/3/2 – 1/2/3 – 2/3/1 – 3/1/2
30. 2/1/3 – 1/2/3 – 3/2/1 – 3/1/2 – 1/3/2

Appendix J

Updated Recruitment Script

Hello everyone and thank you [instructor's title and/or name] for inviting me to your class to discuss participation in research! I am [*a research assistant/the principal investigator/the graduate student investigator*] for the study, and my name is [*say your name*]. We are taking participants for a study in WebEx on study methods using flashcards. In this study you will be shown flashcards, say your answers based on the flashcards shown to you, and take tests. Your participation will expose you to different methods of studying that could be used in your academic career as well as build evidence for study methods that use flashcards.

This study will take approximately three hours and thirty minutes to approximately four hours of your time over the course of three to four weeks. When taking participants, we schedule sessions for five consecutive days according to your availability. We also schedule tests that are delayed by two to three weeks depending on the day in the study and your performance in the sessions. Therefore, the number of visits to the testing room may increase from five to eleven depending on your performance.

Your compensation for completing the study in its entirety will be fifty US dollars in the delivery method you specify (Venmo, PayPal, mailed check, mailed money order, etc.). If you do not complete the entire study including all delayed tests, you will not receive the compensation. You can decline the compensation if you wish to do so. Your instructor may provide you extra credit for participating in research, however, this is dependent upon whether they offer extra credit and the rules created for it.

You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA, grade in this class, or grade in any other class will not be affected. Your participation in this study is purely voluntary and at your discretion.

If you are interested in this study and would like to find out more, please contact the graduate student investigator, Andrew Smith, at andrew.r.smith@wmich.edu. Are there any questions or parts that you would like me to repeat [*Answer any questions and/or repeat any parts as necessary. If there are questions you do not know how to answer, ask them to email their question to the graduate student investigator, Andrew Smith.*]? Thank you.

Appendix K

Updated Recruitment Flyer

GET PAID TO STUDY

Participants needed for a psychological research study on studying methods.

CONTACT ANDREW SMITH (andrew.r.smith@wmich.edu)

The purpose of this study is to compare the effects of different studying methods on performance. These methods will be explained to you by an investigator or research assistant.

Participants will receive:

- Monetary compensation.
- Extra credit for participating classes.
- Knowledge of new study techniques.

Location and Time

- WebEx.
- Appointments are based on your schedule.
- Testing occurs for five consecutive days and at least one session two to three weeks later. Sessions will last approximately 18-30 minutes.
- Time commitment is a total of approximately 3 hours and 30 minutes to approximately four hours over three to four weeks.

Are you eligible?

- You must be a currently enrolled undergraduate student at Western Michigan University and age 18-99 of any gender.
- You must not have knowledge of Romance languages or have taken/are taking PSY 3844.

Andrew Smith andrew.r.smith@wmich.edu
Andrew Smith andrew.r.smith@wmich.edu
Andrew Smith andrew.r.smith@wmich.edu
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Andrew Smith andrew.r.smith@wmich.edu

Appendix L

Updated Email Scripts

Hello [*insert name here*],

Thank you for inquiring about participation in our study. In this email you are being provided a list of initial steps that take place before you begin the experiment:

1. You will meet for approximately thirty minutes with an investigator and/or research assistant who will go over the study with you and ask if you would like to participate. You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

2. Should you decide to participate in the study the investigator and/or research assistant will schedule a pre-session and four experimental sessions on five consecutive days, as well as delayed posttests that occur two to three weeks* later. Then the task will be explained to you, which will take approximately thirty minutes. You may have the option to begin the experiment immediately afterwards.

3. In the event you do not begin the experiment immediately, you may ask additional questions or leave after the explanation of the task has taken place. Otherwise, the investigator and/or research assistant will begin the experiment.

If you are interested in participating in the study, please send an email to the sender of this email indicating your desire to participate as well as all days of the week and times that you are available.

* The delayed posttests may be scheduled two to three weeks after the pre-session or one or more of the four experimental sessions. The investigator and/or research assistant you meet with will explain this via WebEx or email/phone.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. Please come meet with me on [*day of the week*] at [*time of day*] via WebEx [*insert link/schedule meeting if applicable*]. You will be greeted by an investigator and/or research assistant, who will go over the study with you, and you may begin the study immediately or on another day. At any point you may decline to participate in the study regardless if you have or have not met with an investigator or research assistant. You are under no obligation to participate in this study and will receive no consequences for participating, refraining from participating, or withdrawing from the study. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Appendix M

Updated Consent Form

Informed Consent Document
Western Michigan University
Department of Psychology

Principal Investigator:	Dr. Douglas Johnson
Student Investigator:	Andrew Smith
Title of Study:	Can't stop: The effects of high-p sequencing on fluency and retention

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to compare the effects of different flashcard procedures on the rate of accurate answers and retention. This research will serve as Andrew Smith's thesis for the requirements of the master's degree in Industrial Organizational Behavior Management. If you take part in the research, you will be asked to look at foreign words on flashcards and say their corresponding English words aloud to an investigator or research assistant, or you will study by yourself using a study method of your choosing as long as it is not an experimental study method. You will do this in pretests, pre-sessions, experimental sessions, posttests, and delayed posttests that occur two to three weeks after each condition's respective final posttest. You will also go through flashcards with an investigator or research assistant in flashcard reviews. Your time in this study will take approximately three hours and thirty minutes to approximately four hours over three weeks. You will be recorded in this study, both audio and video will be recorded. We also want to request that you keep all the information about the study confidential and refrain from sharing it with others. Possible risks and costs to you for taking part in the study may be the time taken to participate in this research study, and potential benefits of taking part may be learning study methods that can aid you in your academic career. An alternative to taking part in the research study is to not take part in it.

You are invited to participate in this research project titled "Can't stop: The effects of high-p sequencing on fluency and retention" and the following information in this consent form will provide more detail about the research study. Please ask any questions if you need more clarification and to assist you in deciding if you wish to participate in the research study. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form. After all of your questions have been answered and the consent document has been reviewed, if you decide to participate in this study, you will be asked to sign this consent form.

Who can participate in this study?
You must be currently enrollment as an undergraduate at Western Michigan University and be age 18-99 of any gender.
Exclusionary criteria include any knowledge of Romance languages and taking or having taken PSY3844 at Western Michigan University.

Where will this study take place?
The study will take place via WebEx after 3/20/2020 due to COVID-19. Only in WebEx will the data collection for the study take place.

What is the time commitment for participating in this study?
The time commitment for participation over the entire study is approximately three hours and thirty minutes to approximately four hours over the course of three to four weeks. Sessions will last approximately 18-30 minutes, and the number of visits to the testing room can increase from 5-11 depending on your performance.

What are the benefits of participating in this study?
The potential benefits of participating in this study are learning and practicing flashcard study methods that could assist you when studying. The results from this study may be used to validate a flashcard study method that could reduce time and increase performance in training or in studying.

Are there any costs associated with participating in this study?
The cost for participating in this study is your time, which will total approximately three hours and thirty minutes to approximately four hours over the course of three to four weeks.

Is there any compensation for participating in this study?
Upon completion of the study you will receive compensation in the form of $50.00 USD via the delivery method you specify (Venmo, PayPal, mailed check, mailed money order, etc.). If you do not complete the study for any reason you will not receive any compensation. You may decline compensation upon request.

Who will have access to the information collected during this study?
Subjects' names and information will be de-identified by assigning each subject a randomized 8-digit serial-number. These will be used in data sheets that will be kept in a locked filing cabinet in room 2521, and data will only be accessible to investigators and research assistants. A form matching serial numbers to subjects' names will be kept in a locked filing cabinet in room 2521 in Wood Hall, and this document will only be accessible to investigators and research assistants. Video and/or audio files of participants and data entered into Excel sheets/Word documents will be protected by storing them in files on WMU's cloud service that only investigators and research assistants have access to. After the study has concluded, research assistants' access to Qualtrics surveys, Qualtrics consent forms, Excel, Word, video, and audio files will be denied/removed, and data sheets as well as the form matching serial numbers to subject's names will be kept in a locked filing cabinet in the Principal Investigator's office or University Archives for no less than three years. Video and/or audio files of participants and data entered into Excel sheets/Word documents will be maintained in the cloud for no less than three years after the study has ended. Informed consent documents will be kept in a locked filing cabinet in the Principal Investigator's office, Qualtrics, WMU's cloud service, or University Archives for no less than three years. Online Qualtrics consent forms and surveys will be kept in Qualtrics or WMU's cloud service, and will be kept for three years after the study

has ended. After three years, all physical copies of data will be destroyed by the Principal Investigator. In the event the study is published and/or its contents presented, subjects will be given pseudonyms that do not sound or look like subjects' actual names.

What will happen to my information or biospecimens collected for this research after the study is over?

After information that could identify you has been removed, the de-identified information collected for this research may be used by or distributed to investigators for other research (with written permission from Andrew Smith, the graduate student investigator) without obtaining additional informed consent from you.

What if you want to stop participating in this study?

You can choose to stop participating in the study at any time for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study. If you do not complete the study for any reason you will not receive any compensation.

<u>*An investigator can also decide to stop your participation in the study without your consent.*</u>

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at 269-387-4424 or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531 or andrew.r.smith@wmich.edu. You may also contact the Chair of the Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to the subject except as otherwise stated in the consent form.

This consent document has been approved for use for one year by the Western Michigan University Institutional Review Board (WMU IRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I agree to the use of video and audio recordings for this study and the usage of my audio and video

Please Print Your Name

_____

Subject's signature

I disagree to the use of video and audio recordings for this study and the usage of my audio and video

_____

Please Print Your Name

_____

Subject's signature

I have read this informed consent document. The risks and benefits have been explained to me. I agree to take part in this study.

_____

Please Print Your Name

_____

Subject's signature

Appendix N

Updated Explanation of Task Script

The study's investigators or research assistants will present you flashcards during pre-tests, reviews, experimental sessions, posttests, and delayed posttests, except for when you will be asked to study by yourself. First I will explain the flashcard task that you will participate in. The side of the flashcard facing you will display a single foreign word, like this one [*using a dummy-flashcard show the participant a foreign word for one second, then say "demonstration over" and put the card in your lap*], and each foreign word will correspond to an English word, like this one [*flip the same dummy-flashcard and show the English word for one second, then say "demonstration over" and put the card in your* lap]. When you see the foreign word you should say the corresponding English word as fast as possible, like this [*show the participant the foreign-word for same dummy-flashcard and say the English word as fast as you can, then say "demonstration over" and put the card back in your lap*]. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the order you will go through when participating in the study. There are five consecutive days and delayed posttests. This will be the order of events on the first day, which is called the pre-session:

1. The pretest for the first condition.
2. Up to five minutes of flashcard review for the first condition.
3. The thirty second experimental session for the first condition.
4. The pretest for the second condition.
5. Up to five minutes of flashcard review for the second condition.
6. The thirty second experimental session for the second condition.
7. The pretest for the third condition.
8. Up to five minutes of flashcard review for the third condition.
9. The thirty second experimental session for the third condition.
10. The thirty second posttest for the first condition.
11. The thirty second posttest for the second condition.
12. The thirty second posttest for the third condition.
13. The first day will end.

Days two through five will be identical but there will no longer be pretests. The delayed posttests will occur depending on your performance and the day of the study. Regardless of what day you are at in the study, if you get all thirty flashcards for a condition's posttest correct within thirty seconds you will have mastered that condition's flashcards. The reviews, experimental sessions, and posttests for that condition will cease and you will schedule a delayed posttest with an investigator or research assistant. The delayed posttest will occur two to three weeks after the day you mastered the condition. Alternately, in the event you do not master a condition's flashcards within the five days or if you reach mastery on the fifth day, the delayed posttest(s) will occur two to three weeks after the fifth day. Do you have any questions [*answer all the participant's questions*]?

Now I will explain what you will do in the pretests, reviews, the pre-session and experimental sessions, posttests, and delayed posttests because the rules will vary slightly. I will start by explaining the pretests. In each pretest the investigator or research assistant will present you a condition's thirty flashcards within thirty seconds without

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feedback. The investigator or research assistant will ask you to say the English word that corresponds to the foreign word for each of the thirty flashcards within thirty seconds, start the timer, and begin the pretest. You will have about one second to answer a flashcard before the next flashcard is displayed. So if you say an incorrect answer, which is any verbal utterance other than the correct answer, or do not respond within about a second, the investigator or research assistant will put the card in the incorrect pile and move on to the next flashcard. It will look like this [Say "In this example the incorrect English word is coffee. The correct English words are (say the correct English words) for the two flashcards I am about to show you, but I am going to play both your role and my role. For the first card I will pretend to be you and say the incorrect word, but then I will resume my role and put the flashcard in the incorrect pile. When showing you the card after that one, I will pretend to be you and not say anything, but then I will resume my role and put the flashcard in the incorrect pile.", *show the same dummy-flashcard's foreign word and immediately say "coffee", then put it that card on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word without saying anything for one second, then put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word then say "demonstration over" and put both cards in your lap"*]. If you say the correct answer the investigator or research assistant will move on to the next flashcard. It will look like this [*Say "In this example the correct English word is (say the correct English word).", show the same dummy-flashcard's foreign word and immediately say the correct English word, put it on the table in the correct pile, show the participant another dummy-flashcard's foreign word then say "demonstration over" and put both cards in your lap"*]. As you give your answers, the investigator or research assistant will sort these flashcards into piles of correct and incorrect answers and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the reviews. During reviews you will be given up to five minutes to review the flashcards with the investigator or research assistant. They will hold each card in front of you so you can see each foreign word and they will say their corresponding English words. You may repeat after them during this process, request to proceed to the next flashcard, or ask to see a previous flashcard as you see fit. You may also request to end the review at any time. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the pre-session and experimental sessions. These will differ based on whether you are studying by yourself or someone is presenting flashcards to you. In sessions where someone is presenting flashcards to you, thirty flashcards will be presented to you within thirty seconds just like the pretest, but there will be different sets of flashcards corresponding to the different conditions of the study, and you will receive feedback for correct and incorrect answers. Flashcards that are not answered within about one second and without error will be considered incorrect. The investigator or research assistant will give you feedback by telling you what the correct answer was before moving on to the next flashcard. So if you say an incorrect answer, which is any verbal utterance other than the correct answer, or do not respond within one second, it will look like this [Say "In this example the incorrect English word is coffee. The correct English words are (say the correct English words) for the two flashcards I am about to show you, but I am going to play both your role and my role. For the first card I will pretend to be

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you and say the incorrect word, but then I will resume my role and say the correct answer before putting the flashcard in the incorrect pile. When showing you the card after that one, I will pretend to be you and not say anything, but then I will resume my role and say the correct answer before putting the flashcard in the incorrect pile.", *show the same dummy-flashcard's foreign word and immediately say "coffee", say the flashcard's correct English word, put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word without saying anything for one second, say the flashcard's correct English word, put it on the table in the incorrect pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"*]. If you say the correct answer the investigator or research assistant will say "good!" and move on to the next flashcard. It will look like this [*Say "In this example the correct English word is (say the correct English word), but I am going to play both your role and my role. I will pretend to be you and say the correct word, but then I will resume my role and say 'good' before putting the flashcard in the correct pile.", show the same dummy-flashcard's foreign word and immediately say the correct English word, say "good!", put the flashcard on the table in the correct pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"*]. Please note that you must give your answer in full before the research assistant or investigator begins to say the correct answer, or it will be incorrect. As you give your answers, the investigator or research assistant will sort these flashcards into piles of correct and incorrect answers and enter these into a data sheet at the end. When you are told to study by yourself, you will go through a set of thirty flashcards within thirty seconds using whatever study method you wish to use as long as it is not an experimental studying method. When you are ready, you will start a timer for thirty seconds, go through each flashcard, and sort them into correct and incorrect piles. Once thirty seconds have been reached, or you have gone through all the flashcards, you will be finished. Please stop the timer as quickly as possible if you finish before thirty seconds. The investigator or research assistant will go through your piles of flashcards and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the posttests. There will be three different posttests corresponding the study's three conditions. In posttests you will be presented a condition's flashcards within thirty seconds, feedback will not be provided, and the investigator or research assistant will not move on until you answer or request to pass. So if you request to pass, it will look like this. Once again, I will pretend to be both you and me. [*Show the same dummy-flashcard's foreign word, say "pass", put it on the table in the pass pile, show the participant another dummy-flashcard's foreign word, then say "demonstration over" and put both cards in your lap"*]. As you give your answers, the investigator or research assistant will sort these flashcards into piles of passes, correct answers, incorrect answers, and unanswered flashcards and enter these into a data sheet at the end. Do you have any questions [*answer all the participant's questions*]?

Now I will explain the delayed posttests. These are identical to posttests but either Occur two to three weeks after a condition has been mastered or two to three weeks after the fifth day. In the delayed posttests you will be presented flashcards within thirty seconds, feedback will not be provided, and the investigator or research assistant will not move on until you answer or request to pass. As you give your answers, the investigator

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or research assistant will sort these flashcards into piles of passes, correct answers, incorrect answers, and unanswered flashcards and enter these into a data sheet at the end. Once all delayed posttests are completed debriefing will be conducted and then your time in the study will end. Do you have any questions [*answer all the participant's questions*]? This concludes the explanation of the experimental task.

Appendix O

Updated Debriefing Script

Thank you for participating in this research study. Now I will begin your debriefing for this study. During debriefing I will explain the reason why the conditions as well as the foreign language were not fully explained to you, the nature of recording you during this study, the purpose of the study, pretests, reviews, pre-sessions, and the conditions and posttests you were exposed to. Then I will answer any questions you may have, give you your compensation for completing the study, and conclude your participation in this study. We also want to request that you keep all information about the study confidential and refrain from sharing it with others. If others have knowledge of the study before or during their participation, this could affect the outcomes of the study.

Now I will begin explaining the reason why all conditions of the study and the foreign language, which was Portuguese, were not initially explained to you. In research it is sometimes necessary to withhold information until the study has been completed. The conditions of the study and the foreign language were not fully explained to you to in order to minimize influencing your performance during the study. To be specific, telling you the differences between all the conditions of the study or that the language was Portuguese may have changed your responses during experimental sessions, which could have altered your performance.

Now I will explain the nature of recording you during this study. Video and audio of you were recorded throughout this study. These were used for processes called interobserver agreement and error analysis. This means that your performance was observed and scored by two or more investigators or research assistants in this study, and that the types of errors made during the study were recorded so we could study them. No one outside the investigators and research assistants of the study were given access to your recordings.

Now I will explain the purpose of the study. The purpose of the study was to measure the effects of three different conditions on the speed and accuracy of answers within a time-limit, and the maintenance of such performance after a delay of two weeks.

Now I will explain the pretests. These were conducted to establish baseline performance before reviews, feedback, or experimental sessions occurred. Feedback was not given during the pretests because this could have affected your performance in the study. All thirty of a condition's flashcards were presented to you within thirty seconds to establish a baseline.

Now I will explain the reviews. In these, the investigator or research assistant let you practice with flashcards for each condition at your own pace for up to five minutes. Their purpose was to ensure you had practice with each flashcard before beginning experimental sessions.

Now I will explain the conditions you were exposed to. While in the pre-session and experimental sessions you were exposed to all three conditions and their respective decks of thirty cards in counterbalanced sequences. One of these conditions was self-study. In self-study you were instructed to study the thirty flashcards using whatever study-method you were comfortable using as long as it was not an experimental study method. Another condition was SAFMEDS. In the SAFMEDS method of studying you went through each of the thirty flashcards by quickly saying the answer and receiving feedback until the thirty seconds had elapsed or you answered every flashcard. These

flashcards were presented to you in randomized sequences each time. While you answered, the investigator or research assistant sorted them into correct and incorrect piles. These were then counted by an investigator or research assistant and entered into a data sheet. The other condition you were exposed to was SAFMEDS with high-p sequencing. This was identical to the SAFMEDS condition but used a high-p sequence. This means that the order in which flashcards were presented to you was constantly changed so that it would begin with the flashcards you had answered correctly in previous sessions.

Now I will explain the posttests and delayed posttests you were exposed to. Posttests were distributed to you at the end of experimental sessions, and delayed posttests were distributed to you two weeks after you mastered a condition or four consecutive days in experimental sessions had elapsed. During both types of posttests an investigator or research assistant presented the flashcards for each condition within thirty seconds and did not give you feedback for your answers. While you answered the investigator or research assistant sorted them into correct, incorrect, and pass piles. These were then counted by an investigator or research assistant and entered into a data sheet. In general, these tests were conducted to compare your performance across conditions and measure retention. This means that we were measuring your performance for each condition as the number of experimental sessions increased and after a period of time where you were not exposed to the same flashcards.

Thank you for participating in our study. Do you have any questions about this debriefing or your participation [*answer any questions*]? Should you have any questions in the future, please contact the graduate student investigator, Andrew Smith, at andrew.r.smith@wmich.edu. Now that you have completed the study, you will receive your compensation of fifty US dollars via the delivery method you would like to specify [*ask if they would like PayPal, Venmo, mailed check, mailed money order, or another option*]. Your participation in this study has now ended.

Appendix P

Online Informed Consent Form

<div align="center">

Western Michigan University
Department of Psychology

</div>

Principal Investigator: Dr. Douglas Johnson
Student Investigator: Andrew Smith
Title of Study: Can't stop: The effects of high-p sequencing on fluency and retention

You are invited to participate in this research project titled "*Can't stop: The effects of high-p sequencing on fluency and retention*"

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to: compare the effects of different flashcard procedures on the rate of accurate answers and retention. This research will serve as Andrew Smith's thesis for the requirements of the master's degree in Industrial Organizational Behavior Management. If you take part in the research, you will be asked to look at foreign words on flashcards and say their corresponding English words aloud to an investigator or research assistant, or you will study by yourself using a study method of your choosing as long as it is not an experimental study method. You will do this in pretests, pre-sessions, experimental sessions, posttests, and delayed posttests that occur two to three weeks after each condition's respective final posttest. You will also go through flashcards with an investigator or research assistant in flashcard reviews. Your time in this study will take approximately three hours and thirty minutes to approximately four hours over three to four weeks. You will be recorded in this study, both audio and video will be recorded. We also want to request that you keep all the information about the study confidential and refrain from sharing it with others. Possible risks and costs to you for taking part in the study may be the time taken to participate in this research study, and potential benefits of taking part may be learning study methods that can aid you in your academic career. An alternative to taking part in the research study is to not take part in it.

The following information in this consent form will provide more detail about the research study. Please ask any questions if you need more clarification and to assist you in deciding if you wish to participate in the research study. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form. After all of your questions have been answered and the consent document reviewed, if you decide to participate in this study, you will be asked to sign this consent form.

What are we trying to find out in this study?
Investigators and research assistants are conducting this study to determine the accurate rate of responses under each condition, as well as retention after a delayed period of time.

Who can participate in this study?
You must be currently enrolled as an undergraduate at Western Michigan University and be age 18-99 of any gender.

Exclusionary criteria include any knowledge of Romance languages and taking or having taken PSY3844 at Western Michigan University.

Where will this study take place?
This study will take place through WebEx. Only in WebEx will the data collection for this study take place.

What is the time commitment for participating in this study?
The time commitment for participation over the entire study is approximately three hours and thirty minutes to approximately four hours over the course of three to four weeks. Sessions will last approximately 18-30 minutes, so the number of research sessions can increase from 5-11 depending on your performance.

What will you be asked to do if you choose to participate in this study?
You will be asked to look at foreign words on flashcards and say their corresponding English words aloud to an investigator or research assistant, or you will study by yourself using a study method of your choosing as long as it is not an experimental study method. You will do this in pretests, pre-sessions, experimental sessions, posttests, and delayed posttests that occur two to three weeks after each condition's respective final posttest. You will also go through flashcards with an investigator or research assistant in flashcard reviews.

What information is being measured during the study?
This section will describe the measurements that we are going to take during your participation in the study. Your completion time and responses will be measured. The number of correct answers, incorrect answers, passes, and error types will be obtained and counted based on your responses.

What are the risks of participating in this study and how will these risks be minimized?
Participation in the study may result in frustration associated with studying. This will be minimized by asking if the subject would like a break.

What are the benefits of participating in this study?
The potential benefits of participating in this study are learning and practicing flashcard study methods that could assist you when studying. The results from this study may be used to validate a flashcard study method that could reduce time and increase performance in training or in studying.

Are there any costs associated with participating in this study?
The cost for participating in this study is your time, which will total approximately three hours and thirty minutes to approximately four hours over the course of three to four weeks.

Is there any compensation for participating in this study?

After completion of the study you will receive compensation in the form of $50.00 USD via the delivery method of your choosing (Venmo, PayPal, mailed check, mailed money order, etc.). If you do not complete the study for any reason you will not receive any compensation. You may decline compensation upon request.

Who will have access to the information collected during this study?
Informed consent documents will be kept in a locked filing cabinet in the Principal Investigator's office, Qualtrics, WMU's cloud service or University Archives for no less than three years. Subjects' names and information will be de-identified by assigning each subject a randomized 8-digit serial-number. These will be used in data sheets that will be kept in a locked filing cabinet in room 2521, and data will only be accessible to investigators and research assistants. A form matching serial numbers to subjects' names will be kept in a locked filing cabinet in room 2521 in Wood Hall, and this document will only be accessible to investigators and research assistants. After the study has been concluded, data sheets and the form matching serial numbers to subject's names will be kept in a locked filing cabinet in the Principal Investigator's office or University Archives for no less than three years. Video and/or audio files of participants and data entered into Excel sheets/Word documents will be protected by storing them in files on WMU's cloud service that only investigators and research assistants have access to. These will be maintained in the cloud for no less than three years after the study has ended. Online Qualtrics consent forms and surveys will be kept in Qualtrics or WMU's cloud service, and will be kept for three years after the study has ended. After three years, all physical copies of data will be destroyed by the Principal Investigator. After the study has concluded, research assistants' access to Qualtrics surveys, Qualtrics consent forms, Excel, Word, video, and audio files will be denied/removed. In the event the study is published and/or its contents presented, subjects will be given pseudonyms that do not sound or look like subjects' actual names.

What will happen to my information or biospecimens collected for this research project after the study is over?
After information that could identify you has been removed, the de-identified information collected for this research may be used by or distributed to investigators for other research (with written permission from Andrew Smith, the graduate student investigator) without obtaining additional informed consent from you.

What if you want to stop participating in this study?
You can choose to stop participating in the study at any time for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study. If you do not complete the study for any reason you will not receive any compensation.

An investigator can also decide to stop your participation in the study without your consent.

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at 269-387-4424 or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531 or andrew.r.smith@wmich.edu. You may also contact the Chair of the Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.
This study was approved by the Western Michigan University Institutional Review Board (WMU IRB) on (approval date).

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

Participating in this survey online indicates your consent for use of the answers you supply. Verbal consent (if you selected the alternative to meet over WebEx to obtain consent) - Verbal agreement or disagreement indicates your agreement/disagreement to participate in the study.

Appendix Q

Online Informed Consent Form Email Scripts

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. I am emailing to ask if you would be interested in participating in the study via WebEx. Please feel free to click on this link [*insert link* here] to view the consent form and give your consent/decline to participate in the study. If you have any questions before deciding to give your consent or at any time, you may email them to the student investigator, Andrew Smith, at andrew.r.smith@wmich.edu. You may also call the graduate investigator, Andrew Smith, at 352-817-0531.

Alternatively, you can request an investigator or research assistant to email the consent document to you and have your consent obtained verbally through a WebEx meeting. The investigator or research assistant will document your consent in a file on WMU's cloud service.

At any point you may decline to participate in the study regardless if you have or have not met with an investigator or research assistant or viewed/have not viewed the consent form. Compensation will be delivered based on the delivery method you specify (Venmo, PayPal, mailed check, mailed money order, etc.). You are under no obligation to participate in this study and will receive no consequences for participating or refraining from participating. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. Attached is the consent document. Please send all days and times of the week you are available to discuss the document and give your consent over WebEx. The research assistant or investigator will then schedule a time with you. If you have any questions before deciding to give your consent or at any time, you may email them to the student investigator, Andrew Smith, at andrew.r.smith@wmich.edu. You may also call the graduate investigator, Andrew Smith, at 352-817-0531.

At any point you may decline to participate in the study regardless if you have or have not met with an investigator or research assistant or viewed/have not viewed the consent form. Compensation will be delivered based on the delivery method you specify (Venmo, PayPal, mailed check, mailed money order, etc.). You are under no obligation to participate in this study and will receive no consequences for participating or refraining from participating. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Email Script:
Response to request to participate in study – Online informed consent (requested
alternative and sent days and times for a WebEx meeting)

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. Please come meet with me on [*day of the week*] at [*time of day*] via WebEx [*insert link/schedule meeting if applicable*]. If you have any questions before deciding to give your consent or at any time, you may email them to the student investigator, Andrew Smith, at andrew.r.smith@wmich.edu. You may also call the graduate investigator, Andrew Smith, at 352-817-0531.

At any point you may decline to participate in the study regardless if you have or have not met with an investigator or research assistant or viewed/have not viewed the consent form. Compensation will be delivered based on the delivery method you specify (Venmo, PayPal, mailed check, mailed money order, etc.). You are under no obligation to participate in this study and will receive no consequences for participating or refraining from participating. This also means that your GPA and grade for any class will not be affected. Your participation in this study is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

Thank you for your response. By declining to meet or participate in the study you have not and will not receive any consequences or penalties.

Have a great day.

Sincerely,
[*insert name of investigator or research assistant here*]

Appendix R

Online Informed Consent Form Qualtrics Survey Questions/Answers

○ Yes, I consent, I agree to the use of video and audio recordings for this study, and the usage of my audio and video as I have previously indicated in the Research Media Records Release Form.

○ No, I do not consent.

☐ Q4   The following is for your name:

⚙   ○ Name:

＊

☐ Q7   The following is for the date (month/day/year):

⚙   ○ Date (month/day/year):

＊

☐ Q5   The following is for you signature:

⚙

iQ   ✕ _____SIGN HERE_____

＊   clear

Appendix S

Social Validity Survey Consent Form

Principal Investigator: Dr. Douglas Johnson
Student Investigator: Andrew Smith

You are invited to participate in this research project titled "*Can't stop: The effects of high-p sequencing on fluency and retention*"

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. You may choose to not answer any question. compare the effects of different flashcard procedures on the rate of accurate answers and retention. This research will serve as Andrew Smith's thesis for the requirements of the master's degree in Industrial Organizational Behavior Management. If you take part in the survey, you will be asked to give your answers based on Likert scales and free-response lines regarding the conditions of the study, and a free-response area for any thoughts, comments, or suggestions you would like to write. Your replies will be completely anonymous, so do not put your name anywhere on the survey. Your time in the survey will take approximately 5-10 minutes. Possible risk and costs to you for taking part in the survey may be the time taken to complete the survey, and potential benefits of taking part in the survey may be providing researchers with your input. An alternative to taking part in the survey is not to take part in it.

The de-identified (anonymous) information collected for this research may be used by or distributed to investigators for other research without obtaining informed consent from you.

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at 269-387-4424 or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531 or andrew.r.smith@wmich.edu. You may also contact the Chair of the Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

This consent has been approved by the Western Michigan University Institutional Review Board (WMU IRB) on "(study approval date).

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

Participating in this survey online indicates your consent for use of the answers you supply.

Appendix T

Survey Email Scripts

Hello [*insert name here*],

I am emailing to ask if you would like to take an optional anonymous survey. The survey will take approximately five to ten minutes depending on how quickly you complete the survey.

If you are interested in completing the optional anonymous survey, please send an email to the sender of this email indicating your desire to complete the survey.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

My name is [*insert name of investigator or research assistant here*]. Feel free to click on this link [*insert link* here] to take the survey. Please do not include any personally identifiable information. At any point you may decline to participate in the optional anonymous survey regardless if you have or have not met with an investigator or research assistant. You are under no obligation to participate in this survey and will receive no consequences for participating or refraining from participating. This also means that your GPA and grade for any class will not be affected. Your participation in this survey is purely voluntary and at your discretion.

Sincerely,
[*insert name of investigator or research assistant here*]

Hello [*insert name here*],

Thank you for your response. By declining to meet or participate in the optional anonymous survey you have not and will not receive any consequences or penalties.

Have a great day.

Sincerely,
[*insert name of investigator or research assistant here*]

Appendix U

Social Validity Survey

Optional_Anonymous_Post-Study_Survey

iQ Score: Great

▾ Optional Anonymous Survey

Block Options ⌄

☐
Q19

⚙

✱

Western Michigan University
Department of Psychology

Principal Investigator: Dr. Douglas Johnson
Student Investigator: Andrew Smith

You are invited to participate in this research project titled "*Can't stop: The effects of high-p sequencing on fluency and retention*"

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. You may choose to not answer any question. compare the effects of different flashcard procedures on the rate of accurate answers and retention. This research will serve as Andrew Smith's thesis for the requirements of the master's degree in Industrial Organizational Behavior Management. If you take part in the survey, you will be asked to give your answers based on Likert scales and free-response lines regarding the conditions of the study, and a free-response area for any thoughts, comments, or suggestions you would like to write. Your replies will be completely anonymous, so do not put your name anywhere on the survey. Your time in the survey will take approximately 5-10 minutes. Possible risk and costs to you for taking part in the survey may be the time taken to complete the survey, and potential benefits of taking part in the survey may be providing researchers with your input. An alternative to taking part in the survey is not to take part in it.

The de-identified (anonymous) information collected for this research may be used by or distributed to investigators for other research without obtaining informed consent from you.

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at 269-387-4424 or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531

The de-identified (anonymous) information collected for this research may be used by or distributed to investigators for other research without obtaining informed consent from you.

Should you have any questions prior to or during the study, you can contact Dr. Douglas Johnson at 269-387-4424 or douglas.johnson@wmich.edu, or the student investigator, Andrew Smith, at 352-817-0531 or andrew.r.smith@wmich.edu. You may also contact the Chair of the Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

This consent has been approved by the Western Michigan University Institutional Review Board (WMU IRB) on "(study approval date).

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

Participating in this survey online indicates your consent for use of the answers you supply.

○ Yes, I give my consent
● No, I do not give my consent

↳ Condition: **No, I do not give my consent Is Selected.** Skip To: **End of Survey.**   Options ⌄

- Page Break -

☐ Q1
⚙   During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I could tell that the two conditions that were not self-study were conducted differently (1-5).

○ 1 - Strongly Disagree
○ 2 - Disagree
○ 3 - Neutral
○ 4 - Agree
○ 5 - Strongly Agree

www.manaraa.com

Q2 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the SAFMEDS condition the best (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q3 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the high-p condition the best (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q4 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I liked the self-study condition the best (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q5 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought SAFMEDS was the easiest condition (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q6 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought high-p was the easiest condition (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q21 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, I thought self-study was the easiest condition (1-5).
- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

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Q22 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the SAFMEDS condition (1-5).

- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q23 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the high-p condition (1-5).

- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q24 During the timed sessions where flashcards were either presented for about a second each, or I went through flashcards by myself within thirty seconds, my answering behaviors were most likely to be reinforced in the self-study condition (1-5).

- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q25 For the session posttests (not the delayed posttests), I could tell I was definitely doing better at one condition's flashcards than the others (1-5).

- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q26 If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?

- ○ SAFMEDS
- ○ High-p
- ○ Self-study
- ○ Not applicable

Q30 For the delayed posttests, I could tell I was definitely doing better at one condition's flashcards than the others (1-5).

- ○ 1 - Strongly Disagree
- ○ 2 - Disagree
- ○ 3 - Neutral
- ○ 4 - Agree
- ○ 5 - Strongly Agree

Q27

☐

⚙

If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?

○ SAFMEDS

○ High-p

○ Self-study

○ Not applicable

Q31

☐

⚙

I would use one of the same methods in one of the conditions for studying (1-5).

○ 1 - Strongly Disagree

○ 2 - Disagree

○ 3 - Neutral

○ 4 - Agree

○ 5 - Strongly Agree

Q28

☐

⚙

If so, what is the name of that condition (on the line below, write the name of the condition, otherwise, please select "Not applicable")?

○ SAFMEDS

○ High-p

○ Self-study

○ Not applicable

Q29

☐

⚙

Do you have any thoughts, comments, or suggestions?

○ On the line below, write whatever you would like, otherwise, please state "Not applicable":

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Appendix V

Signed HSIRB Approval Letter

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Date: January 6, 2020

To: Douglas Johnson, Principal Investigator
Andrew Smith, Student Investigator for thesis

From: Amy Naugle, Ph.D., Chair *AmyNaugle*

Re: IRB Project Number 19-12-27

This letter will serve as confirmation that your research project titled "Can't Stop: The Effects of HGH-P Sequencing on Fluency and Retention" has been **approved** under the **expedited** category of review by the Western Michigan University Institutional Review Board (IRB). The conditions and duration of this approval are specified in the policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes to this project (e.g., *add an investigator, increase number of subjects beyond the number stated in your application, etc.*). Failure to obtain approval for changes will result in a protocol deviation.

In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the IRB for consultation.

The Board wishes you success in the pursuit of your research goals.

A status report is required on or prior to (no more than 30 days) January 5, 2021 and each year thereafter until closing of the study.

When this study closes, submit the required Final Report found at
https://wmich.edu/research/forms.

Note: All research data must be kept in a secure location on the WMU campus for at least three (3) years after the study closes.