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A Comparative Assessment of TAGteach® and Video Self-Evaluation on Increasing Fluency of Dance Movements

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Fluency of Dance Movements

by

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Abstract

A Comparative Assessment of TAGteach® and Video Self-Evaluation on Increasing Fluency of Dance Movements

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Dance coaching and education is a rapidly evolving field both within behavior analysis and in other disciplines. Previous behavior analytic research in dance or similar athletics has demonstrated the effectiveness of video feedback/self-evaluative video feedback and TAGteach® separately. However, there is no published research comparing these two interventions. The present study applied an adapted alternating treatment design to examine the effects of TAGteach™ versus self-evaluative video feedback in improving the accuracy of dance movements in beginner level dance students. All participants demonstrated a visibly greater increase in skills paired with TAGteach™ compared to skills paired with video self-evaluation.

Keywords: TAGteach, video feedback, self-evaluation, dance

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Dedication

I dedicate my thesis to Bea and Marilyn, my grandmothers.

Chapter 1: Introduction

Sports in ABA

Applied behavior analysis (ABA) has proven effective in changing behavior in a variety of organizational settings, from human service settings (e.g., Luiselli et al., 2009) to traffic safety (VanWagner et al., 2011). Additionally, a specific subfield of ABA, organizational behavior management (OBM) is becoming more commonly applied to sports (Schenk & Miltenberger, 2019). Some examples include horseback riding (Kelley & Miltenberger, 2016), rock climbing (Walker et al., 2020), basketball (Kladopoulos & McComas, 2001), football (Allison & Ayllon, 1980; Ward & Carnes, 2002), tennis (Allison & Ayllon, 1980), gymnastics (Allison & Ayllon, 1980; Boyer et al., 2009), and yoga (Downs et al., 2015).

A review from Schenk and Miltenberger (2019) of behavior analytic applications to athletics analyzed 101 articles. The review covered consequence, antecedent, feedback, skill training, and other procedures. There was a total of 23 different procedures implemented that primarily focused on the behavior of the athlete, coach, or trainer. Eight studies used video modeling or instruction, 13 applied goal setting, seven auditory feedback, 23 verbal feedback, 14 video modeling, and ten assessed self-monitoring.

Concerning specific sports, ABA has also been applied to dance. Dance research has included the use of public posting graphic feedback (Quinn, Miltenberger, Abreu, et al., 2017), auditory feedback from peers (Quinn, Miltenberger, James et al., 2017) and

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teachers (Quinn et al., 2015), video modeling, and video modeling combined with video feedback (Quinn et al., 2019). All interventions have demonstrated considerable effects in improving dancer accuracy.

Regarding research designs, most studies used a multiple baseline design, followed by reversal designs and multielement designs. Despite the numerous interventions applied to sports, few studies have applied comparative designs to directly compare different interventions. Comparative studies may be particularly beneficial. While many interventions have demonstrated effectiveness, some may prove more efficient or socially valid than others.

Feedback

Feedback is information concerning the performance of an individual that allows the individual to alter their own behavior (Daniels & Bailey, 2014). This intervention is prevalent in many performance improvement studies as it is little to no cost, easy to implement, and effective. However, there are many characteristics that can influence the effects of feedback. In a review of performance feedback studies published across several journals, Sleiman et al. (2020) indicated that feedback is most effective when provided prior to performance.

Research suggests that positive feedback during coaching is more effective than standard applications of coaching when working with athletes. For instance, Allison and Ayllon (1980) studied the effects of behavioral coaching procedures which involved modeling, specific corrective feedback, and positive feedback across several independent

movement topographies to the standard coaching procedures. The standard coaching procedures typically contain more negative than positive reinforcement. Researchers found that all targeted skills across all performers improved at a higher rate during intervention phases than standard coaching procedures. Correct foul-shooting in basketball was targeted in a similar way; researchers would provide directions for correct form and deliver praise contingent on players making a shot while engaging in at least one target for correct form. At the conclusion of the contingent praise intervention, all participants improved both their form and the frequency of shots made (Kladopoulos & McComas, 2001).

Video Feedback

An increasingly popular method of feedback delivery is video feedback. Video feedback is a type of performance feedback where the performers view a recording of their previous performance (Schenk & Miltenberger, 2019). The recording of previous performance is frequently supplemented with other components such as a comparison model, verbal feedback from a teacher, or self-evaluation. This approach allows performers to see errors in their technique that they may not be able to recognize as incorrect while they are performing. Video feedback can be particularly relevant in sports when form is critical. As mentioned, in several studies, video feedback has also been used alongside video modeling. Video modeling often precedes performance in which the participant is shown a video of a performer demonstrating the correct form of the target skill (Schenk & Miltenberger, 2019).

Within the field of behavior analysis, video modeling and/or video feedback have been applied to horseback riding (Kelley & Miltenberger, 2016), rock climbing (Walker et al., 2020), gymnastics (Boyer et al., 2009), and yoga (Downs et al., 2015). This approach requires pinpointing specific skills that are desired within a respective sport. For instance, Kelley and Miltenberger (2016) targeted jumping, position, and dressage skills used in horseback riding with riders who had some previous training and only provided video feedback as opposed to a model. Similarly, Downs et al. (2015) targeted beginning yoga poses with performers who had no prior experience but did not receive a video model, only providing the participants with video feedback on their own performance.

For those interventions in which video modeling was used alongside video feedback, the researchers found a video of an expert performer demonstrating the skill and asked the participants to match the skill (Boyer et al., 2009; Walker et al., 2020). For instance, a video of an expert rock-climber was provided to participants who were considered novices in climbing. The skills demonstrated in the video were all relatively new skills. Following their performance, participants were provided with video feedback. All participants demonstrated an increase in accuracy (Walker et al., 2020). In a similar study with trained gymnasts, participants were provided a model of skills that were familiar but not yet mastered. Their performance was shown to them following each trial. Again, all participants demonstrated an increase in accuracy across all skills. Authors suggested similar interventions be examined in other sports (Boyer et al., 2009).

Dance research has primarily focused on positive feedback with the occasional addition of antecedent components. Quinn et al. (2019) compared the effects of a video

model alone to the effects of a video model with video feedback, finding that the addition of feedback was a necessary component in improving student performance. The researchers suggested future research on the evaluation of video feedback alone in a comparative study in improving the effectiveness of the dance. This is the only study using video feedback as an intervention that has been conducted with dancers, and this study did not evaluate the effects of video feedback as a sole intervention.

Much research on video feedback involves researchers or coaches providing feedback as the participant views the video and listens to the feedback. While there is some research on self-evaluation when viewing the video (e.g., Downs et al., 2015; Williams & Gallinat, 2011), there is no research that explores the effects of self-evaluative video feedback in dancers.

Visual Self-Evaluative Feedback

Alongside feedback, the use of self-evaluation and self-monitoring programs are increasingly popular interventions as they are typically low cost and do not require significant oversight. Additionally, by evaluating their own performance, participants can gain feedback more immediately than if they were to only receive peer or supervisor feedback (Cooper et al., 2020). A meta-analysis of performance feedback studies published in the Journal of Organizational Behavior Management conducted by Sleiman et al. (2020) found that self-generated feedback was more effective in all applications, however only four publications from 1998 through 2018 applied self-generated feedback alone. Other publications supplemented self-generated feedback with supervisor feedback. Several

studies have implemented self-evaluative interventions using visual feedback with videos of the participant's own performance (Downs et al., 2015; Guercio & Dixon, 2010; Sigurdsson & Austin, 2008).

The use of visual self-evaluative interventions is best for behaviors in which the individual has control, may observe a single dimension of behavior, and when the individual(s) are provided with prompts or cues (Cooper et al., 2020). Within research targeting athletic behaviors, targets are primarily focused on the topography of a response. Examples of such applications of visual self-evaluative feedback include safe posture while typing in an organizational setting (Sigurdsson & Austin, 2008), characteristics of acceptable staff interactions with participants in a group home (Guercio & Dixon, 2010), and accuracy of yoga poses in a fitness studio (Downs et al., 2015). All these skills focus on a required form. Participants were expected to assess their own form using a visual antecedent or stimulus. With the implementation of self-evaluation and monitoring, performance of the dependent variables improved across all studies.

Considering more specific procedures, Downs et al. (2015) provided a model during the first two baseline sessions to allow the participant to learn what the targeted yoga pose should look like. Baseline was immediately followed by a video self-evaluation phase in which the researcher asked the participants to score their own behavior based on a video of their performance and task analysis of the pose. If participants did not demonstrate a meaningful increase in performance during self-evaluation, a researcher would provide feedback based on the video. Participants required retraining on video self-evaluation to maintain efficacy. While the pose increased in accuracy from baseline across all

participants, a maintenance probe shows a decrease in accuracy from the intervention phases. Similarly, Guercio and Dixon (2010) filmed staff interactions with group home residents and showed the videos to the staff. In the first intervention phase, staff were trained to evaluate their performance. Specifically, they were given a model of behavior, and were provided verbal feedback from a behavior analyst. In the following intervention phase, participants scored a video of their performance without a model or verbal feedback but were provided immediate feedback for interactions on the floor. Both phases demonstrated moderate effects, with one performer showing an initial increase in performance followed by a decrease in correct performance of interaction skills. Sigurdsson and Austin (2008) used video feedback, a pop-up prompt and a self-scoring form to improve posture while typing. The only feedback participants received occurred at the onset of training for safe posture. The participants showed an increase in all criteria for safe posture; and they also demonstrated a slight decrease in typed words per minute from baseline.

Video self-evaluation is an effective tool at improving accuracy of skills and given the research in self-evaluation on yoga (Downs et al., 2015), it would likely demonstrate effectiveness across other sports such as dancing. By giving athletes the opportunity to view and score their own performance on a skill, performance and fluency of those skills will likely increase. While there are benefits of video feedback, there are also drawbacks. While performers may be able to see their actual performance after performing a skill, they do not receive immediate feedback in the moment. It could be that other approaches to feedback that are more immediate may prove more effective.

TAGteach™

TAGteach™, or teaching with acoustical guidance, promotes immediate feedback through a sound from a clicker which is delivered immediately following the correct performance of a step or behavior. This approach to feedback is derived from clicker training. Due to the immediacy of the click, which serves as a reinforcer for correct behavior, the target behavior(s) increase in one or more dimensions (TAGteach International, 2016). This type of feedback has proven effective with a variety of dependent variables including those relevant in sports. Some examples include golf (Fogel et al., 2010), yoga (Ennet et al., 2020), and dance (Quinn et al., 2015; Quinn, Miltenberger, James et al., 2017).

Similar to video feedback, TAGteach™ is often implemented when the targeted dependent variables are form-based, with current literature showing positive results in form accuracy. For example, researchers targeted the form of a golf swing in a single performer (Fogel et al., 2010). Specifically, they targeted five individual behaviors that would contribute to a more effective golf swing using a multiple baseline design across behaviors. TAGteach™ has also been effectively used in yoga to improve the form of selected poses (Ennet et al., 2020). Additionally, TAGteach™ has proven effective in dance with noticeable improvements in accuracy of dependent variables following its implementation (Fogel et al., 2010; Quinn et al., 2015; Quinn et al., 2017).

Considering dance more specifically, Quinn et al. (2015) implemented a multiple baseline design across three skills using four young dancers. The implementation of

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TAGteach™ alone proved to be effective at improving performance of all skills apart from one participant. For the youngest participant, aged six, the click sound provided by the instructor did not function as a reinforcer and required the addition of a token economy to increase skills. For the remainder of the participants, TAGteach™ was demonstrated as an effective intervention on its own. The targeted skills included dance movements such as kicks, turns, and leaps. All skills were both functionally and topographically independent of one another.

While there are several published applications of TAGteach™ or similar auditory feedback interventions to dance, less has been published on the comparative effects of other approaches to feedback. Only two comparative studies pertaining to auditory feedback applications in athletics have been published. One of the two aforementioned studies assessed yoga (Ennet et al., 2020) whereas the second assessed dance (Quinn, Miltenberger, James et al., 2017).

Using an adapted alternating treatment design, Ennet et al. (2020) compared two TAGteach™ interventions: the standard (practicing each tag point three times) and the reduced practice (practicing each tag point once). Authors targeted five yoga poses, with two for each treatment condition and one pose serving as the control condition for each participant. There was little consistency across participants in which level of TAGteach™ was more efficient at improving skill accuracy, however both increased all targeted skills to 100% accuracy.

Quinn et al. (2017) compared effects of providing auditory feedback versus receiving auditory feedback on dance performance, in which performers delivered auditory feedback to their peers for some skills and received auditory feedback from their peers for the other skills. Both interventions were evaluated to determine if providing and receiving auditory feedback would improve performance. Results demonstrated that both giving and receiving feedback increased correct performance of all dance skills across all participants. However, receiving feedback proved more effective than providing feedback. While each of these studies compared the effects of various applications of TAGteach, no research has compared the effects of TAGteach™ to a non-TAGteach™ intervention in athletics. Thus, it is still unknown if TAGteach™ would be more effective at improving dance proficiency when compared to another form of feedback.

Overall, applying feedback interventions to athletics has proven effective. This is perhaps one reason why the primary intervention assessed has been feedback. Often, feedback has been combined with an antecedent intervention such as a model. While there has been a range of interventions applied to improving athletic performance, few studies have used comparative designs. Additionally, there appears to be a lack of studies that compare the effects of different methods of feedback delivery. Concerning feedback delivery, there is no self-evaluative research in dance, however there is some research applying video self-evaluation to yoga, a dance adjacent activity. Given the effectiveness of TAGteach™ as demonstrated in training dance behaviors, and the lack of comparative feedback in athletics, the goal of this study was to evaluate if feedback offered through an intervention, such as TAGteach™, leads to visible improvement compared to another

method, such as self-evaluation. Thus, the purpose of the present study was to evaluate the comparative effects of two interventions: 1) video modeling and video self-evaluation and 2) TAGteach™ on the percentage of correct dance steps performed on a TA by university students who had little to no experience in dance. The study was done in a laboratory setting that was equipped with appropriate dancing equipment.

Chapter 2: Method

Participants

Four female graduate students participated in this study. All student participants were masters or doctoral level graduate students enrolled at a university in the southeastern United States. Two participants were recruited by their academic instructor and received course credit for their participation in this study, those who elected not to participate in this study received other opportunities or were given an alternative assignment. The remaining participants were volunteers who did not receive compensation of any kind.

All participants were required to be able to read at a 3rd grade reading level or better, as well as have the physical ability to perform the dance steps. Prior to being admitted to the study, participants were asked to complete to Physical Activity Readiness – Questionnaire (See Appendix A) to ensure they were physically able to complete the required steps (Warburton et al., 2011). If participants passed the PAR-Q, they were asked to perform these skills. Three participants who scored greater than 40% on either dance skill as defined by the task analysis (See Appendix B) move were excluded from the study.

Informed consent consisted of a form signed by participants that described the purpose of the study, procedures, risks and benefits of participation, how participants would be compensated, confidentiality, and noted that participation was voluntary and that they had the right to withdraw at any time. After reading the informed consent document,

participants were given the opportunity to ask questions. Any questions could be asked via email. Informed consent was delivered via electronic signature. All participants were provided with a code name.

Setting and Materials

Sessions with student participants took place in a large conference room at a university in the southeastern United States. The room was 10 meters by 3 meters, with roll-up Marley flooring, a vinyl dance-floor material, laid on the floor. The room had three white boards, two doors, eight tables, 15 chairs, cabinets along one side of the room, and a large computer monitor. The type of flooring and the size of the room allowed for ease of movement and prevented injury to the participants.

The materials used for this study included two task analyses (see Appendix B), a hand-held tagger, an iPad equipped with the Good Notes application, and Apple Pencil, a laptop computer equipped with video editing software, two camera tripods, and two GoPro cameras used for feedback sessions and data collection purposes. Participants were asked to wear form fitting clothing (leotards, leggings, form-fitting tank-tops, etc.) and soft ballet shoes, jazz shoes, or socks without gripping material.

Dependent Variables and Measurement

To avoid potential carryover effects associated with the research design chosen for the study, two dance moves were selected. The specific details of each assessment are described below. These dance moves were selected because they are functionally

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independent (e.g., one focuses more on the lower body, while the other focuses more on the upper body), yet they are equally challenging.

Correct Leg and Foot Positioning During a Pique Turn (Lower Body)

One dependent variable targeted was the correct leg and foot positioning during a pique turn. A pique turn is a traveling turn that involves stepping and turning on one leg, while the other bends so the foot is touching the knee, then stepping down on the bent leg to repeat the movement again. While considered a beginner step in ballet, this step requires dancers to move their legs and feet in different directions and to bend their knees. For the novice dancer, this can make maintaining turnout significantly more difficult.

The measurement procedure used to assess correct performance was the percentage of steps correctly performed on a task analysis (TA) while completing the pique turn (See Appendix B1). While this dance move includes a modest degree of arm movement, it was selected given that it primarily requires movement of the lower body. Furthermore, to ensure functional independence, the TA steps targeted specific movements related to the lower body only. A total of 41 steps were selected that were believed to demonstrate correct leg and foot positioning during a pique turn. Only 35 of those steps were scored; the remaining six were taught to the participant but not scored as they were performed without any training.

Examples of correct completion of a pique turn may include the step 18 of the pique turn TA, if the participant touched their foot to the back of their knee. This would be considered incorrect if the participant touched their left foot to the front of their right knee.

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Hand/Arm Shape During Port De Bras (Upper Body)

The second dependent variable targeted correct hand/arm shape during a port de bras. Correct hand/arm shape is defined as a dropped shoulder, slight bend to the elbow, and an open hand with elongated fingers (i.e., a ballet hand).

Correct handshape was defined as all fingers straight and angled slightly inward from the first phalange, with the middle finger angled more than the rest and the pad of the thumb approximately in line with the middle finger. Correct arm shape was defined as a slight bend between a 20 and 60-degree angle in the elbow with the hand in line with the elbow and the shoulder(s) relaxed. Unless the arm(s) or hand(s) are written in the TA to be above the head or shoulder, the elbow should be lower than the shoulder and the hand should be lower than the arm or parallel to the ground.

The measurement procedure used to assess correct performance was the percentage of steps correctly performed on a TA while completing the port de bras (See Appendix B2). While this dance move includes a modest degree of leg movement, it was selected given that it primarily requires movement of the upper body. Furthermore, to ensure functional independence, the TA steps targeted specific movements related to the upper body only. A total of 41 steps were selected that were believed to demonstrate the correct completion of a port de bras exercise. Only 35 of those steps were scored, the remaining six were taught to the participant but not scored.

Examples of correct completion of the steps may include any instance in which the participant maintains the specified arm shape, slightly rounded at the elbows, denoted by

steps one, 12, 18, 28, and 34. All these steps would be considered incorrect if one or both of participant's elbows were unbent or if they were at an angle of 90 degrees or less. Further examples of correct behavior may include any instance in which the participant keeps their shoulders down at a "relaxed" position, as in steps six, 21, 29, 37 and 41. This would be considered incorrect if the participant raised one or both shoulders upward toward the ears and head.

Most tag points met the recommendations made by TAGteach International, (TAGteach International, 2016). All task analyses were selected and developed by the author, who has received 15 years of formal dance education. The scores for each session were determined by using the video recording following each session and calculated as percent accurate by dividing the number of steps correct by the total number of steps and multiplying by 100. These tag points were used for scoring purposes during both interventions. Data were collected by viewing the participant's performance of the skill at the conclusion of the session.

Interobserver Agreement

Interobserver agreement (IOA) was collected for 33% of all sessions with a goal of mean 80% or greater agreement. Videos were selected using a random generator. IOA was determined using trial-by-trial agreement, using the task analyses and selected tag points for each dance step. Observers scored steps of the TA as correct or incorrect. The number of agreements between the primary recorder and the independent observer were added

together and divided by the total number of agreements and disagreements and multiplied by 100.

Four observers were selected. All observers had a history of dance education in one or more areas, including ballet, jazz, and/or hip-hop. Observers were provided with detailed instruction and training concerning how to identify and score correct turnout and hand/arm shape (See Appendix C). Training consisted of reviewing a presentation of each step, which included photographs and/or videos of each step being completed by a model alongside descriptions of what may make a step incorrect versus correct. Following instruction, observers independently scored at least two videos of varying difficulty. All observers reached 90% agreement prior to scoring further videos. Observers were provided two videos to score for agreement, but they were not provided with the step and intervention pairings for each participant. After observers scored two videos, observers met with the researcher to review any disagreements. This was completed for all participants until sessions were complete.

The level of agreement for the present study was 89%.

Independent Variables

TAGTeach

TAGteach, or Teaching with Acoustical Guidance, is a behavioral intervention, which has previously demonstrated effective in improving dance performance (Quinn et al., 2015). During the intervention, participants were trained to complete the steps of the task analysis. All tag points, which are the individual steps of the TA, for this intervention

were selected using the WOOF criteria: **W**hat you want (i.e., the desirable behavior), **O**ne behavior per step, **O**bservable, and **F**ive words or less. This approach is in alignment with guidelines by TAGteach™ International.

Prior to the onset of the intervention, participants were trained on the TAGteach™ intervention. They were introduced to the clicker and the instructor explained the reasoning behind the clicks: "when you hear a click, it means you have performed the step correctly, this is also called a tag. If you do not hear a click, you have not performed the skill correctly." Participants were given the opportunity to hold and click the clicker, the chance to participate in games to introduce the use of the clicker and create a conditioned reinforcer.

For sessions in which TAGteach™ was the selected intervention, participants were asked to perform the dance move described on the task analysis moving from step to step, or tag point, one-by-one. Typically, the task analysis was completed in order, however, at the researcher's discretion some steps would be completed non-sequentially or returned to following the intervention. When a participant performed a tag point correctly, the researcher clicked the tagger and asked the participant to repeat the step up to two more times before moving onto the next tag point. Only one researcher completed each TAGteach™ session. If the tag point was incorrect, the participant was given up to three attempts at completing the tag point correctly. If the participant continued performing the tag point incorrectly, the researcher returned to a previously mastered tag point and considered re-evaluating the tag point. Each time a new tag point was added, the participant completed the skill up to the new tag point.

Video Self-Evaluation

Video self-evaluation was the second intervention employed. This intervention used the same tag points as those used in TAGteach. At the onset of the intervention, participants were trained by the researcher on correct video self-evaluation. Similar to Downs et al. (2015), participants were again given a model that demonstrates exceptional performance on all targets and the researcher walked them through the task analysis and together scored the exceptional performance on all targets. They were then asked to complete a self-evaluation based on a video of themselves completing the task in baseline. The researcher provided feedback on this evaluation only during the training. During video self-evaluation sessions, the researcher did not provide any feedback to the performer on their video self-evaluation. Participants were not retrained at any point during the study.

Following training, participants were asked to perform the move at the beginning of each session, and shown a video of their performance of a targeted skill from the previous session. Participants were asked to score their performance using the skill's task analysis and the established tag points. Participants were not provided feedback on their performance by the researcher during the intervention or maintenance sessions. Participants who were assigned to receive video self-evaluation for lower body viewed the video with their upper body cropped out, and those assigned upper body viewed videos in which the lower body is cropped out. By cropping the videos, a potential confound was avoided. Participants were not able to receive video feedback of their performance of the dependent variable assigned to TAGteach.

Research Design

An adapted alternating treatment design (AATD) was used across four participants for this study. The treatments consisted of the two independent variables, TAGteach™ and video self-evaluation, that were applied to the two topographically different target behaviors, hand/arm shape and turnout. This study consisted of four phases: baseline, comparison of the independent variables, followed by a phase using the superior treatment alone (to rule out sequence effects), and maintenance.

This research design was selected given that it was a comparison design and could best answer the research question. Furthermore, it was also selected due to the nature of the targets being evaluated. These are learned (irreversible) behaviors and therefore the traditional alternating treatment design would not be appropriate as there would likely be carryover effects during rapid alternation of the interventions. By using two target behaviors that were topographically different, yet equally challenging for novice dancers, the comparison between two interventions could be best demonstrated.

Procedures

Pre-baseline Assessment

Each potential participant was asked to complete the first page of the Physical Activity Readiness Questionnaire (PAR-Q) (See Appendix A). If the participant answered "No" to all questions on the first page, they were not asked to complete the remainder of the questionnaire and were admitted to the study. If participants answered "Yes" to any questions on the first page, they were asked to complete all questions on page two and

three. If the participant answered "No" to all questions on page two and three, they were admitted to the study. If they answered "Yes" to any question, they were dismissed from the study. This is in line with the requirements of the PAR-Q.

Baseline

The instructor provided a video model of each target to the participants prior to the first baseline trial for each target. The participants were only shown the video model once for all of baseline to prevent practice effects. Participants were then asked to demonstrate the skill based on the model within 5-seconds of the model being completed, if they scored above 40% accuracy for either target during baseline, they were dismissed from the study.

During all baseline sessions, the instructor asked the participants to demonstrate each dance step. Each dance step had six baseline trials. No feedback was provided for the student's performance of the skill, only the instructor saying "thank you" noncontingently at the conclusion of the skill. Each trial during baseline lasted no longer than five minutes.

As an AATD was the chosen design, the receipt of the interventions for each dependent variable was counterbalanced across the different participants. Following baseline, approximately half of the participants were randomly assigned to receive TAGteach™ intervention for pique turn maintenance and video self-evaluation for port de bras. The remaining half were be assigned video self-evaluation for pique turn and TAGteach™ for port de bras to rule out potential confounds due to behavioral difficulty. Assignments were made using a random generator.

Comparison of the Independent Variables

TAGteach Training

At the onset of the study, participants were introduced to the tagger device that was used for TAGteach™. The participants were given the opportunity to play games using the tagger, click the device, and learn what the sound from the clicker meant. The participants were told that the sound of the tagger indicated that they had performed the stated step correctly. The researcher described what a tag point was and demonstrated what completing a tag point looked like to the participant. The researcher stated "The tag point is…" followed by the name of a given tag point as listed under the description column of the TA. The researcher then provided the participant an opportunity to tag the researcher or click on the clicker. Participants were given the opportunity to ask the researcher questions about the tagger or the procedure.

As previously mentioned, half of the participants received TAGteach™ intervention for hand/arm shape during port de bras and half of the participants received TAGteach™ for turnout during the pique turn.

TAGteach Data Collection

For TAGteach™ sessions, the participants were asked to perform the designated dance moves and the instructor went through the tag points for each step. The instructor provided verbal instructions and a model, when needed, for these skills or individual steps at any point during the intervention. At the onset of each session, the participants were made aware of which behaviors were targeted for that session, reminded what the clicking

sound meant, and that they would not be receiving verbal feedback following the conclusion of the step.

Each participant performed the tag points step-by-step. The tag points were introduced to the participants first by a verbal instruction, then a model if necessary, and using the phrase "The tag point is…" followed by the name of the step. If a participant performed a tag point correctly, the instructor tagged the step and asked that the participant perform the tag point up to three more times. If completed incorrectly, the instructor did not tag the tag point and allowed the participant to repeat the step up to three times. If the participant continued to perform the tag point incorrectly, the researcher would consider re-evaluating the tag point and returned to a previously mastered tag point for the participant to complete. Each time a new tag point was added, the participant completed the skill up to the new tag point. For example, a participant would complete steps 1-5 prior to completing step, or tag point, 6 as the tag point and they would not move onto step 7. If needed, the researcher would return to a previous tag point if they determined that the participant was not performing that tag point correctly.

At the conclusion of the TAGteach™ session, the participant was given the opportunity to practice the step twice. During practice, the participant would not receive any feedback from the researcher. They then performed the targeted dance step once for the camera without the tagger. This video was used for scoring and IOA purposes and is the only part that was scored for the performer. After at least one data point was collected for the first dance move, the researcher rotated to the next intervention and behavior. Up to

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two data points were collected prior to rotating to the other behavior and other intervention. It continued in this fashion for the remainder of the comparison phase.

Video Self-Evaluation Training

At the onset of the comparison phase, participants were provided with training for self-evaluating their own performance based on the video. The researcher provided verbal instructions to the participant for how to utilize the task analysis. The participant was told to circle the '+' for all steps completed correctly and the '- 'for all incorrect steps. Following instruction on how to use the TA, a video of an expert performer engaging in the behavior was shown. The researcher provided a description for hand shape and turnout. The researcher and participant scored the expert together using the TA to help the participant see what expert performance looked like and how it should be scored. The researcher provided detail about a step as needed. Following this, the participant viewed a video of themselves completing the task in baseline and scored their own performance using the TA and received feedback from the researcher based on their accuracy.

Video Self-Evaluation

For the first session, participants were asked to perform the step again and would score that behavior at the beginning of the next session. For remaining sessions, they were again asked to perform the step following the self-scoring and would be asked to score their performance at the beginning of the next session. Essentially, the participants were instructed to score their own performance of a specific target (port de bras or pique turn) using the task analysis displayed on an iPad via the Good Notes application and an Apple

pencil that was provided to them. They were asked to circle a '+' for correct steps and a '-'for incorrect steps. The instruction provided by the researcher contained the following information: specifying that this video was from their previous session, the name of the skill, the video may be viewed three times, and request the TA be used for scoring. While the researcher was present in the room, they did not provide feedback on the participant's self-evaluation, nor did they view the participant's video along with them. The researcher monitored the viewing to ensure that the video was not viewed more than three times and that the participant did not pause the video. The participant was allowed to restart the video on their own.

The task analysis was collected from the participant after they had the opportunity to view and score the performance based on the video. The scoring sheet was then evaluated to determine the participant's accuracy. No feedback was provided to the participant based on their accuracy. For scoring and data collection purposes, the same tag points used in the TAGteach™ intervention were used during the video self-evaluation intervention. Sessions lasted until the participants completed the viewing, scoring and performance of the skill. Up to two data points were collected prior to rotating to the other behavior and other intervention.

Superior Treatment Alone

Following the conclusion of the comparison phase, the researcher viewed the data to determine which intervention was most effective. The intervention that demonstrated superior effects was introduced alone to rule out sequence effects. The intervention that

was less effective did not move forward to the superior treatment phase. Across all participants and behaviors, the TAGteach™ intervention demonstrated the greater impact on performance accuracy when compared to the video self-evaluation intervention. During this phase, the TAGteach™ was selected and was implemented exactly as it had been implemented for the previous phase but there was not a rotation between the two behaviors and interventions. This phase lasted three sessions for all participants.

Maintenance

Three weeks following the conclusion of the previous phase, participants were asked to perform the dance steps from each skill again to determine maintenance of the skills. The participants were scored exactly as they had been in the previous phases and on all targeted behaviors regardless of which intervention proved superior. During this phase, no intervention was in place. Participants were asked to perform the skill for the camera without practice.

Procedural Integrity

Procedural integrity was evaluated by one independent observer recording and viewing 33% of the sessions (18 sessions). Nine of the sessions selected were video self-evaluation sessions, and nine of the sessions selected were TAGteach™ sessions. Sessions were randomly selected using a random generator. Training sessions were excluded.

All procedural integrity data collection were collected by an observer trained in both interventions. Training consisted of a review of the presentation provided to IOA observers, as well as a description of how to use the task analysis. The observer did not

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have a history in dance education or in implementing either intervention, however the observer did have experience in behavior analytic research.

TAGteach™ was evaluated by the observer recording whether or not the researcher delivered a verbal instruction; the delivery of the phrase "The tag point is…", the point-to-point statement of the description as listed in the task analysis, whether or not the step was correctly tagged, whether or not the step was completed at least once but no more than three times, and if the researcher gave the participant the opportunity to practice the step twice. These criteria were selected as the most important aspects of TAGteach™ training. Treatment integrity was calculated by accuracy of all six areas for each step of the task analysis. Observers were provided with a spreadsheet (See Appendix D1, Appendix D2) and told to mark a one for steps completed correctly and a zero for steps completed incorrectly or skipped. The numbers were automatically totaled by the spreadsheet with a maximum of 206 possible steps. The number of steps performed correctly was divided by the number of possible steps and multiplied by 100. The treatment integrity for TAGteach™ was 99%.

Video self-evaluation was evaluated by recording the researcher's presentation of the video, the researcher's response to the participant's performance and self-scoring, and whether or not the participant was given two practice attempts without researcher feedback. A form was provided to the observer for all of these items (See Appendix D3). The observer marked a one for all steps completed correctly and a zero for all steps completed incorrectly for a potential high score of seven. The number of steps performed

correctly was divided by the number of possible steps and multiplied by 100. The treatment integrity for video self-evaluation was 100%.

Social Validity

Following the conclusion of the study, a social validity survey (see Appendix E) was emailed to each participant asking them to rate the procedures and goals of the study, as well as indicate if they preferred TAGteach™ or video self-evaluation. Participants were asked to score their agreement with a statement on a 5-point Likert Scale, with a one as strongly disagree and a five as strongly agree. Once participants completed the survey, they were asked to email it back to the researcher.

Chapter 3: Results

Four participants met the inclusion criteria for the study. Three individuals were excluded due to scoring above the limit for inclusion. All excluded individuals scored above 40% accuracy in the pique turn. Two female individuals demonstrated average scores of 68% and 61% for the pique turn, over 20% above inclusion criteria. A male participant performed at an average of 59% accurate for the pique turn. Of those excluded, only one of the female participants scored above 40% during any session for the port de bras with an average at 36%. The other female participant scored a 20% average of the port de bra and the male performed the step with an average of 23% accuracy. No participants were excluded for failure of the PAR-Q.

Following intervention, results demonstrated an increase in accuracy across all performers and steps (see Figure 1). Both interventions improved the performance accuracy of the dance steps. Mean baseline for all participants for pique and port de bras was 22% and 23%, respectively. TAGteach™ when paired with pique showed a mean increase across participants to 83%, and TAGteach™ paired with port de bras showed a mean increase to 91% at the end of the comparison phase. Video self-evaluative feedback demonstrated a mean increase to 58% for pique and 56% for port de bras across participants at the end of the comparison phase. Table 1 displays all data across participants, interventions, conditions, and dance moves (See Table 1). Figure 1 provides a graphical display of the data for each participant (see Figure 1).

Pique Turn and TAGteach™

TAGteach™ paired with pique turn was assigned to two participants (e.g., Harriet and Evelin). Harriet demonstrated an increase in accurate performance of pique from a mean of 18% accuracy in baseline to 83% in the comparison phase (range, 71% to 94%). This skill was demonstrated in the best alone phase. Harriet increased to a mean accuracy of 93% with one of the sessions at 97% accurate, in which 34 of the 35 steps were performed correctly. Three weeks following the last intervention session of the best alone phase, maintenance data were collected. Harriet decreased to an average of 88% accurate in maintenance from the best alone phase, a decrease of 5%. However, during the last session for the pique turn, she performed 34 out of 35 steps correctly (97%). This was similar to her highest performance of the step during the best alone condition.

Evelin showed an increase from 30% to 83% in the comparison phase (range, 63% to 91%). Both participants demonstrated this dance move in the best alone phase. For TAGteach™ and pique turn, there was a mean increase across participants to 93% during this phase. This skill was demonstrated in the best alone phase. Evelin increased to a mean accuracy of 93% with one session at 97% accurate. She did not perform the skill at 100% accuracy in either condition. Three weeks following the best alone phase, maintenance of skill accuracy was evaluated. Evelin's performance of the pique turn decreased to an average of 89% from the best alone phase with one session scoring a 94.14% accurate, in which she scored correctly on 34% of all steps.

Pique Turn and Video Self-Evaluation

Participants Beatrice and Mabel were assigned to video self-evaluative feedback for the pique turn. Beatrice showed a mean increase from 10% to 49% in the comparison phase (range, 46% to 51%). Following the first session of video self-evaluative feedback, Beatrice decreased in accurate performance level and returned to her initial performance after two sessions. As this was determined to be the less effective intervention, this skill was not evaluated in the best alone condition. During the maintenance phase, we saw a greater decrease in accuracy from the comparison phase for the pique turn. Beatrice performed at an average of 43% accurate, about a 6% decrease following the comparison phase. As shown on the graphical display of Beatrice's data in Figure 1, Beatrice decreased in accuracy following the second maintenance session (see Figure 1).

Mabel demonstrated an increase in performance accuracy for the pique turn from an average of 29% in baseline to 68% in the comparison phase (range, 57% to 77%). Best alone data were not collected for video self-evaluation given that it was the less effective intervention. Three weeks following the best alone condition, maintenance data were collected. Mabel demonstrated similar decreases in skill accuracy for the pique turn as Beatrice, with a decrease to an average of 63% accurate during the maintenance phase. Mabel demonstrated a slight upward trend in accuracy during the maintenance phase.

Port de Bras and TAGteach™

TAGteach™ was paired with the port de bras for Beatrice and Mabel. Beatrice increased from a mean of 32% in baseline to 91% following the comparison phase (range,

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89% to 97%). As TAGteach™ demonstrated greater efficiency at improving accurate performance when compared to the skill paired with video self-evaluation, Beatrice demonstrated this skill in the best alone phase. Beatrice performed the skill at an average of 99% accuracy, with two sessions reaching 100% accuracy. TAGteach™ paired with port de bras demonstrated a slight decrease in maintenance, as well. Beatrice decreased to an average of 92% accuracy following the best alone phase with a slight decreasing trend, a decrease of approximately 7%. She did not perform any sessions at the same level as demonstrated in the best alone condition.

Mabel increased from an average of 17% accurate in baseline to 91% at the end of the comparison phase (range, 86% to 97%). As this skill demonstrated a greater increase in performance compared to the other skill, this skill was demonstrated in the best alone condition. Mabel performed port de bras at an average of 99% accuracy during the best alone session, with two sessions performed at 100% accuracy. Following the best alone condition, maintenance data were collected. Mabel decreased to an average of 98% accurate steps for port de bras during the maintenance phase, with one session performed at 100% accuracy.

Port de Bras and Video Self-Evaluation

Two participants were assigned to port de bras and video self-evaluation (e.g., Harriet and Evelin). Harriet increased from a mean baseline of 23% to 56% in the comparison phase (range, 51% to 69%). Harriet did not demonstrate this skill during the best alone condition as it demonstrated lower performance accuracy. During the

maintenance phase three weeks following the final best alone session, Harriet decreased to near baseline levels at an average of 32% with an increasing trend. The participant vocally reported that she did not remember the skill.

Evelin improved from a baseline average of 19% accurate to 54% accurate in the comparison phase (range, 34% to 66%). Evelin's performance for the port de bras decreased following the initial session, and increased the following sessions. Evelin did not demonstrate this skill during the best alone phase as the skills paired with TAGteach demonstrated a greater increase in accuracy. Evelin demonstrated a very minor decrease to an average of 53%, about a 2% decrease in accuracy. Her performance was relatively stable in the maintenance phase, with a slight upward trend.

Social Validity

Social validity was evaluated on a 5-point Likert Scale, with a one as strongly disagree and a five as strongly agree. Overall, participants scored the clearness of the dance task at a 4.75. Results demonstrated that participants preferred the TAGteach™ intervention over the self-evaluative video feedback intervention, with all four participants indicating a preference for TAGteach™. All participants rated a preference for using TAGteach™ in the future as well, with an average score of five. All questions relating to TAGteach™ were scored at an average of five. Participants were asked if the sound of the tagger helped them to identify if a step was performed correctly, this step was scored at an average of five.

There was more variability relating to the questions targeting video self-evaluation. Participants scored their ability to read the TA at an average of 4.75 but scored their understanding of scoring at an average of 4.25. Receiving feedback prior to the intervention was scored at an average of 3. Preference for the future use of video self-evaluation was rated at an average of 2. Participants rated watching their own video performance at a 2.5. Table 2 provides a breakdown of these scores by participant and question (see Table 2).

Session Lengths

Intervention session lengths were measured, as well. However, it should be noted that training session length was not included in the average. Additionally, the videos for three sessions were lost due to a failure of technology, with two TAGteach™ sessions for Harriet lost and one video self-evaluative session lost for Mabel. Based on the existing data, TAGteach™ sessions averaged 18 minutes 18 seconds. There was a 50 second difference in averages between the pique turn and port de bras under the TAGteach™ intervention, with pique sessions lasting an average of 18 minutes 45 seconds, and port de bras sessions averaging 17 minutes 55 seconds. Video self-evaluative feedback sessions averaged six minutes 25 seconds, approximately one third of the length of TAGteach™ sessions. Pique sessions for video self-evaluative feedback averaged six minutes 46 seconds and port de bras sessions lasting six minutes seven seconds.

Chapter 4: Discussion

The purpose of the present study was to compare the effectiveness of TAGteach™ and self-evaluative video feedback in training novice dancers to perform two dance steps, pique turn and port de bras, to accurate performance. A pique is a turn in which one leg remains planted firmly on the ground while the other is lifted so that the foot touches the back of the planted leg. Port de bra is a collection of arm and upper body movements. The targeted dance steps were identified and defined by the first author, who has 15 years of formal dance education, including collegiate level dance education. Following the completion of the study, TAGteach™ was demonstrated as visibly superior to video self-evaluation.

Participants who were selected had not been previously exposed to either dance step. While some participants had recently taken dance classes, none of the participants were currently taking or enrolled in dance classes. Harriet partook in yoga classes, which did not appear to impact her performance. One participant had taken an introductory ballet class more than 15 years previously, but this did not appear to influence her performance either.

Across all participants, the dance steps paired with the TAGteach™ intervention improved more quickly and to a higher level than those paired with self-evaluative video feedback, regardless of the dance step selected. This may have been due to a variety of TAGteach™ characteristics, such as the immediacy, source, and accuracy of the feedback.

In line with traditional TAGteach™, during intervention sessions feedback for the correct completion of the step was delivered immediately via an auditory stimulus (click). Aside from feedback, a component of TAGteach™ included verbal instruction and modeling from the researcher prior to practice. This may have allowed participants to rehearse the step overtly or covertly prior to actual practice of the step for feedback, which may have resulted in increased accuracy during practice and performance.

Despite TAGteach™ demonstrating a visible difference in improving accuracy in performance of the dance steps, the video self-evaluation intervention did improve performance from baseline levels across all participants as well. There are many factors that may have contributed to the effects of this intervention. Initial increases may have been a result of the training provided by the researcher, in which the researcher described steps as they were scored and the participant was able to view the expert video model more than once. Three participants continued to increase performance accuracy in successive sessions (e.g., Harriet, Mabel, and Evelin). Conversely, Beatrice demonstrated an initial increase from baseline levels in the pique turn following the introduction of the video self-evaluation but decreased in accuracy during the following sessions in the comparison phase. Her performance was relatively stable. Other components influencing the effect of the video self-evaluation may have been exposure to the task analysis, as participants were able to read the steps during the self-scoring. The actual act of self-scoring may have also influenced the performance of the participants, however the accuracy of the participant's scoring varied. When interobserver agreement was collected with the primary researcher, IOA was not above 80% for any participant.

In evaluating how efficient either program is to implement, in the present study the average duration of TAGteach™ sessions was triple the average duration of video self-evaluation sessions. The additional time required to for TAGteach™ sessions may be burdensome on dance teachers who only have a limited amount of time to train multiple skills during a dance class. If instructors wish to adopt TAGteach™ methodologies in training their students, they may adapt the intervention by restricting the number of steps taught, setting a maximum duration each target that will be practiced, or decreasing the number of times each step is practiced, as evaluated by Ennet et al. (2020). Along with the added time commitment of carrying out a TAGteach™ procedure, there is also the added time commitment of learning to implement the procedure. TAGteach™ may also require more training prior to beginning sessions to its effectiveness, with the initial training from TAGteach™ International requiring a nine-hour course (TAGteach International, 2016b). Applied settings may find that self-evaluative feedback would be a more efficient use of their time in class. Concerning self-evaluative feedback, aside from any training required for basic video editing skills, there is little to no time needed to learn how to implement this intervention. However, video feedback may require more time outside of class to allow the instructor to crop and trim the video for students, whereas TAGteach™ does not require any prep time outside of sessions.

As an AATD was selected for the design, at least two independent dance steps had to be selected for intervention. The steps selected for intervention were beginner level steps of approximate equal difficulty level. Additionally, the steps were counterbalanced to rule out any potential performance differences due to step type with the same difficulty.

Participants demonstrated varying accuracy for each skill during baseline. Evelin and

Mabel performed at a lower level for port de bras and a higher level for the pique. Beatrice

and Harriet performed at a higher level for port de bras and a lower level for the pique turn.

Moreover, certain task analysis steps appeared to be more difficult. For example, in

performing the pique turn, errors during step 30 were common across all participants

regardless of intervention type. However, those receiving the TAGteach™ made this error

less frequently. Step 30 of the pique turn requires participants to maintain a turned-out

leg/foot position as they change their body weight from the right to left foot. For most

participants, this positioning did not occur naturally. This, along with the brevity and speed

with which the step was to be completed may have contributed to frequent errors. In port

de bras, steps 12 and 28 were frequently performed incorrectly. Both steps required the

participant to round their elbows slightly, as opposed to having their arms straight. While

seemingly simple, this step is often occurring in conjunction with the performance of other

steps, and this may have contributed to the difficulty of this step. Participants across all

intervention and step pairings typically made errors on steps that were to be performed

very quickly in addition to those that did not occur naturally for the human body. Steps

typically deemed more difficult, such as turning on one's tiptoes in the pique turn, were

performed correctly more frequently across all participants.

For port de bras, most participants regardless of intervention type vocalized

concern over maintaining the ballet handshape. Ballet handshape refers to a specific finger

positioning such that no finger is contacting another finger. Participants had the

opportunity to perform correct ballet handshape step five times throughout the task

analysis. Errors in this step were more frequent when the step was paired with video self-evaluative feedback compared to participants who learned the step under the TAGteach™. Typical topographical errors for this step during the intervention phase included fingers touching each other or hands making a cupping shape. More variations of errors were seen during the baseline phase, in which one participant engaged in accurate handshape once. As ballet handshape is not a positioning used in any sport and dance style outside of ballet, it was anticipated that frequent errors would be made during this step given the lack of experience with dance and ballet from all participants. As participants under the video self-evaluative feedback intervention for port de bras did not receive any further expert feedback for handshape, this likely impacted their performance of those steps.

Following the conclusion of all interventions, maintenance data were collected to determine how well performance would maintain over time. Regardless of intervention, all steps demonstrated at least a minor decrease in performance accuracy. Harriet was the only participant whose performance almost returned to baseline levels during the maintenance phase for the port de bras skill paired with the video self-evaluative feedback. Prior to beginning sessions for port de bras, the participant vocally expressed that she did not remember the movement. For the pique turn paired with video self-evaluative feedback, Mabel and Beatrice voiced similar concerns, but continued to perform near comparison levels during the maintenance phase. Overall, skills developed in video self-evaluation were less likely to maintain when compared to skills developed through TAGteach™.

Limitations and Future Directions

While results strongly favor TAGteach™ over video self-evaluation, no study is without limitations. Given the limited number of participants, the adapted alternating treatments design was determined to be the best choice for the present study. However, a between group design may have been a more effective design to compare the effectiveness of either intervention. A between groups design would have allowed researchers to evaluate both interventions on the same behavior across multiple groups and evaluate the level of change from each intervention. This would allow the use of a single behavior, as when two behaviors are selected there is a possibility that either behavior will be more or less difficult than the other. Further, to rule out the possibility that extraneous variables were influencing performance, future research in adapted alternating treatment designs should imbed a multiple baseline design.

The present study attempted to overcome the aforementioned concern through counterbalancing. To ensure counterbalancing occurred, half of the participants were randomly assigned to TAGteach™ with pique turn and video self-evaluation with port de bras and the other half received the opposite assignment. This was used to demonstrate that neither intervention was more effective with a specific target versus the other. As demonstrated by the results, TAGteach™ demonstrated greater effectiveness in improving accuracy regardless of the step.

Although the counterbalancing technique likely overcame the concern mentioned above, a group design would have been ideal. Future research should seek to compare the

effects of TAGteach™ and video self-evaluative feedback on improving accuracy of dance movements compared to a control group using a between groups design.

A maintenance session was conducted three weeks following the conclusion of the best alone phase. Given that the best alone phase was conducted one week following the comparison phase, there was a greater amount of time between the performance of the skill paired with video self-evaluation prior to conducting maintenance sessions. Further, the skills paired with TAGteach received more intervention sessions than the skills paired with video self-evaluation. This limitation may have influenced the maintenance of either skill paired with video self-evaluation.

Each dance move during this study was repeated six times during baseline, allowing the participants to potentially evaluate and modify their own performance for future repetitions. Given the nature of the behaviors selected, practice effects were possible and most likely to occur during baseline sessions. Practice effects refer to improved accuracy in the skill regardless of the intervention. Both target behaviors required that the participants rehearse the skills numerous times during baseline. Practice effects were controlled by limiting the possibility for feedback outside of the selected intervention during comparison and best alone phases, as well as during baseline and maintenance phases in which no intervention was present. This was done by covering the front view screen of the GoPro to prevent visual feedback and only allowing participants to view the video model of each skill once before beginning baseline sessions to prevent further covert self-evaluation. Additionally, during intervention phases, the expert video model was not shown to the participant following training for video self-evaluation.

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As with most single subject research designs ceiling effects presented a risk to the present study. To prevent the presence of ceiling effects during baseline, participants with little to no dance education who did not have previous exposure to either of the targeted dance moves were selected. This allowed participants to increase from low to high performance accuracy in both targets. While these dance steps are considered introductory level ballet steps, they are typically taught after traditional dance students have learned the basics of ballet as well as other skills that serve as a foundation for acquiring the skills. While this may be common practice, the participants in the present study were not exposed to foundational skills that might have improved their performance, therefore, it is unclear whether training prerequisite skills may have enhanced the effects of either intervention. Further, the target dance moves were defined using lengthy, and very detailed task analyses, the precision of the task analyses provided more opportunities for errors. TAGteach™ should also be evaluated in training more complex skills in ballet, such as intermediate or expert level dance moves or in training choreography, sets of movements that occur consecutively. These skills may be evaluated in dancers with varying levels of experience, from novice adults or children to individuals that perform or teach dance professionally.

Given that two interventions were being rapidly alternated, there was a possibility that sequencing effects were impacting the results. Specifically, with just the comparison condition, it would have been uncertain whether the superior intervention would have exhibited the same impact if it had not been rotated with the less superior intervention. To eliminate this concern, sessions were alternated randomly based on a random generator, as

well as the addition of a best alone condition. The best alone condition demonstrated that

TAGteach™ continued to maintain superior performance without the presence of video

self-evaluation, ruling out the possibility of sequencing effects. Similarly, the possible

limitation for carryover was prevented through the selection of two distinct behaviors. The

targeted behaviors were topographically and functionally independent from each other. No

skills from one behavior would have carried over to the other behavior and influenced the

performance of the skills.

Despite the extensive amount of research conducted with athletics, there is little

comparative research in athletic research and many interventions that have proven

effective. Future research should seek to compare TAGteach™ to other popular

interventions that have previously been demonstrated as effective. Building on the research

performed by Ennet et al. (2019), future researchers should conduct component analyses of

TAGteach™ to determine which area of TAGteach™ may be more effective in increasing

behavior. As TAGteach™ only allowed participants to contact positive feedback, if they

performed a step incorrectly, they did not receive any feedback from the researcher. Future

researcher should seek to evaluate how different forms of auditory feedback may influence

the effectiveness of auditory feedback.

In the present study, TAGteach™ was evaluated on single introductory ballet steps

with novice dancers. These steps would traditionally be taught to dancers after they have

demonstrated some level of competency in foundational technical ballet skills, such as

positions of the feet and arms. Further research in TAGteach™ should evaluate

introductory skills after participants have been trained in such technical skills to determine

if these skills might improve more quickly as well as conducting research to compare and evaluate these interventions with experienced rather than novice dancers.

Video self-evaluation has been demonstrated as effective in athletics prior to this study. In the present study, modest effects on performance accuracy were observed across all participants. Future research should implement a demonstration design to better show the effects of video self-evaluation. Further, a component analysis should be implemented to determine which component of the intervention contributed to improved performance. When considering ideas for building an effective self-evaluation package, the expert video model was not viewed by the participant following the training phase, showing the expert video model during all video evaluations may improve the effectiveness of the video self-evaluation. Future research should seek to evaluate the addition of video models during self-evaluation. Presently, video self-evaluation sessions took considerably less time than TAGteach™ sessions. Future research should consider requiring video self-evaluation sessions last the same length of time as the average TAGteach™ sessions.

Chapter 5: Conclusion

In the present study, a comparison of TAGteach™ and video self-evaluation was conducted using an adapted alternating treatment design to determine which intervention would demonstrate a greater efficiency at improving accurate performance of two dance skills. Following the implementation of both interventions across four female participants and two skills, it was visibly evident that TAGteach™ demonstrated superior improvements in performance accuracy. While video self-evaluation did demonstrate improvements in performance from baseline conditions, the steps did not improve as quickly or to the same levels as those paired with TAGteach™. As with any study, certain limitations may provide opportunities for future research. Future research should evaluate these interventions with different populations, target behaviors, and/or through a between group design. Future research should also seek to build the video self-evaluation intervention.

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Table 1

Average Scores of Participants Across Interventions, Skills, and Conditions

Participant	TAGteach				Video Self-Evaluation			
	Baseline	Comparison	Best Alone	Maintenance	Baseline	Comparison	Best Alone	Maintenance
	Pique				Port de Bras			
Harriet	18%	83%	93%	88%	25%	56%		32%
Evelin	30%	83%	93%	89%	19%	55%		53%
	Port de Bras				Pique			
Beatrice	31%	91%	99%	92%	10%	49%		43%
Mabel	16%	91%	99%	98%	29%	68%		63%
Average	24%	87%	96%	92%	21%	57%		48%

Note. This table displays the average scores of each participant across interventions, skills, and conditions. Blank cells indicate that data were not collected for that skill during that condition

Table 2

Social Validity Results

Statement	Participants				
	Harriet	Evelin	Beatrice	Mabel	Average
1) Tagger helped identify correct step	5	5	5	5	5
2) Liked watching a video of myself perform	3	3	3	1	2.5
3) Dance task instructions were clear to understand	5	5	4	5	4.75
4) Understood how to read the task analysis	4	5	5	5	4.75
5) Understood how to score themselves	3	5	4	5	4.25
6) Preferred feedback after each step	5	5	5	5	5
7) Preferred feedback before the step	4	2	3	3	3
8) Would like to use TAGteach™ in the future	5	5	5	5	5
9) Would like to use video self-evaluation in the future	1	3	3	1	2
10) Preferred procedure	TAGteach	TAGteach	TAGteach	TAGteach	

Note. This tables displays the results of the social validity survey. Participants rated each statement using a 5-point Likert scale, with 1 as strongly disagree and 5 as strongly agree. Higher numbers indicate greater agreement with the statement.

Figures

The Effects of TAGteach™ and Video Self-Evaluation on Pique Turn versus Port De Bras

Mabel

Beatrice
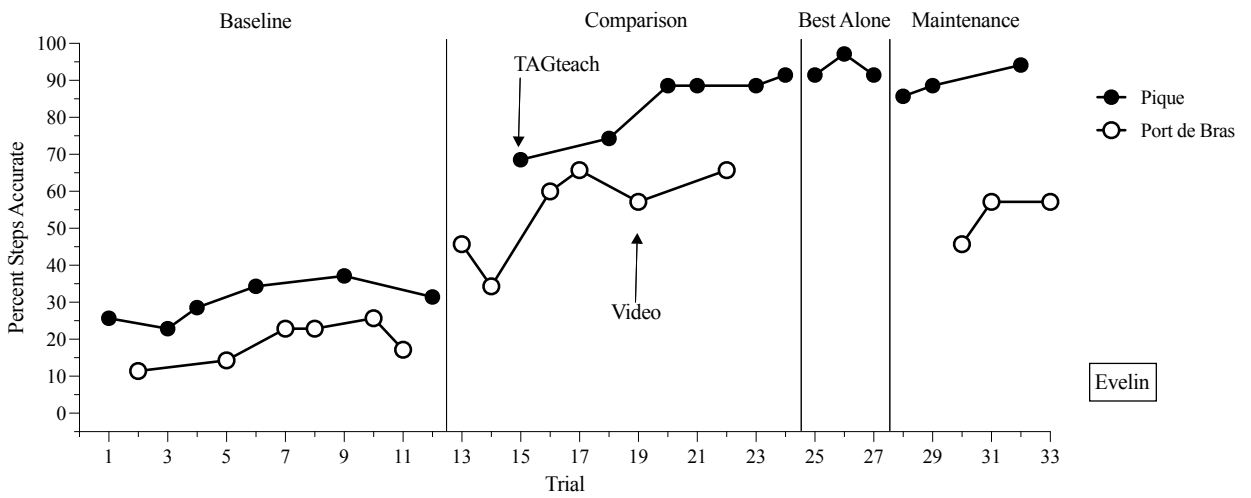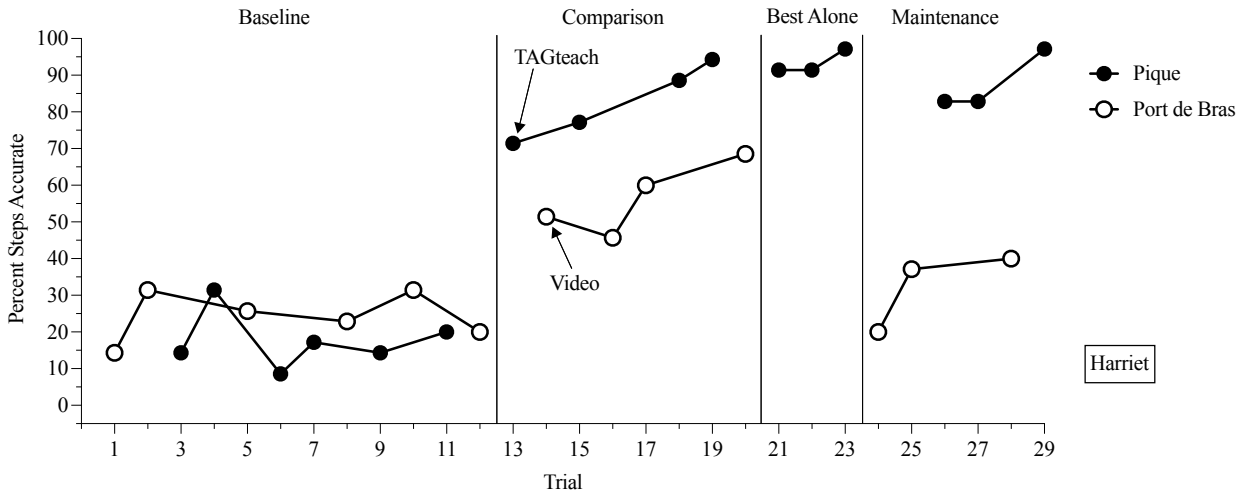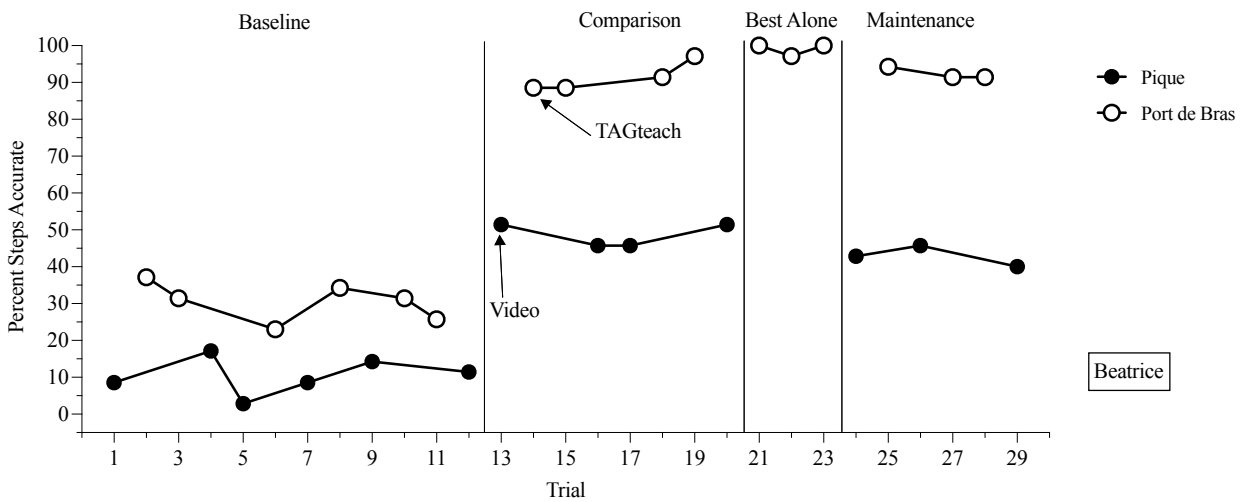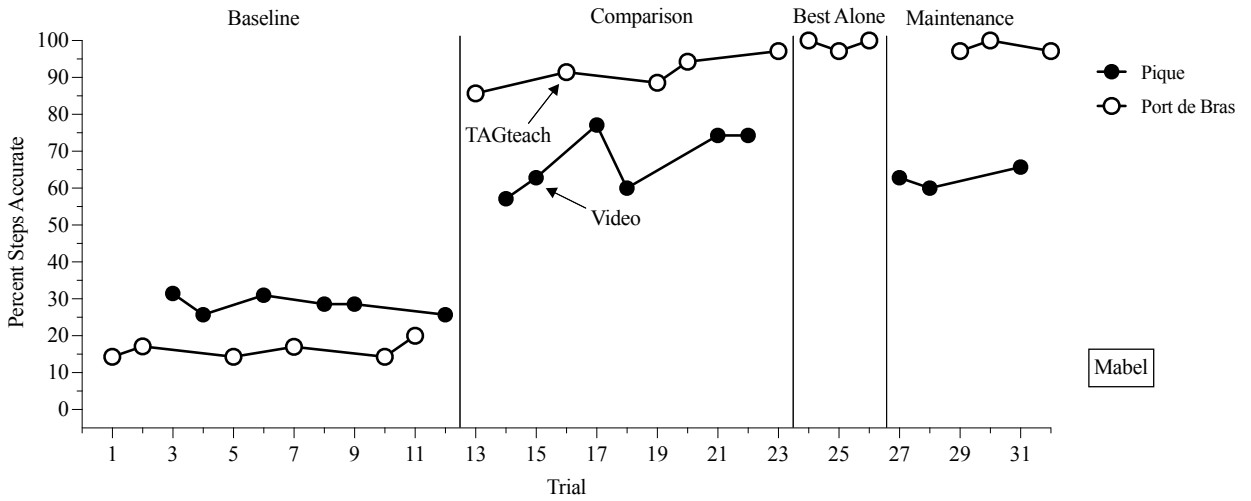
Note. This figure displays the change in percentage of steps performed correctly across four participants. Two of the participants received the TAGteach™ intervention for pique turn and Video Self-Evaluative Feedback (Video) for port de bras. The remaining two participants received the TAGteach™ intervention for port de bras and video for pique turn.

Appendices

Appendix A: Knowledge and Ability Assessment

PAR-Q

2021 PAR-Q+

FOLLOW-UP QUESTIONS ABOUT YOUR MEDICAL CONDITION(S)

1. **Do you have Arthritis, Osteoporosis, or Back Problems?**

If the above condition(s) is/are present, answer questions 1a-1c   If **NO** ☐ go to question 2

1a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
1b.	Do you have joint problems causing pain, a recent fracture or fracture caused by osteoporosis or cancer, displaced vertebra (e.g., spondylolisthesis), and/or spondylolysis/pars defect (a crack in the bony ring on the back of the spinal column)?	YES ☐ NO ☐
1c.	Have you had steroid injections or taken steroid tablets regularly for more than 3 months?	YES ☐ NO ☐

2. **Do you currently have Cancer of any kind?**

If the above condition(s) is/are present, answer questions 2a-2b   If **NO** ☐ go to question 3

2a.	Does your cancer diagnosis include any of the following types: lung/bronchogenic, multiple myeloma (cancer of plasma cells), head, and/or neck?	YES ☐ NO ☐
2b.	Are you currently receiving cancer therapy (such as chemotherapy or radiotherapy)?	YES ☐ NO ☐

3. **Do you have a Heart or Cardiovascular Condition? This includes Coronary Artery Disease, Heart Failure, Diagnosed Abnormality of Heart Rhythm**

If the above condition(s) is/are present, answer questions 3a-3d   If **NO** ☐ go to question 4

3a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
3b.	Do you have an irregular heart beat that requires medical management? (e.g., atrial fibrillation, premature ventricular contraction)	YES ☐ NO ☐
3c.	Do you have chronic heart failure?	YES ☐ NO ☐
3d.	Do you have diagnosed coronary artery (cardiovascular) disease and have not participated in regular physical activity in the last 2 months?	YES ☐ NO ☐

4. **Do you currently have High Blood Pressure?**

If the above condition(s) is/are present, answer questions 4a-4b   If **NO** ☐ go to question 5

4a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
4b.	Do you have a resting blood pressure equal to or greater than 160/90 mmHg with or without medication? (Answer **YES** if you do not know your resting blood pressure)	YES ☐ NO ☐

5. **Do you have any Metabolic Conditions? This includes Type 1 Diabetes, Type 2 Diabetes, Pre-Diabetes**

If the above condition(s) is/are present, answer questions 5a-5e   If **NO** ☐ go to question 6

5a.	Do you often have difficulty controlling your blood sugar levels with foods, medications, or other physician-prescribed therapies?	YES ☐ NO ☐
5b.	Do you often suffer from signs and symptoms of low blood sugar (hypoglycemia) following exercise and/or during activities of daily living? Signs of hypoglycemia may include shakiness, nervousness, unusual irritability, abnormal sweating, dizziness or light-headedness, mental confusion, difficulty speaking, weakness, or sleepiness.	YES ☐ NO ☐
5c.	Do you have any signs or symptoms of diabetes complications such as heart or vascular disease and/or complications affecting your eyes, kidneys, **OR** the sensation in your toes and feet?	YES ☐ NO ☐
5d.	Do you have other metabolic conditions (such as current pregnancy-related diabetes, chronic kidney disease, or liver problems)?	YES ☐ NO ☐
5e.	Are you planning to engage in what for you is unusually high (or vigorous) intensity exercise in the near future?	YES ☐ NO ☐

2021 PAR-Q+

6. **Do you have any Mental Health Problems or Learning Difficulties?** This includes Alzheimer's, Dementia, Depression, Anxiety Disorder, Eating Disorder, Psychotic Disorder, Intellectual Disability, Down Syndrome

If the above condition(s) is/are present, answer questions 6a-6b   If **NO** ☐ go to question 7

6a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
6b.	Do you have Down Syndrome **AND** back problems affecting nerves or muscles?	YES ☐ NO ☐

7. **Do you have a Respiratory Disease?** This includes Chronic Obstructive Pulmonary Disease, Asthma, Pulmonary High Blood Pressure

If the above condition(s) is/are present, answer questions 7a-7d   If **NO** ☐ go to question 8

7a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
7b.	Has your doctor ever said your blood oxygen level is low at rest or during exercise and/or that you require supplemental oxygen therapy?	YES ☐ NO ☐
7c.	If asthmatic, do you currently have symptoms of chest tightness, wheezing, laboured breathing, consistent cough (more than 2 days/week), or have you used your rescue medication more than twice in the last week?	YES ☐ NO ☐
7d.	Has your doctor ever said you have high blood pressure in the blood vessels of your lungs?	YES ☐ NO ☐

8. **Do you have a Spinal Cord Injury?** This includes Tetraplegia and Paraplegia

If the above condition(s) is/are present, answer questions 8a-8c   If **NO** ☐ go to question 9

8a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
8b.	Do you commonly exhibit low resting blood pressure significant enough to cause dizziness, light-headedness, and/or fainting?	YES ☐ NO ☐
8c.	Has your physician indicated that you exhibit sudden bouts of high blood pressure (known as Autonomic Dysreflexia)?	YES ☐ NO ☐

9. **Have you had a Stroke?** This includes Transient Ischemic Attack (TIA) or Cerebrovascular Event

If the above condition(s) is/are present, answer questions 9a-9c   If **NO** ☐ go to question 10

9a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer **NO** if you are not currently taking medications or other treatments)	YES ☐ NO ☐
9b.	Do you have any impairment in walking or mobility?	YES ☐ NO ☐
9c.	Have you experienced a stroke or impairment in nerves or muscles in the past 6 months?	YES ☐ NO ☐

10. **Do you have any other medical condition not listed above or do you have two or more medical conditions?**

If you have other medical conditions, answer questions 10a-10c   If **NO** ☐ read the Page 4 recommendations

10a.	Have you experienced a blackout, fainted, or lost consciousness as a result of a head injury within the last 12 months **OR** have you had a diagnosed concussion within the last 12 months?	YES ☐ NO ☐
10b.	Do you have a medical condition that is not listed (such as epilepsy, neurological conditions, kidney problems)?	YES ☐ NO ☐
10c.	Do you currently live with two or more medical conditions?	YES ☐ NO ☐

PLEASE LIST YOUR MEDICAL CONDITION(S) AND ANY RELATED MEDICATIONS HERE: _____

GO to Page 4 for recommendations about your current medical condition(s) and sign the PARTICIPANT DECLARATION.

2021 PAR-Q+

☑ **If you answered NO to all of the FOLLOW-UP questions (pgs. 2-3) about your medical condition, you are ready to become more physically active - sign the PARTICIPANT DECLARATION below:**

▶ It is advised that you consult a qualified exercise professional to help you develop a safe and effective physical activity plan to meet your health needs.

▶ You are encouraged to start slowly and build up gradually - 20 to 60 minutes of low to moderate intensity exercise, 3-5 days per week including aerobic and muscle strengthening exercises.

▶ As you progress, you should aim to accumulate 150 minutes or more of moderate intensity physical activity per week.

▶ If you are over the age of 45 yr and **NOT** accustomed to regular vigorous to maximal effort exercise, consult a qualified exercise professional before engaging in this intensity of exercise.

🔴 **If you answered YES to one or more of the follow-up questions** about your medical condition:

You should seek further information before becoming more physically active or engaging in a fitness appraisal. You should complete the specially designed online screening and exercise recommendations program - the **ePARmed-X+ at www.eparmedx.com** and/or visit a qualified exercise professional to work through the ePARmed-X+ and for further information.

⚠ **Delay becoming more active if:**

✓ You have a temporary illness such as a cold or fever; it is best to wait until you feel better.

✓ You are pregnant - talk to your health care practitioner, your physician, a qualified exercise professional, and/or complete the ePARmed-X+ **at www.eparmedx.com** before becoming more physically active.

✓ Your health changes - talk to your doctor or qualified exercise professional before continuing with any physical activity program.

● You are encouraged to photocopy the PAR-Q+. You must use the entire questionnaire and NO changes are permitted.
● The authors, the PAR-Q+ Collaboration, partner organizations, and their agents assume no liability for persons who undertake physical activity and/or make use of the PAR-Q+ or ePARmed-X+. If in doubt after completing the questionnaire, consult your doctor prior to physical activity.

PARTICIPANT DECLARATION

● All persons who have completed the PAR-Q+ please read and sign the declaration below.

● If you are less than the legal age required for consent or require the assent of a care provider, your parent, guardian or care provider must also sign this form.

I, the undersigned, have read, understood to my full satisfaction and completed this questionnaire. I acknowledge that this physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if my condition changes. I also acknowledge that the community/fitness center may retain a copy of this form for records. In these instances, it will maintain the confidentiality of the same, complying with applicable law.

NAME _____   DATE _____

SIGNATURE _____   WITNESS _____

SIGNATURE OF PARENT/GUARDIAN/CARE PROVIDER _____

Appendix B: Dance Step Task Analysis

Appendix B1: Pique Turn

Step Label	Description	Correct?
Not scored: for balance purposes, we recommend placing hands on hips or in 1st position (beach-ball to the front).		
1. Opening 5th position 1.1	Left foot flat on floor	
2. Opening 5th position 1.2	Left leg straight	
3. Opening 5th position 1.3	Left leg turned out	+ -
4. Opening 5th position 1.4	Right leg straight extended forward	+ -
5. Opening 5th position 1.5	Right toes pointed	+ -
6. Opening 5th position 1.6	Right toes on ground	+ -
7. Opening 5th position 1.7	Right leg turned out	+ -

8. Opening body 1.1	Forward facing	███
9. 2nd position 1.1	Rotate right leg clockwise	+ -
10. 2nd position 1.2	Right leg stopped side body	+ -
11. 2nd position 1.3	Place right tiptoes on ground	+ -
12. 2nd position 1.4	Right leg turned out	+ -
13. Left retire derriere 1.1	Body weight to right foot	███
14. Left retire derriere 1.2	Turn body toward right foot	+ -
15. Left retire derriere 1.3	Lift left foot off ground	+ -
16. Left retire derriere 1.4	Point left toes	+ -
17. Left retire derriere 1.5	Bend left leg	+ -

18. Left retire derriere 1.7	Left toes to back right knee	+ -
19. Left retire derriere 1.8	Left knee pointed to side	+ -
20. Turn 1.1	Turn right to face back	+ -
21. Turn 1.2	Right leg straight	+ -
22. Turn 1.3	Right leg turned out	+ -
23. Turn 1.4	On right tiptoes	+ -
24. Turn 2.1	stop turning on right foot	■
25. Turn 2.2	Straighten left leg below body	+ -
26. Turn 2.3	Left tiptoes behind right foot	+ -
27. Turn 2.4	Body weight to left foot	+ -

28. Turn 2.5	Flatten left foot to ground	+ -
29. Turn 2.6	Small bend in left knee	+ -
30. Turn 2.7	Both legs turned out	+ -
31. Turn 2.8	Right leg straight to side body	+ -
32. Turn 2.7	Turn right to front facing	+ -
33. Turn 2.8	Shift weight to right tiptoes	+ -
34. Closing 1.1	Right tiptoes beneath your body	+ -
35. Closing 1.2	Lift left foot off ground	+ -
36. Closing 1.3	Forward facing	■
37. Closing 1.4	Left leg extended straight forward	+ -

38. Closing 1.5	Left toes pointed	+ -
39. Closing 1.6	Right foot to flat	+ -
40. Closing 1.7	Both legs straight, turned out	+ -
41. Closing body	Left toes touching ground	+ -

Appendix B2: Port de Bras

Step Label	Description	Correct?
Not scored: For balance purposes, it is recommended feet are in first position parallel		
1. 5th en bas 1.1	Arms in beachball (slightly rounded)	+ -
2. 5th en bas 1.2	Hands in front of thighs	+ -
3. 5th en bas 1.3	Hands separated	+ -

4. 5th en bas 1.4	Both hands in ballet handshape	+ -
5. 5th en bas 1.5	Elbows pointing away from body	
6. 5th en bas 1.6	Shoulders down (relaxed)	
7. 5th en bas 1.7	Back straight	
8. 3rd en bas 1.1	Right hand/arm to side body	+ -
9. 3rd en bas 1.2	Left hand/arm remains still	+ -
10. 3rd en bas 1.3	Maintain ballet hand shape	+ -
11. 3rd en bas 1.4	Right arm 45* from hip	+ -
12. 3rd en bas 1.5	Elbows slightly rounded	+ -
13. 3rd en bas 1.6	Inside right elbow aiming front	+ -

14. 3rd en haut 1.1	Bend left arm to chest	+ -
15. 3rd en haut 1.2	Right hand/arm remains still	+ -
16. 3rd en haut 1.3	Maintain ballet handshape	+ -
17. 3rd en haut 1.4	Move left hand above head	+ -
18. 3rd en haut 1.5	Left arm slightly rounded	+ -
19. 3rd en haut 1.6	Left hand directly above head	+ -
20. 3rd en haut 1.7	Turn face to diagonal left	+ -
21. 3rd en haut 1.8	Shoulders down	+ -
22. 2nd arms 1.1	Open left arm to left side	+ -
23. 2nd arms 1.2	Stop left arm parallel ground	+ -

24. 2nd arms 1.3	Lean body 10* to left	+ -
25. 2nd arms 1.4	Right arm parallel from ground	+ -
26. 2nd arms 1.6	Move body to straight up	+ -
27. 2nd arms 1.7	Turn face forward	+ -
28. 2nd arms 1.7	Both elbows slightly rounded	+ -
29. 2nd arms 1.8	Shoulders down	■
30. 2nd arms 1.9	Hands in ballet handshape	+ -
31. 2nd arms 1.10	Inside elbows aiming forward	+ -
32. Arms to front 1.1	Turn palms to ceiling	+ -
33. Arms to front 1.2	Move arms to front body	+ -

34. Arms to front 1.3	Elbows slightly rounded	+ -
35. Arms to front 1.4	Arms parallel from ground	+ -
36. Arms to front 1.5	Palms facing ceiling	+ -
37. Arms to front 1.6	Shoulders down	■
38. Arms to front 1.7	Hands in ballet handshape	+ -
39. Arms to sides 1.1	Drop arms to sides	+ -
40. Arms to front 1.2	Hands touching outer thighs	+ -
41. Shoulders	Shoulders down	■

Appendix C: Interobserver Agreement

Appendix C1: Pique Turn IOA form

Step Label	Description	Correct?
Not scored: for balance purposes, we recommend placing hands on hips or in 1st position (beach-ball to the front).		
1. Opening 4th position 1.1	Left foot flat on floor	
2. Opening 4th position 1.2	Left leg straight	
3. Opening 4th position 1.3	Left leg turned out	+ -
4. Opening 4th position 1.4	Right leg straight extended forward Still, a part of opening not moving, toe does not have to be pointed or on the ground	+ -
5. Opening 4th position 1.5	Right toes pointed From the ankle	+ -
6. Opening 4th position 1.6	Right toes on ground If the heel is on the ground, this is incorrect	+ -

7. Opening 4th position 1.7	Right leg turned out	+
	Look for inside of knee or the outer toes on the ground	-
8. Opening body 1.1	Forward facing	■
9. 2nd position 1.1	Rotate right leg clockwise	+
	Stopping point does not matter, just that the leg rotated clockwise	-
10. 2nd position 1.2	Right leg stopped side body	+
	In line with left heel or arch of the foot, not behind	-
11. 2nd position 1.3	Place right tiptoes on ground	+
	Incorrect if the heel is down	-
12. 2nd position 1.4	Right leg turned out	+
	Foot to the side, not rotated inward	-
13. Left retire derriere 1.1	Body weight to right foot	■
14. Left retire derriere 1.2	Turn body toward right foot	+
		-
15. Left retire derriere 1.3	Lift left foot off ground	+
	Full foot off ground, shape or location of foot does not matter	-

16. Left retire derriere 1.4	Point left toes From the ankle and toes	+ -
17. Left retire derriere 1.5	Bend left leg Any degree of bent	+ -
18. Left retire derriere 1.7	Left toes to back right knee Any portion of the foot behind knee, wrapping is incorrect	+ -
19. Left retire derriere 1.8	Left knee pointed to side Toward camera or to the side once they are turned around	+ -
20. Turn 1.1	Turn right to face back	+ -
21. Turn 1.2	Right leg straight Throughout the turn	+ -
22. Turn 1.3	Right leg turned out Heel positioning once facing backward	+ -
23. Turn 1.4	On right tiptoes Heel not on ground, any degree is acceptable	+ -
24. Turn 2.1	stop turning on right foot	■
25. Turn 2.2	Straighten left leg below body	+

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	Within 10inches of the right foot, left leg does not have to be fully straightened	-
26. Turn 2.3	Left tiptoes behind right foot	+
	toes touch before heel is acceptable	-
27. Turn 2.4	Body weight to left foot	+
		-
28. Turn 2.5	Flatten left foot to ground	+
	Heel & toes on the ground	-
29. Turn 2.6	Small bend in left knee	+
	Any degree of bend is acceptable, must happen before step 33	-
30. Turn 2.7	Both legs turned out	+
	Knees to the side, may be more evident after #31	-
31. Turn 2.8	Right leg straight to side body	+
	To their right side, may happen as the turn, foot does not matter	-
32. Turn 2.7	Turn right to front facing	+
		-
33. Turn 2.8	Shift weight to right tiptoes	+
	Toes down first for this to be correct	-
34. Closing 1.1	Right tiptoes beneath your body	+
	Foot may be flat, straight below me	

		-
35. Closing 1.2	Lift left foot off ground Shape or location of foot does not matter	+ -
36. Closing 1.3	Forward facing	████
37. Closing 1.4	Left leg extended straight forward Foot does not have to be pointed or on the grounds	+ -
38. Closing 1.5	Left toes pointed From the ankle and toes	+ -
39. Closing 1.6	Right foot to flat Heel touches ground	+ -
40. Closing 1.7	Both legs straight, turned out Both legs must turned out for this to be correct	+ -
41. Closing body	Left toes touching ground Heel should not be on the ground	+ -

_____/35

_____%

Appendix C2: Port de Bras Turn IOA form

Step Label	Description	Correct?
Not scored: For balance purposes, it is recommended feet are in first position parallel		
1. 5th en bas 1.1	Arms in beachball (slightly rounded) Straight arms is incorrect, more than a 90* bend is incorrect, location of hands does not matter	+ -
2. 5th en bas 1.2	Hands in front of thighs Hips is acceptable as well	+ -
3. 5th en bas 1.3	Hands separated	+ -
4. 5th en bas 1.4	Both hands in ballet handshape Middle finger inward, fingers relaxed, pad of thumb in line with middle pad, not touching	+ -
5. 5th en bas 1.5	Elbows pointing away from body	■
6. 5th en bas 1.6	Shoulders down (relaxed)	■

7. 5th en bas 1.7	Back straight	■
8. 3rd en bas 1.1	Right hand/arm to side body Just direction, angle does not matter	+ -
9. 3rd en bas 1.2	Left hand/arm remains still	+ -
10. 3rd en bas 1.3	Maintain ballet hand shape	+ -
11. 3rd en bas 1.4	Right arm 45* from hip More or less 45	+ -
12. 3rd en bas 1.5	Elbows slightly rounded Not straight	+ -
13. 3rd en bas 1.6	Inside right elbow aiming front Slightly downward is okay	+ -
14. 3rd en haut 1.1	Bend left arm to chest Hand bends toward chest, its okay if the elbow looks funky	+ -
15. 3rd en haut 1.2	Right hand/arm remains still	+ -
16. 3rd en haut 1.3	Maintain ballet handshape	+ -

17. 3rd en haut 1.4	Move left hand above head Directionally above the head, doesn't matter where	+ -
18. 3rd en haut 1.5	Left arm slightly rounded Not perfectly straight, not a 90 degree angle	+ -
19. 3rd en haut 1.6	Left hand directly above head At least 6inches or more	+ -
20. 3rd en haut 1.7	Turn face to diagonal left Turn face all the way to the side is incorrect, slightly downward is okay	+ -
21. 3rd en haut 1.8	Shoulders down Look for a gam between shoulder and ear	+ -
22. 2nd arms 1.1	Open left arm to left side	+ -
23. 2nd arms 1.2	Stop left arm parallel ground about	+ -
24. 2nd arms 1.3	Lean body 10* to left Any degree of bend is okay, over 10 degrees is great	+ -
25. 2nd arms 1.4	Right arm parallel from ground As they are leaning over, goes up	+ -
26. 2nd arms 1.6	Move body to straight up Only accurate if step 24 was correct	+ -

27. 2nd arms 1.7	Turn face forward Only accurate if step 20 was correct	+ -
28. 2nd arms 1.7	Both elbows slightly rounded	+ -
29. 2nd arms 1.8	Shoulders down	■
30. 2nd arms 1.9	Hands in ballet handshape	+ -
31. 2nd arms 1.10	Inside elbows aiming forward Slightly downward is okay	+ -
32. Arms to front 1.1	Turn palms to ceiling	+ -
33. Arms to front 1.2	Move arms to front body Arms moving perpendicularly to the front	+ -
34. Arms to front 1.3	Elbows slightly rounded	+ -
35. Arms to front 1.4	Arms parallel from ground Forearms or elbows is acceptable, NOT upper arms	+ -
36. Arms to front 1.5	Palms facing ceiling Its okay if it is a little bit toward their face	+ -

37. Arms to front 1.6	Shoulders down	
38. Arms to front 1.7	Hands in ballet handshape May be looser, thumb should still be tucked in	+ -
39. Arms to sides 1.1	Drop arms to sides	+ -
40. Arms to front 1.2	Hands touching outer thighs Any part of the hand is fine, as soon as their hands touch the thighs	+ -
41. Shoulders	Shoulders down	

_____/35

_____%

Appendix D: Procedural Integrity

Appendix D1: Pique Turn TAGteach™ evaluation form

Step Label	Description	Instructions	"The tag point is…"	Stated description (column B)	Step tagged correctly	Step completed 1-3 times
1. Opening 4th position 1.1	Left foot flat on floor					
2. Opening 4th position 1.2	Left leg straight					
3. Opening 4th position 1.3	Left leg turned out					
4. Opening 4th position 1.4	Right leg straight extended forward. Still, a part of opening not moving, toe does not have to be pointed or on the ground					
5. Opening 4th position 1.5	Right toes pointed. From the ankle					
6. Opening 4th position 1.6	Right toes on ground. If the heel is on the ground, this is incorrect					
7. Opening 4th position 1.7	Right leg turned out. Look for inside of knee or the outer toes on the ground					

8. Opening body 1.1	Forward facing					
9. 2nd position 1.1	Rotate right leg clockwise Stopping point does not matter, just that the leg rotated clockwise					
10. 2nd position 1.2	Right leg stopped side body In line with left heel or arch of the foot, not behind					
11. 2nd position 1.3	Place right tiptoes on ground Incorrect if the heel is down					
12. 2nd position 1.4	Right leg turned out Foot to the side, not rotated inward					
13. Left retire derriere 1.1	Body weight to right foot					
14. Left retire derriere 1.2	Turn body toward right foot					
15. Left retire derriere 1.3	Lift left foot off ground Full foot off ground, shape or location of foot does not matter					
16. Left retire derriere 1.4	Point left toes From the ankle and toes					
17. Left retire derriere 1.5	Bend left leg Any degree of bent					
18. Left retire derriere 1.7	Left toes to back right knee Any portion of the foot behind knee, wrapping is incorrect					
19. Left retire derriere 1.8	Left knee pointed to side Toward camera or to the side once they are turned around					
20. Turn 1.1	Turn right to face back					
21. Turn 1.2	Right leg straight Throughout the turn					
22. Turn 1.3	Right leg turned out Heel positioning once facing backward					
23. Turn 1.4	On right tiptoes Heel not on ground, any degree is acceptable					
24. Turn 2.1	stop turning on right foot					
25. Turn 2.2	Straighten left leg below body Within 10inches of the right foot, left leg does not have to be fully straightened					
26. Turn 2.3	Left tiptoes behind right foot toes touch before heel is acceptable					
27. Turn 2.4	Body weight to left foot					

28. Turn 2.5	Flatten left foot to ground Heel & toes on the ground					
29. Turn 2.6	Small bend in left knee Any degree of bend is acceptable, must happen before step 33					
30. Turn 2.7	Both legs turned out Knees to the side, may be more evident after #31					
31. Turn 2.8	Right leg straight to side body To their right side, may happen as the turn, foot does not matter					
32. Turn 2.7	Turn right to front facing					
33. Turn 2.8	Shift weight to right tiptoes Toes down first for this to be correct					
34. Closing 1.1	Right tiptoes beneath your body Foot may be flat, straight below me					
35. Closing 1.2	Lift left foot off ground Shape or location of foot does not matter					
36. Closing 1.3	Forward facing					
37. Closing 1.4	Left leg extended straight forward Foot does not have to be pointed or on the grounds					
38. Closing 1.5	Left toes pointed From the ankle and toes					
39. Closing 1.6	Right foot to flat Heel touches ground					
40. Closing 1.7	Both legs straight, turned out Both legs must turned out for this to be correct					
41. Closing body	Left toes touching ground Heel should not be on the ground					
Step Totals			0	0	0	0	0
Offer 2 chances for practice			███████████████████████			
						0
					OUT OF	208

Appendix D2: Pique Turn TAGteach™ Evaluation Form

Step Label	Description	Instructions	"The tag point is..."	Stated description	Step tagged correctly	Step completed 1-3 times
1. 5th en bas 1.1	Arms in beachball (slightly rounded) Straight arms is incorrect, more than a 90* bend is incorrect, location of hands does not matter					
2. 5th en bas 1.2	Hands in front of thighs Hips is acceptable as well					
3. 5th en bas 1.3	Hands separated					
4. 5th en bas 1.4	Both hands in ballet handshape Middle finger inward, fingers relaxed, pad of thumb in line with middle pad, not touching					
5. 5th en bas 1.5	Elbows pointing away from body					
6. 5th en bas 1.6	Shoulders down (relaxed)					
7. 5th en bas 1.7	Back straight					
8. 3rd en bas 1.1	Right hand/arm to side body Just direction, angle does not matter					
9. 3rd en bas 1.2	Left hand/arm remains still					
10. 3rd en bas 1.3	Maintain ballet hand shape					
11. 3rd en bas 1.4	Right arm 45* from hip More or less 45					
12. 3rd en bas 1.5	Elbows slightly rounded Not straight					
13. 3rd en bas 1.6	Inside right elbow aiming front Slightly downward is okay					
14. 3rd en haut 1.1	Bend left arm to chest Hand bends toward chest, its okay if the elbow looks funky					
15. 3rd en haut 1.2	Right hand/arm remains still					

16. 3rd en haut 1.3	Maintain ballet handshape					
17. 3rd en haut 1.4	Move left hand above head Directionally above the head, doesn't matter where					
18. 3rd en haut 1.5	Left arm slightly rounded Not perfectly straight, not a 90 degree angle					
19. 3rd en haut 1.6	Left hand directly above head At least 6inches or more					
20. 3rd en haut 1.7	Turn face to diagonal left Turn face all the way to the side is incorrect, slightly downward is okay					
21. 3rd en haut 1.8	Shoulders down Look for a gam between shoulder and ear					
22. 2nd arms 1.1	Open left arm to left side					
23. 2nd arms 1.2	Stop left arm parallel ground about					
24. 2nd arms 1.3	Lean body 10* to left Any degree of bend is okay, over 10 degrees is great					
25. 2nd arms 1.4	Right arm parallel from ground As they are leaning over, goes up					
26. 2nd arms 1.6	Move body to straight up Only accurate if step 24 was correct					
27. 2nd arms 1.7	Turn face forward Only accurate if step 20 was correct					
28. 2nd arms 1.7	Both elbows slightly rounded					

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29. 2nd arms 1.8	Shoulders down					
30. 2nd arms 1.9	Hands in ballet handshape					
31. 2nd arms 1.10	Inside elbows aiming forward Slightly downward is okay					
32. Arms to front 1.1	Turn palms to ceiling					
33. Arms to front 1.2	Move arms to front body Arms moving perpendicularly to the front					
34. Arms to front 1.3	Elbows slightly rounded					
35. Arms to front 1.4	Arms parallel from ground Forearms or elbows is acceptable, NOT upper arms					
36. Arms to front 1.5	Palms facing ceiling Its okay if it is a little bit toward their face					
37. Arms to front 1.6	Shoulders down					
38. Arms to front 1.7	Hands in ballet handshape May be looser, thumb should still be tucked in					
39. Arms to sides 1.1	Drop arms to sides					

		Hands touching outer thighs					
40. Arms to front 1.2		Any part of the hand is fine, as soon their hands touch the thighs					
41. Shoulders		Shoulders down					
Step Totals			0	0	0	0	0
Offer 2 chances for practice							
							0
						OUT OF	208

Appendix D3: Video Self-Evaluation Treatment Fidelity Form

Session number	
Dance step	
Participant	
Item	Yes/No
Identified performance of step	
Watch video up to 3 times	
Score using TA	
Did not watch video with participant	
Did not provide feedback on scoring	
Did not provide feedback on performance	
Allowed for practice up to 2 times	
Total	

Appendix E: Social Validity Survey

Please read these statements and underline a number to indicate your agreement.

1 = strongly disagree, 5 = strongly agree

1. I thought the sound of the tagger helped me identify when I did something right.

   1   2   3   4   5

2. I liked watching a video of myself perform the dance move.

   1   2   3   4   5

3. I thought the dance task instructions were clear to understand.

   1   2   3   4   5

4. I understood how to read the task analysis for each dance move.

   1   2   3   4   5

5. I understood how to score a video of myself.

   1   2   3   4   5

6. I preferred receiving feedback right after I performed the step.

   1   2   3   4   5

7. I preferred receiving feedback right before I performed the step.

   1   2   3   4   5

8. If I take dance in the future, I would like my teachers to use TAGteach™ in the future.

1   2   3   4   5

9. If I take dance in the future, I would like my teachers to use video self-evaluation in the future.

1   2   3   4   5

10. Which procedure did you prefer?

TAGteach   Video Self-Evaluation