



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Research Commons

<https://researchcommons.waikato.ac.nz/>

## Research Commons at the University of Waikato

### Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

**Enhancing Athletic Performance: Can Video Modelling and Feedback on Forehand  
Hitting Increase Passing Accuracy of Field Hockey Players?**

A thesis  
submitted partial fulfilment  
of the requirements for the degree  
of  
**Master of Applied Psychology**  
**(Behaviour Analysis)**  
at  
**The University of Waikato**  
By  
**Dylan Joseph Platt**



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

2025

## Abstract

Research in applied behaviour analysis and sports performance is becoming more evident in sporting environments. I aimed to explore the effectiveness of video modelling (VM), and video modelling combined with feedback (VF), and whether combined video modelling and video feedback (VM+VF) is an effective coaching tool to teach and improve athletes' skill accuracy. A single subject multiple baseline design across participants was used. Four male field hockey players, who were all members of the same North Island National U18 team, took part in this study. The intervention had three phases: beginner-level video modelling; intermediate level video modelling; intermediate video modelling + video feedback. Participants watched a short instructional video and then practiced their forehand hitting in a structured practice session which was videotaped. Both video modelling conditions were effective, but the most performance gains were seen in Phase 3 where video feedback was added. All the participants showed an increase in the number of successful forehand hits after being exposed to VM and VM+VF, supporting the effectiveness of the intervention. These findings add to the existing body of work that supports the use of applied behaviour analysis techniques in sports training. Video modelling and video feedback may be useful for enhancing skill execution in field hockey. Further research should be conducted to determine the long-term retention of these skills and the usability of similar interventions for other technical aspects of field hockey and other sports.

## **Acknowledgments**

I would like to take the time to thank my participants and their parents for their time and willingness to participate in my study.

I would also like to acknowledge the Hockey Association that allowed me the use of their facility to undertake sessions that facilitate the collection of data contained in my study. I also thank the many coaches that have influenced my development as an athlete.

Lastly, I would like to thank my whaanau for their on-going support of not only my life journey but my learning journey.

## Table of Contents

|   |    |
|---|----|
| Abstract .....  | 2  |
| Video Modelling .....                                       | 7  |
| Evidence for Video Modelling .....                          | 8  |
| Differences between Video Feedback and Video Modelling..... | 9  |
| Evidence for Video Feedback .....                           | 10 |
| Field Hockey.....   | 11 |
| Forehand Hitting in Field Hockey .....                      | 12 |
| Evidence for Video Modelling in Sports .....                | 15 |
| Evidence for Video Feedback in Sports Context .....         | 16 |
| Experimental design.....                                    | 17 |
| Research Aim .....  | 17 |
| Method .....  | 18 |
| Design .....  | 18 |
| Ethical Considerations .....                                | 19 |
| Ethical Approvals.....                                      | 19 |
| Description of the Video Content .....                      | 19 |
| Duration and Frequency of the Intervention.....             | 20 |
| Implementation Process .....                                | 21 |
| Data Collection Methods .....                               | 21 |
| Tools and Instruments .....                                 | 21 |
| Data Collection Procedures.....                             | 21 |
| Data Analysis .....   | 22 |
| Analytical Techniques Used.....                             | 22 |
| Results.....  | 22 |
| .....   | 23 |
| Participant 1 .....   | 24 |

|  |    |
|--|----|
| Participant 2 .....  | 24 |
| Participant 3 .....  | 24 |
| Participant 4 .....  | 25 |
| Reliability testing .....  | 25 |
| Discussion .....   | 25 |
| Strengths and limitations.....   | 28 |
| Implications.....  | 30 |
| Recommendations.....   | 31 |
| Conclusion .....   | 31 |
| References.....  | 32 |
| Appendix A: Information Sheet .....  | 39 |
| Appendix B: Recruitment Mail.....  | 41 |
| Appendix C: Email to Management .....  | 43 |
| Appendix D: Email to members from the Club Management.....                     | 44 |
| Appendix E: Consent Form for Guardians of Under 16-year-old Participants ..... | 45 |
| Appendix F: Consent Form for Participants .....                                | 47 |
| Appendix G: Approval from Ethics Letter.....                                   | 48 |
| Appendix H: Standardised Checklists .....                                      | 49 |

**List of Figures**

|   |    |
|---|----|
| Figure 1. Five Protocols to Enhance Forehand Hitting.....                 | 14 |
| Figure 2. Participant Accuracy and Baseline and Intervention Stages ..... | 23 |

## **Enhancing Athletic Performance: Can Video Modelling and Feedback on Forehand Hitting Increase Passing Accuracy of Field Hockey Players?**

In field hockey, the forehand hitting technique is used to pass the ball accurately between players. In a conventional coaching situation, a coach will give instruction by explaining the various aspects of the skill, and or demonstrate the technique by modelling it in a team practice setting. Stone et al. (2020) acknowledged that their traditional methods for coaching did not always result in developing athlete performance, and that when they implemented a more individualised approach, they saw athlete performance improve. Stone et al. identified the need for the integration of both traditional and contemporary coaching methods to enhance athlete performance.

### **Video Modelling**

Video modelling is when a target behaviour is demonstrated through a video and the participant models the behaviour being performed (Bellini & Akullian, 2007; LeBlanc et al., 2003). Video modelling can showcase the individuals themselves or other peers or adults in action scenarios to facilitate learning and development of specific abilities. The technique is used in many settings, for example, to improve proficiency in language acquisition and usage so as to enhance social interactions and behaviours along with fostering playfulness and functional adaptive skills (Acar & Diken, 2012; Corbett & Abdullah, 2005; Marcus & Wilder, 2009). Video modelling, role-play, and computer-based instruction have received support from a systematic review on how to teach social skills effectively in children and adolescents with autism spectrum disorder (McCoy et al., 2016). O'Brien (2010) also demonstrated the effectiveness of video modelling to teach desired behaviours, such as social interactions, daily routines, or academic tasks.

Video modelling originated from Bandura's work on social learning theory. In video modelling, behaviours that one would like others to emulate are modelled (Wahoski, 2015). Video modelling is widely used in educational and therapeutic settings, particularly for individuals with developmental disorders such as autism. This method is effective because it leverages observational learning, making abstract concepts more concrete and accessible through visual representation (Nikopoulos, 2008). A variation of this approach, video modelling plus feedback, combines the visual representation of behaviours with corrective feedback provided after the learner attempts the observed behaviour. This addition of feedback enhances the learning process by reinforcing correct behaviours and addressing errors in real time. Video modelling (VM) is an effective tool for teaching skills through an example of the skill to be executed whereas video feedback (VF) provides a video of the learner executing the skill that is critiqued to highlight areas of weakness and strength. While both of these interventions are effective in teaching and learning, there is evidence that combining these interventions enhances overall learning of skills (Martinez, 2023).

### **Evidence for Video Modelling**

A systematic review by Wilkes-Gillan et al. (2021) highlighted the effectiveness of video modelling for improving the social skills and behaviour of individuals with ADHD. They found that video modelling facilitated behaviour change, with participants demonstrating improvements in specific targeted behaviours. By providing a visual representation of desired behaviours, video modelling encouraged self-awareness and reflection, which contributed to shifts in social skills. The evidence for its effectiveness lies in the observed behavioural changes, indicating that participants were able to acquire and apply the desired skills in practice (Wilkes-Gillan et al., 2021).

Catania et al. (2009) investigated the effectiveness of video modelling as a training method for staff to implement discrete-trial instruction. Three new employees were exposed

to a video which showed how to implement discrete-trial teaching strategies and this led to improvement in the accuracy of the employees. At the beginning their accuracy was about 12%, and then, after watching the video, they achieved the accuracy of 85-98%. These findings indicate that video modelling is a viable means of increasing teaching accuracy as well as the performance of the staff (Catania et al., 2009).

Kurt et al. (2024) explored the effectiveness of video modelling to teach earthquake and post-earthquake evacuation safety skills for children with autism. The participants observed a video demonstrating the skill of the 'drop, cover, hold on' process. Findings suggested that participants were still able to exhibit this behavior after the study had been completed. Kurt et al. (2024) pointed out that after creating the first video clip, there was an easy way of delivering the information that could be used by parents, teachers, and other people who were involved with the participants.

### **Differences between Video Feedback and Video Modelling**

In the field of applied behaviour analysis, both video modelling and video feedback are behavioural interventions used to either teach new behaviours or to re-shape or improve existing skills and behaviours. These interventions can be combined, however, there are distinct differences as video feedback is typically used to shape an existing skill or behaviour and video modelling is typically used to teach a new skill or behaviour (Digennaro-Reed et al., 2010). The procedure for video feedback usually consists of replaying a certain recording of a behaviour with a participant with a goal that they will work towards and a plan that promotes the skill acquisition or behaviour shaping (Dowrick & Azizah, 2021). Video feedback provides an individual with opportunities to develop an increased awareness of either the skill or behaviour (Benitez-Santiago & Miltenberger, 2016). Observational learning, through video modelling and self-assessment via video feedback are both effective techniques for skill enhancement (Williams & Gallinat, 2011). Much like video modelling,

video feedback can be used in educational and therapeutic settings to modify targeted behaviours (Dowrick & Johns, 1976). Benitez Santiago and Miltenberger (2016) found that video feedback enhanced participants' proficiency in executing movements as it provided participants with a clearer insight into their errors and thus where work was needed to promote improvement.

Park et al. (2018) found that video modelling was an effective way of teaching employment-related social skills to young adults with intellectual disabilities and that video modeling serves as a tool to prepare for performance while video feedback enhances performance post activity. This same approach can be used for enhancing teaching practices could also be used in sports. Thus, video modelling may be potentially useful for the improvement of various skills, including athletic, which was the focus of my study on field hockey forehand hitting techniques.

### **Evidence for Video Feedback**

Video feedback can be applied in various contexts. Josol et al. (2022) examined the effectiveness of video feedback as an intervention for enhancing affective empathy skills in adolescents with Autism Spectrum Disorder (ASD), a developmental condition defined by difficulties in social communication and behavior. Four participants, 11–14 years old with ASD, were introduced to video feedback to help them improve their empathetic responses in conversations. The intervention was designed to replace poor responses with better ones and to help the development of these skills across different conversational partners. For two of the participants, video feedback was beneficial in improving empathic communication abilities (Josol et al., 2022).

In a systematic review, Balldin et al. (2016) explored how video feedback interventions impacted parent-child interactions for children between the ages of 0 to 12 years old. They reviewed 29 studies published between 1990 and 2014, highlighting that

video feedback programmes were mostly effective in improving parental sensitivity and children's behaviour. In 41% of the cases analysed in the review, moderate outcomes were observed. Recording parent-child interactions on video and offering feedback showed success in enhancing sensitivity.

Ballidin et al. (2016) noted that the diversity in video feedback programmes such as differences in their frameworks, durations, and elements presented challenges in arriving at conclusions. Shorter video feedback interventions of six sessions were identified as successful despite the differences observed among them. The authors also highlighted a limitation in some studies where the specific elements of video feedback programmes lack clarity and consistency and they suggested standardised interventions to address this. I aimed to address these issues in my research by providing a clear instructional video to break down the correct technique of the forehand hitting pass for my research participants, with the goal of improving accuracy. To address the issues with video feedback, I used clear and easy to understand terminology when addressing the participants and giving them feedback to increase the accuracy. I expected that video feedback would allow me to identify areas that each player could focus on for improvement. My aim was to develop a video modelling intervention that can be easily replicated to improve and enhance the skill techniques of players with varying levels of skill.

### **Field Hockey**

Field hockey is a sport recognized worldwide with some of the strongest teams being The Netherlands, India, Australia, and the United Kingdom. In locations like the United States, it is traditionally an autumn activity, but in areas with milder climes, it is played all year round. Major international competitions including the sport include the Olympic Games and the FIH Hockey World Cup (Barboza et al., 2018).

Field hockey is a fast-paced sport played on a grass or synthetic turf field, where two teams compete to score more goals than the opponent. Each team has 16 players, however, only 10 players and one goalkeeper are allowed on the turf at any given time. Field hockey is played on a rectangular field that measures 91.40 meters x 55 meters. Goals are positioned in the centre at each end of the field with a semi-circular area around them. The attacking team must be in the circle to score a goal. The game is played over a total of 60 min divided into four 15-min quarters, with 2 minutes between quarters and 5 minutes for half time (International Hockey Federation [FIH], 2018).

Hockey players use a specially designed stick that has a flat side and a rounded side. Only the flat side of the stick is used for hitting, passing, and sweeping the ball to either their own team or taking a shot at the opponent's goal (International Hockey Federation [FIH], 2018). The ball is made from a firm rubber material with dimples to help it move across the artificial turf or grass. The player must use the flat side of the stick to control and strike the ball; if the player uses the rounded side of the stick, then it is considered a foul. If a team fails to follow rules by using the stick dangerously or hitting the ball with the wrong side of the stick, this can result in a free hit, penalty corner, and penalty stroke depending on which rule was broken (International Hockey Federation [FIH], 2018). These rules highlight the critical importance of mastering the skill of hitting in hockey, as precise technique and adherence to regulations are essential for both individual and team success.

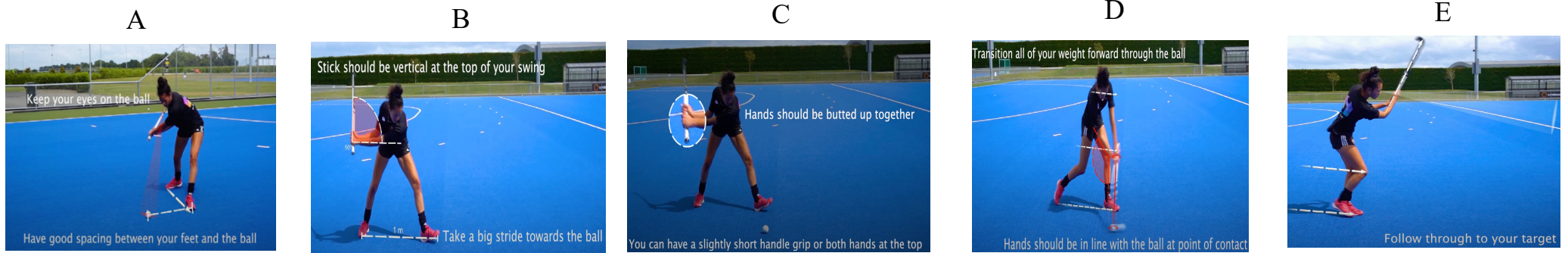
### **Forehand Hitting in Field Hockey**

Forehand hitting is a skill used in field hockey to move the ball at quick pace to achieve greater ball distance travelling as well as for switching the play from one side of the field to the other. Forehand hitting allows the ball-carrying team to quickly advance territory or to avoid losing possession to the opposing team (AbdeLsaLam, 2018). There are a series of five protocols required to enhance performance when completing the skill of forehand

hitting. Firstly, the player needs to maintain eye contact with the ball while also having a good space between the player's feet and the ball. The space between player's feet and the ball is usually shoulder width with the ball close to the front foot as seen in Panel A of Figure 1. Secondly, the hands should form a 90° angle with the body at the top of the swing, while the player steps forward toward the ball. The body itself should also maintain an upright vertical posture to ensure balance and precision during the movement as seen in Panel B of Figure 1. Thirdly, the player's hands should be placed together either at the top of the stick or just below the top of the stick as seen in Panel C of Figure 1. Fourthly, the player then transfers all of their weight through the ball on the down swing and at that point the player's hands should be in line with the ball when contact is made as seen in Panel D of Figure 1. Fifthly, the player then follows through with the stick hitting the ball to the desired target as seen in Panel E of Figure 1.

**Figure 1**

*Five Protocols to Enhance Forehand Hitting*



## **Evidence for Video Modelling in Sports**

In the context of sports, video modelling has been used as a behavioural intervention to increase skill competency over many different sports (Schenk & Miltenberger, 2019). Boyer et al. (2009) examined the impact of video modelling and video feedback on gymnastics skills of high-performance gymnasts. Boyer et al. found that video modelling and video feedback rapidly improved the performance of skills compared to the traditional coaching method. The traditional coaching method typically begins with in-person demonstrations by the coach, where the coach physically performs the skill to guide the athlete through the steps and provides physical corrections or guidance. This is often accompanied by verbal instructions to address errors and refine technique (Horn, 2008). The traditional coaching method relies heavily on direct interaction and real-time feedback from the coach to correct performance. In contrast, video modelling offers a consistent and repeatable visual reference that athletes can review multiple times at their own pace (Collier-Meek et al., 2012). Video modelling could complement or even replace traditional methods by providing athletes with more opportunities for self-paced observational learning and more effective error correction.

Capalbo et al. (2022) evaluated three specific skills of two 9-year-old male goalkeepers who had received 4 years of training in soccer. Using a multiple-baseline-across-behaviours design, the researchers took measurements under baseline, video modelling, and video-modelling-plus-video-feedback conditions. The target skills of all 3 skills had noticeably improved in the video-modelling phase, however it was also noted that performance improved more when video-modelling and video-feedback were combined showing between 92% to 98% improvement. Capalbo et al. stated that there should be further research into the effectiveness of video modelling as a standalone intervention.

Walker et al. (2020) found that video modelling and video feedback improved the accurate execution of complex climbing techniques of novice climbers. Studies (Boyer et al., 2009; Capalbo et al., 2022; Schenk & Miltenberger, 2019) demonstrated that video modelling is an effective intervention for improving a behaviour or skill compared to traditional coaching methods. One commonality in the studies is that they compared the effectiveness of video modelling to baseline levels and to video-modelling-plus-video-feedback. Both video modelling and video feedback were effective, with the most effective intervention being video-modelling-plus-video feedback.

### **Evidence for Video Feedback in Sports Context**

The potential to enhance sports performance through video feedback is significant as identified by Cochrane et al. (2022) who tested the effectiveness of video feedback as a skill training tool for trainers and to enhance a weightlifter's deadlift exercise form by comparing the form from athletes who have expertise in deadlifting. Three instructors and three learners were involved in this research. Instructors and learners both improved their performance compared to the baseline approach (Cochrane et al., 2022). Furthermore, O'Donoghue (2006) explored how video feedback is used in sports to enhance player performance and coaching strategies. Video feedback provides coaches and athletes with visual data that can be viewed and analysed to identify areas where improvement is necessary to enhance the athlete's skills and overall performance. It is a valuable tool for providing athletes with the opportunity to review their performance. Video feedback can be used in real time or after the event in subsequent training sessions making it applicable to multiple settings. Despite its time-consuming nature and the need for high-end technical video gear and skilled staff able to use the equipment appropriately along with specialised software, O'Donoghue emphasised how video technology in sports coaching is both efficient and adaptable by allowing coaches to provide players with practical feedback covering technical and mental performance aspects.

My aim was to explore video modelling to teach the specific skill of forehand hitting in field hockey through use of an instructional video recording accompanied with video feedback. In my study, I planned to review each video of the participants, compare it with the VM, and then provide them feedback to improve their skill and accuracy.

### **Experimental design**

I used a single-subject, multiple-baseline design to teach the forehand hit to participants, as forehand hitting is an essential skill players need in the game of field hockey. Once such a skill is learned it cannot be unlearned. Therefore, I chose to use a multiple-baseline design rather than a reversal design. A reversal design was not suitable as removing the intervention would not have resulted in the behaviour reverting to baseline levels. The multiple-baseline-across-participants design allows for the introduction of the intervention at different times across participants, helping to identify changes in the accuracy of forehand hitting attributable to the intervention. Given the constraints of working with established teams and schedules in a sports training environment, the multiple-baseline approach allows for the practical implementation of the intervention while still providing robust data (Chan-Viquez et al., 2024). Additionally, this design is particularly appropriate for measuring the impact of educational and training interventions over time (Outhwaite et al., 2019).

### **Research Aim**

My primary objective was to evaluate the effectiveness of video modelling and video feedback as an intervention to increase the accuracy of forehand hitting as a passing technique for field hockey players. My research questions were: Does video modelling improve the forehand-hitting technique of field hockey players? Is video modelling enhanced when video feedback is introduced to increase players forehand hitting accuracy?

## **Method**

### **Design**

I used a single-subject multiple-baseline-across-participants design which allows for the comparison of players' performances before and after the intervention without the need for random assignment to experimental and control groups. Players from various local clubs were invited to participate and the forehand hitting technique of four volunteers were assessed multiple times during baseline and an 8-week period of the intervention. This intervention was completed in phases. Phase 1 included video modelling at a beginner level, Phase 2 included video modelling at an intermediate level, and Phase 3 included video-modelling-plus-video-feedback. Phases 2 and 3 began with participants viewing the exemplar video, then were told to excuse the forehand pass. Phase 4 presented the intermediate video plus the feedback alongside the video modelling. The multiple baseline design was employed to strengthen the study's validity by sequentially applying the intervention across participants, enhancing experimental control. This design leveraged prediction, verification, and replication to demonstrate that observed improvements were attributable to the intervention. It was possible to verify that changes only occurred for participants exposed to the independent variable by maintaining baseline conditions for participants who had not yet received the intervention. Since this method does not require the withdrawal of the intervention, which is often impractical or unethical in applied settings, it was particularly suitable.

### **Participants**

The inclusion criteria required participants to be between the ages of 15 and 18 and actively training with a local field hockey association. Participants also had to have a basic understanding of field hockey and ability to perform the forehand-hit technique thus ensuring they could benefit from the video-modeling intervention. Exclusion criteria included any player currently undergoing rehabilitation for a serious injury or those who had participated

in similar skill-enhancement studies recently, to avoid confounding variables. Initially, six male hockey players provided consent to participate in this research, however two withdrew early in the process, one prior to the commencement of data collection and the one after baseline was collected. The four participants who completed the study were all part of the same North Island National U18 team. All participants had competed at a high level for their age. They all played in their respective school teams and had competed at both the New Zealand National Under 16 and 18 tournaments. Participant 1 was 16 years old and had been playing hockey for 10 years. Participant 2 was 16 years old and had been playing for the past 8 years. Participant 3 was 17 years old and had been playing hockey for the past 12 years. Participant 4 was 17 years old and had been playing hockey for the past 8 years.

### **Ethical Considerations**

Information explaining the purpose of the study, procedures involved, risks and benefits associated with the study was provided to the legal guardians and participants of this research. The information sheet that was given to the legal guardians and participants is in Appendix A. I was available to answer any questions if they needed further clarification. Informed consent was provided by the legal guardian of each participant.

### **Ethical Approvals**

Ethical approval was provided by Arts, Law, Psychology and Social Sciences Human Research Ethics Committee, Approval number FS2024-19. The ethical approval letter is in Appendix G.

### **Description of the Video Content**

I carefully selected video content to demonstrate the correct techniques for executing a forehand hit in field hockey. The videos were sourced from Inside Hockey (<https://www.insidehockey.co.nz/ih-coach>), a coaching platform designed specifically for

field hockey coaches. This platform offers instructional videos on various techniques used in the game, including passing techniques such as the forehand hit. High-definition footage of professional players was featured, showcasing key movements and positions such as grip, stance, swing mechanics, and follow-through. The videos incorporated slow-motion sequences and close-up shots to emphasize critical elements of the technique. Additionally, narration and on-screen annotations were provided to guide viewers through each step of the forehand-hitting process, ensuring clear, detailed instruction. Three levels of the forehand hit were available from beginner, intermediate, and advanced level but only the beginner and intermediate videos were used. Upon review, the advanced video was deemed unsuitable as it illustrated a different exemplar from that in both the beginner and intermediate videos, with the model leading from the right foot opposed to the left foot, in essence demonstrating a different technique. Instead, video feedback paired with the intermediate-level video was introduced as the third phase of the intervention.

### **Duration and Frequency of the Intervention**

Participants watched the instructional video, which was approximately 1 min long, once a stable baseline measure of their forehand passing accuracy was established. A stable baseline was defined as having at least three data points at the same level, or more data points where the trend line remains stable despite upward or downward variations (Manolov et al., 2019). During the intervention phase, participants viewed the video and immediately followed it with approximately 5 mins of forehand passing practice. This process was repeated until all participants completed their video viewing and practice sessions, with each session lasting around 15 minutes. The frequency of these sessions varied but was generally 2-3 times per week and at minimum once per week, and the intervention continued until stable measures were achieved, which varied between participants ranging from 6 sessions over 2 weeks or 4 sessions over 2 to 3 weeks. Once the data were stable for one participant in

the intervention phase then the next participant started the intervention. The whole study took 12 weeks.

### **Implementation Process**

Initially, participants performed the baseline measurements by pairing up and attempting 20 forehand passes to each other over a distance of 30 m. Each baseline session lasted approximately 5 minutes per participant. During all phases, the forehand passing attempts were recorded on video to ensure accurate measurement of their performance.

Once a stable baseline was established, participants entered the intervention phase where they watched a short instructional video demonstrating the forehand-passing technique. After viewing the video, they immediately practiced the technique by performing 20 forehand passes, as for the baseline procedure.

### **Data Collection Methods**

#### ***Tools and Instruments***

I used an iPhone 13 pro max and an iPhone 15 pro to record in high definition each participant's forehand hitting attempts. Instead of a tripod, I held the phone to ensure that the appropriate angle was captured. Cones or markers were placed 30 m apart using a measuring tape to establish a standard distance between participants. The balls used in this study were made by Kookaburra; these hockey balls are widely used in field hockey, known for their durability and consistent performance and are the gold standard when it comes to training balls and match play (International Hockey Federation et al., 2019). Players provided their own stick that they used to train and play with. A standardised checklist was used to record the accuracy of each forehand pass, defined as the ball landing within stick reach of the receiving player. The standardised checklist is in Appendix H.

#### ***Data Collection Procedures***

Players were paired and situated 30m apart. Each player executed 20 passes of a forehand hit to the opponent, with the direction of the pass being within stick reach. Baseline measures were established using the same methods as during intervention, without feedback or reinforcement. The recorded video footage was played back and the number of completed passes (where the ball remained within stick reach) was counted from 20 attempts.

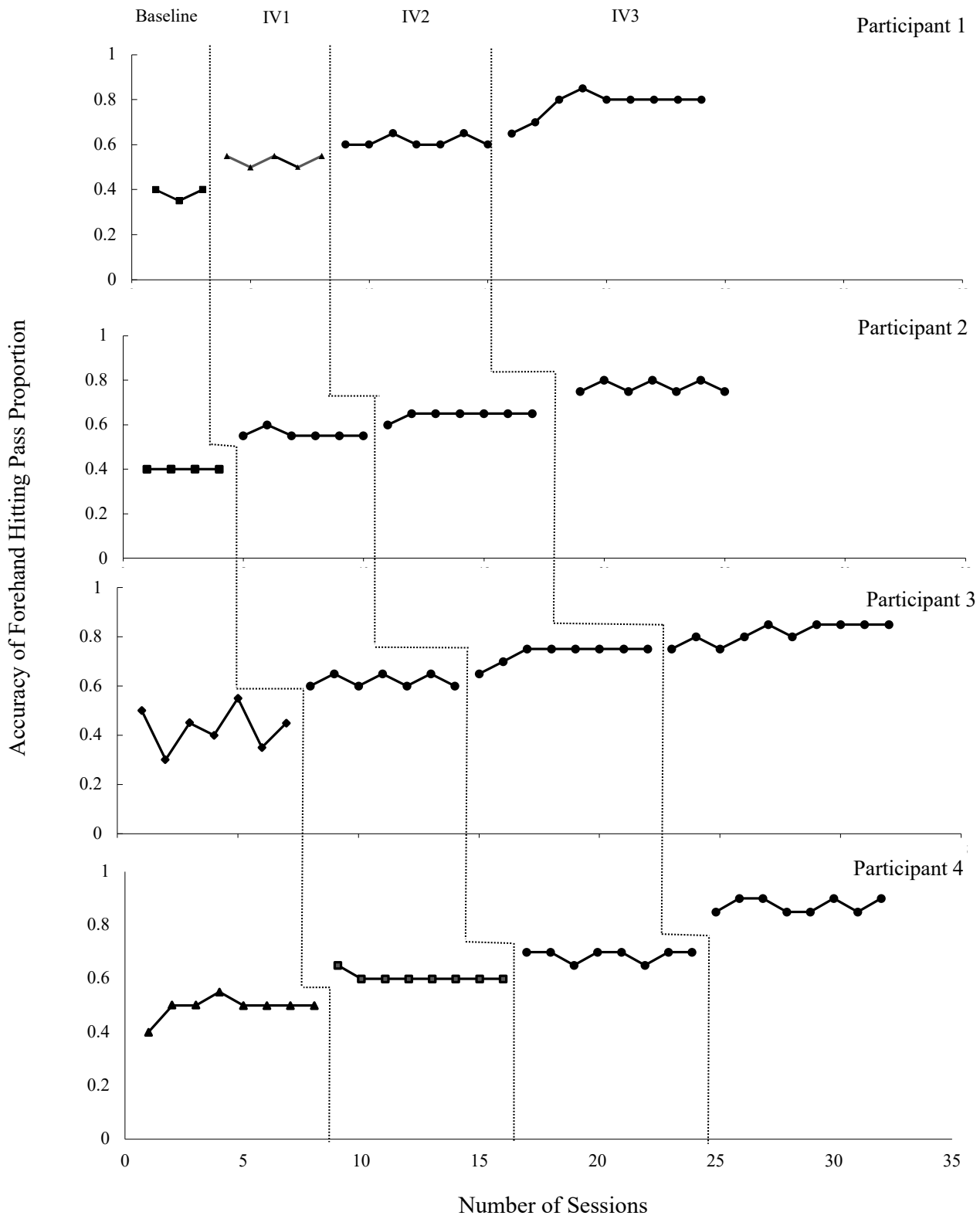
## **Data Analysis**

### ***Analytical Techniques Used***

I used graphical analysis to compare the forehand passing accuracy of the participants during baseline and post-intervention phases to analyse performance changes. This approach allowed for a clear within-subject comparison, ideal for assessing changes resulting from the intervention.

## **Results**

Figure 2 demonstrates that baseline data were stable for all participants, improvement was seen for all players during Phases 1 and 2 when players were shown the beginner and intermediate videos, however, there was increased improvement in Phase 3 when the intermediate video was used, and video feedback was included. Given the clear improvement in performance shown in Figure 2, I did not calculate an effect size measure.

**Figure 2***Participant Accuracy and Baseline and Intervention Stages*

### **Participant 1**

During the baseline phase, Participant 1 had an accuracy of around 50% when attempting the forehand hitting pass (Figure 2). During the first phase of the video modeling intervention, Participant 1's accuracy increased to 60% and was stable across 5 data points. During the second phase of the video modelling intervention, Participant 1's accuracy increased to 70%. During the final phase of the intervention, which was the video-modelling-plus-video feedback, Participant 1's accuracy increased to between 85% to 90%. Overall, for Participant 1, passing accuracy increased from 50% to 87.5%, which is an increase of 37.5% from baseline to the third stage of the intervention. Participant 1's accuracy was stable over the last five sessions in the video-modelling-plus-feedback condition.

### **Participant 2**

During the baseline phase, Participant 2 had an accuracy of 40%, as seen in Figure 2, and his data were stable across all four sessions. During the first phase of video modelling, Participant 2's accuracy increased to 55% and was stable across the last four of five datapoints. During the second phase of the intervention, accuracy increased from 55% to 65% and was stable. During the video modelling plus the video feedback accuracy increased to an average of 77.5% and was stable.

### **Participant 3**

During the baseline phase (Figure 2), Participant 3's baseline data were stable but variable with the accuracy ranging from 30% to 50%. During the first phase of the video modelling intervention, Participant 3's accuracy increased to an average of 62.5% over 7 sessions. In the second phase of the video modelling intervention, Participant 3's accuracy

increased to 65% for the first session, 70% on the second session, and then remained at 75% for the following 5 sessions. Initially when starting the third phase of intervention there was no change to the accuracy, but accuracy gradually increased and became stable at 85% and there was a total increase of 43% from baseline to the third and last stage of the intervention.

#### **Participant 4**

During the baseline phase, Participant 4 had an average accuracy of 37.5% across three sessions and the data were stable. During the first phase of the video modelling intervention, the average accuracy across five sessions was 52.5%. Figure 2 shows that during the first phase of the intervention, this being the video modelling, Participant 4's accuracy increased to 62.5% across seven sessions. During the last phase of the intervention, accuracy gradually increased across the sessions to 85% and the data were stable. This is a total increase of 42.5% from baseline to the third stage of the intervention.

#### **Reliability testing**

To check the reliability of the data, an independent observer reviewed video recordings of participants' performance to determine the accuracy of their performance. I discussed with them how to score the accuracy for the trials before showing them the videos. To evaluate inter-observer agreement, I compared their scores with mine. To calculate the independent observer score the percentage agreement was calculated by dividing the smaller of the two scores by the larger score for each video and multiplying the result by 100. The reliability testing was 94% across the 3 videos that were shown to the interobserver and compared to my scores.

### **Discussion**

My primary objective was to evaluate the effectiveness of video modelling and video feedback as interventions to increase the accuracy of forehand hitting; a passing technique for

field hockey players. My findings align with earlier studies that have evidenced the effectiveness of video modelling in skill learning especially in sports contexts (e.g., Boyer et al., 2009; Walker et al., 2020). Figure 2 demonstrates that baseline data were stable across all participants, improvement was seen during Phases 1 and 2 when players were shown the beginner and intermediate videos. The addition of video feedback in Phase 3 further increased performance consistent with the findings with previous research confirming the effectiveness of video modelling and feedback in improving accuracy of performance in sports. For example, changes in forehand hitting accuracy in Phase 3 of the intervention are consistent with findings of Emmen et al. (1985) who reported that video-feedback training improved the tennis service performance of their novice players. Emmen et al. pointed out that video-feedback training if used alone or together with video modelling enhanced the performance scores because participants got specific feedback on their movement. This is in line with the findings of my study where video feedback helped in improving the technique for forehand hitting. However, in Emmen et al.'s study, video-feedback was not better than conventional methods, since live modelling by coaches was available to all groups. In my study, video modelling was useful but coaching with video feedback may have enhanced the effectiveness of the intervention. These parallels indicate the possibility of combining the dynamic video-based approaches with traditional coaching to enhance learning in sports.

According to Wagner et al., (2022) the use of video feedback is crucial in both formal and informal settings, especially while using both expert and self-modelling to improve motor skills. The ability to see how the movement should be done and then to do it themselves gave players a clear idea of what they were striving to achieve, just as Wagner et al. described the visual feedback mechanisms. Moreover, Kok et al., (2020) proposed that self-controlled video feedback can enhance self-efficacy through autonomy and self-

regulation, thus, supporting the idea that video modelling is an effective way to help young athletes to improve their technical performance and psychological preparation for sports.

The combination of the expert videos and feedback, as suggested by Crosland et al. (2021), was particularly effective. Crosland et al. explained how the comparison of the videos taken of the participants and experts helped in the correction of technical errors in Olympic weightlifting, in techniques like clean and jerk and snatch. This approach is similar to the methods used in my study where field hockey players used video modelling to assess and improve their forehand hitting technique.

Jennings and Reaburn (2013) showed that video interventions can enhance the acquisition and retention of a skill in cycling. Although they found no differences between the traditional verbal feedback and the self-modelling video interventions in terms of performance gain immediately after the intervention, they suggested that video self-modelling might be beneficial for the maintenance of the skill in the long run. The use of verbal feedback and the self-modelling video interventions is particularly important to the present study in which I tested video modelling in field hockey as both studies involve technical motor skills. However, there are some key differences between the two studies. Jennings et al. (2013) reported that video self-modelling may be more suitable for cumulative motor skills than for sequential movements such as cycling standing start. The forehand hit in field hockey involves a combination of distinct and fluid movement patterns, which means that video modelling might provide specific benefits in improving movement patterns. Furthermore, they showed that the effectiveness of video modelling may be determined by the duration of the intervention, and that longer interventions may lead to better outcomes. I used a multiple-baseline design to determine skill acquisition during learning, thereby providing for more time to analyse the effects of video modelling and the ability to track the improvement of the skill over multiple sessions. Also, the importance of high-quality video

editing as identified by Jennings et al. (2013) further stresses the importance of making sure that athletes receive clean, error-free demonstrations to improve their learning. To this end, the present study contributes to the extant literature by addressing some of the factors and further elaborating on the use of video modelling in the enhancement of technical performance in field hockey. For instance, Barzouka and Sotiropoulos (2015) mentioned the use of expert video feedback in the improvement of volleyball skills, while Obrusnikova and Rattigan (2016) mentioned its application in the learning of motor skills. Their findings on VM and VP are comparable to those of the current study where video modelling improved forehand hitting techniques in field hockey.

According to Obrusnikova and Rattigan (2016), video modelling assists in learning by providing the learners with accurate examples of what to do and how to do it and by dividing the movement into several understandable steps that could be followed. I used high-quality videos which were edited to only show the technical aspects of the forehand hit. In addition, Obrusnikova and Rattigan focused on the specificity of the intervention to the learner's level, as well as the use of repetition as a learning strategy, which is in line with the use of the multiple-baseline design in this study to track the development of learned skills over time. Based on the principles of social cognitive theory such as observation and self-regulation, this study goes beyond their work to apply video modelling to the complex and multifaceted setting of field hockey.

### **Strengths and limitations**

The multiple-baseline design, while very valuable in establishing whether the intervention was effective, required very careful planning and monitoring to preserve methodological integrity. This design necessitated staggered participant starts, further raising the level of logistical complexity and extending the time over which data needed to be collected. A key strength to this study, however, was also the single-subject multiple-baseline

approach, as it allowed me to work with a smaller group of participants and thus collect data across a period making this research more manageable. This intervention was designed so that each individual had the opportunity to measure their success using their individual data, without comparison to another participant. This type of staged approach has also been identified in the work of Capalbo et al. (2022).

The focus was on individual skill development rather than comparing participants' abilities against each other. This approach limited the ability to generalise conclusions about the intervention's effectiveness in a game setting. Future research should examine whether these skills transfer successfully to competitive play. Also, whether it can be used for individual personal development as opposed to competing against the diversity of skills across other participants, that would have made it difficult to generalise conclusions and the effectiveness of this intervention.

An inter-observer was used to determine that the results were analyzed correctly so that there would be consistency to the results, this mitigated any possibility of bias as inaccuracies may arise from individual interpretation. As hockey is a winter sports and this research was conducted outside, collecting data was weather dependent resulting in scheduled sessions occasionally being canceled impeding the collection of data. Participants were located within a rural area that required transportation of approximately 80km to where the sessions were held. To overcome this, I scheduled these sessions to align with their team training, however, the distance often meant that not all participants were able to make each training, as a result we had catch-up sessions with participants to collect data. Through frequent interaction with the participants, flexibility in scheduling, and maintaining on-going consistent communication I was able to overcome these limitations, these strategies contributed to a smoother research process, ensuring that the study remained on track.

Another limitation to using a single-subject design is that the withdrawal of participants affects the research. In my study, two participants withdrew early on, one prior to data collection and one at the baseline measurement, this was due to the demands of school, extracurricular activities, and family commitments. Careful planning and frequent communication were used for added care to avoid conflicts with school schedules and extracurricular activities whenever possible without compromising the study.

### **Implications**

Video-modelling and video feedback supported the gradual development of increased accuracy for my four participants. The outcomes of this study suggest that video modelling and feedback can be successfully implemented as part of the daily training for youth athletes to improve sporting techniques (Foltz, 2014), which is beneficial for both players and coaches as video modelling requires minimal time to implement. Forehand hitting is one of the basic skills that form the basis of good playing, which includes making accurate passes, switching play quickly, and keeping the ball under control. In this regard, coaches can use video-based interventions to demonstrate this technique and players will be able to see what the proper grip, stance, and follow-through are. For instance, AbdeLsaLam (2018) developed an educational program utilizing kinematic feedback to improve beginners' hitting techniques in field hockey, emphasizing the importance of grip, stance, and follow-through for skill development. In addition, video modelling and feedback provide coaches with a logical and measurable approach to determining and working on skill problems. Compared to the traditional verbal or live demonstrations, video interventions have an advantage of being clear and can be shown to the learners any time they need. As for the coaches, video modelling reduces the dependence on personal experience and intuition. Thus, video technology can be incorporated into the training process to design a more interesting and

efficient learning environment suitable for the variety of learners and appropriate for the players of different competence levels to develop their skills (Klatt et al., 2021).

### **Recommendations**

Future researchers may examine how sustainable video modelling and video feedback is for players of different ability levels and in the execution of other hockey skills including defence and shooting for goal. Further research on the use of video modelling and feedback in improving forehand hitting accuracy in field hockey has immense benefits to the coaching field.

### **Conclusion**

I aimed to explore whether video modelling and video feedback can enhance field hockey players' forehand hitting accuracy. The multiple baseline design allowed me to demonstrate that all participants exhibited increasing improvements across all intervention phases and most notably during the period when video feedback was implemented. The results of my study are in line with the existing literature on applied behaviour analysis in sports (e.g., Boyer et al., 2009; Walker et al., 2020; Emmen et al., 1985; Crosland et al., 2021), which supports the effectiveness of observational learning and feedback in the development of sports skills. My findings can be used in coaching field hockey but also have implications for other sports that can support the use of video interventions in coaching. The simplicity of the approach and individualised feedback make video modelling and feedback convenient and useful for both athletes and coaches to improve technical skills. Further research should also be directed towards the long-term effect of these improvements and the cross over to other skills and competitive environments. Coaches and sports scientists can continue to improve training programmes and athlete development by building on these methodologies.

## References

- AbdeLsaLam, A. A. (2018). Educational program in field hockey for beginners according to the kinematic comparison between straight vertical hit and hitting the ball with the flat-face ball. *Assiut Journal of Sport Science and Arts*, 6(6), 85-101.
- Acar, C., & Diken, I. H. (2012). Reviewing instructional studies conducted using video modelling to children with autism. *Educational Sciences: Theory and Practice*, 12(4), 2731-2735  
<https://ezproxy.waikato.ac.nz/login?url=https://www.proquest.com/scholarly-journals/reviewing-instructional-studies-conducted-using/docview/1231796860/se-2?accountid=17287>
- Albert, A. (2013). Measuring the effectiveness of pedagogical innovations using multiple baseline testing. Association for Engineering Education - Engineering Library Division Papers, 23.891.1-.autism? *Journal of Early and Intensive Behavior Intervention*, 2(1), 2-8.  
<https://ezproxy.waikato.ac.nz/login?url=https://www.proquest.com/conference-papers-proceedings/measuring-effectiveness-pedagogical-innovations/docview/2317885950/se-2?accountid=17287>
- Balldin, S., Fisher, P. A., & Wirtberg, I. (2016). Video feedback intervention with children: A systematic review. *Research on Social Work Practice*, 28(6), 682-695.  
<https://doi.org/10.1177/1049731516671809>
- Barboza, S. D., Joseph, C., Nauta, J., van Mechelen, W., & Verhagen, E. (2018). Injuries in field hockey players: A systematic review. *Sports Medicine*, 48(4), 849–866.  
<https://doi.org/10.1007/s40279-017-0839-3>
- Barzouka, K., Sotiropoulos, K., & Kioumourtzoglou, E. (2015). The effect of feedback through an expert model observation on performance and learning the pass skill in volleyball and motivation. *Journal of Physical Education & Sport*, 15(3). Doi

[10.7752/jpes.2015.03061](https://doi.org/10.7752/jpes.2015.03061)

- Bellini, S., & Akullian, J. (2007). A meta-analysis of video modelling and video self-modelling interventions for children and adolescents with autism spectrum disorders. *Council for Exceptional Children, 73*(3), 264-287. <https://doi.org/10.1177/001440290707300301>
- BenitezSantiago, A., & Miltenberger, R. G. (2016). Using video feedback to improve martial arts performance. *Behavioural Interventions, 31*(1), 12-27. <https://doi.org/10.1002/bin.1424>
- Boyer, E., Miltenberger, R. G., Batsche, C., & Fogel, V. (2009). Video modeling by experts with video feedback to enhance gymnastics skills. *Journal of Applied Behavior Analysis, 42*(4), 855-860. <https://doi.org/10.1901/jaba.2009.42-855>
- Boyer, E., Miltenberger, R. G., Batsche, C., & Fogel, V. (2009). Video modeling by experts with video feed- back to enhance gymnastics skills. *Journal of Applied Behavior Analysis, 42*, 855–860. <https://doi.org/10.1901/jaba.2009.42-855>
- Boyer, E., Miltenberger, R. G., Batsche, C., & Fogel, V. (2013). Video modeling by experts with video feedback to enhance gymnastics skills. *Journal of Applied Behavior Analysis, 42*(4), 855-860. <https://doi.org/10.1901/jaba.2009.42-855>
- Capalbo, A., Miltenberger, R. G., & Cook, J. L. (2022). Training soccer goalkeeping skills: Is video modeling enough?. *Journal of Applied Behavior Analysis, 55*(3), 958-970. <https://doi.org/10.1002/jaba.937>
- Catania, C. N., Almeida, D., Liu-Constant, B., & DiGennaro Reed, F. D. (2009). Video modeling to train staff to implement discrete-trial instruction. *Journal of Applied Behavior Analysis, 42*(2), 387–392. <https://doi.org/10.1901/jaba.2009.42-387>
- Chan-Viquez, D., Fernández-Huertas, H., Montserrat-Gonzalez, C. et al. Feasibility of a home-based home videogaming intervention with a family-centered approach for children with cerebral palsy: a randomized multiple baseline single-case experimental design. *J NeuroEngineering Rehabil 21, 151* (2024). <https://doi.org/10.1186/s12984-024-01446-2>

- Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders, 30*(6), 537-552. <https://doi.org/10.1023/A:1005635326276>
- Cochrane, E., Miltenberger, R., & Concepcion, A. (2022). Evaluating peer-implemented video feedback to improve weight training form. *Journal of Applied Behavior Analysis, 55*(4), 1144–1156. <https://doi.org/10.1002/jaba.949>
- Cochrane, E., Miltenberger, R., & Concepcion, A. (2022). Evaluating peer-implemented video feedback to improve weight training form. *Journal of Applied Behaviour Analysis, 55*(4), 1144–1156. <https://doi.org/10.1002/jaba.949>
- Collier-Meek, M. A., Fallon, L. M., Johnson, A. H., Sanetti, L. M., & Delcampo, M. A. (2012). Constructing self-modeling videos: Procedures and technology. *Psychology in the Schools, 49*(1), 3-14. <https://doi.org/10.1002/pits.20614>
- Corbett, B. A., & Abdullah, M. (2005). Video modeling: Why does it work for children with autism? *Journal of Early and Intensive Behavior Intervention, 2*(1), 2–8. <https://doi.org/10.1037/h0100294>
- Digennaro-Reed, F. D., Coddling, R., Catania, C. N., & Maguire, H. (2010). Effects of video modeling on treatment integrity of behavioral interventions. *Journal of applied behavior analysis, 43*(2), 291-295. <https://doi.org/10.1901/jaba.2010.43-291>
- Dowrick, P. W., & Azizah, N. (n.d.). Video Feedback and Feedforward. In *Encyclopedia of Autism Spectrum Disorders* (pp. 5045–5048). *Springer International Publishing*. [https://doi.org/10.1007/978-3-319-91280-6\\_102266](https://doi.org/10.1007/978-3-319-91280-6_102266)
- Dowrick, P., & Johns, E. (1976). Video feedback effects on therapist attention to on-task behaviours of disturbed children. *Behaviour Research and Therapy, 14*(4), 293–299. [https://doi.org/10.1016/0005-7916\(76\)90009-4](https://doi.org/10.1016/0005-7916(76)90009-4)

- Emmen, H. H., Wesseling, L. G., Bootsma, R. J., Whiting, H. T. A., & Van Wieringen, P. C. W. (1985). The effect of video-modelling and video-feedback on the learning of the tennis service by novices. *Journal of sports sciences*, 3(2), 127-138.  
<https://doi.org/10.1080/02640418508729742>
- Foltz, B. D. (2014). Video self-modeling and collegiate field hockey: The effect of a self-selected feedforward intervention on player hitting ability and self-efficacy (Order No. 3631093). Available from ProQuest One Academic. (1564754083).  
<https://ezproxy.waikato.ac.nz/login?url=https://www.proquest.com/dissertations-theses/video-self-modeling-collegiate-field-hockey/docview/1564754083/se-2>
- Horn, T. S. (2008). *Coaching effectiveness in the sport domain*.
- International Hockey Federation, Mitchel, S., & Stone, B. (2019). *Hockey Ball Standards - Competition Balls for use on Global category Hockey Turfs (2019 Edition)*.
- Jennings, C. T., Reaburn, P., & Rynne, S. B. (2013). The effect of a self-modelling video intervention on motor skill acquisition and retention of a novice track cyclist's standing start performance. *International Journal of Sports Science & Coaching*, 8(3), 467-480.  
<https://doi.org/10.1260/1747-9541.8.3.467>
- Josol, C. K., Fisher, M. H., Brodhead, M. T., & Dueñas, A. (2022). Using a video feedback intervention package to improve affective empathy skills for adolescents with autism spectrum disorder. *Journal of Developmental and Physical Disabilities*, 34(1), 127-145.  
<https://doi.org/10.1007/s10882-021-09793-x>
- Klatt, S., Noël, B., Schwarting, A., Heckmann, L., & Fasold, F. (2021). Adaptive gaze behavior and decision making of penalty corner strikers in field hockey. *Frontiers in psychology*, 12, 674511. <https://doi.org/10.3389/fpsyg.2021.674511>
- Kok, M., Komen, A., van Capelleveen, L., & van der Kamp, J. (2020). The effects of self-controlled video feedback on motor learning and self-efficacy in a Physical Education setting: an

exploratory study on the shot-put. *Physical Education and Sport Pedagogy*, 25(1), 49-66.

<https://doi.org/10.1080/17408989.2019.1688773>

Kurt, O., Cevher, Z., & Kutlu, M. (2024). Effectiveness of video modeling in teaching earthquake and postearthquake evacuation safety skills for children with autism. *Journal of Applied Behavior Analysis*, 57(2), 331–340. <https://doi.org/10.1002/jaba.1057>

Manolov, R., Solanas, A., & Sierra, V. (2019). Extrapolating baseline trend in single-case data:

Problems and tentative solutions. *Behavior Research Methods*, 51, 2847-2869.

<https://doi.org/10.3758/s13428-018-1165-x>

Martinez, S. K., Miltenberger, R. G., & Deshmukh, S. S. (2024). Comparing video feedback and video modeling plus video feedback for improving soccer skills. *Journal of Applied Behavior Analysis*, 57(4), 936-946. <https://doi.org/10.1002/jaba.2903>

McCoy, A., Holloway, J., Healy, O., Rispoli, M., & Neely, L. C. (2016). A systematic review and evaluation of video modeling, role-play, and computer-based instruction as social skills interventions for children and adolescents with high-functioning autism. *Review Journal of Autism and Developmental Disorders*, 3(1), 48-60. [https://doi.org/10.1007/s40489-015-0065-](https://doi.org/10.1007/s40489-015-0065-6)

6

Mechling, L. C., & Gustafson, M. (2009). Comparison of the effects of static picture and video prompting on completion of cooking related tasks by students with moderate intellectual disabilities. *Exceptionality*, 17(2), 103-116. doi:10.1080/09362830902805889

Mödinger, M., Woll, A. & Wagner, I. (2022). Video-based visual feedback to enhance motor learning in physical education—a systematic review. *Ger J Exerc Sport Res* 52, 447–460 <https://doi-org.ezproxy.waikato.ac.nz/10.1007/s12662-021-00782-y>

Mulqueen, D. , Crosland, K. A. & Novotny, M. A. (2021). Using Video Modeling and Video Feedback to Improve Olympic Weightlifting Technique. *Behavior Analysis: Research and Practice*, 21 (3), 282-292. doi: 10.1037/bar0000211.

- Nikopoulos, C. K. (2008). Teaching complex social skills to children with autism; advances of video modeling. *Journal of Developmental and Physical Disabilities. American Psychological Association*. <https://psycnet.apa.org/fulltext/2014-52729-003.html>
- O'Brien, R. (2010). A case study investigating the potential impact of video modelling on the teaching of a student with autism (Master's thesis, University of Limerick). *University of Limerick Institutional Repository*.  
[https://researchrepository.ul.ie/articles/thesis/A\\_case\\_study\\_investigating\\_the\\_potential\\_impact\\_of\\_video\\_modelling\\_on\\_the\\_teaching\\_of\\_a\\_student\\_with\\_autism/19841500/1](https://researchrepository.ul.ie/articles/thesis/A_case_study_investigating_the_potential_impact_of_video_modelling_on_the_teaching_of_a_student_with_autism/19841500/1)
- O'Donoghue, P. (2006). The use of feedback videos in sport. *International Journal of Performance Analysis in Sport*, 6(2), 1-14. <https://doi.org/10.1080/24748668.2006.11868368>
- Obrusnikova, I., & Rattigan, P. J. (2016). Using video-based modeling to promote acquisition of fundamental motor skills. *Journal of Physical Education, Recreation & Dance*, 87(4), 24-29. <https://doi.org/10.1080/07303084.2016.1141728>
- Outhwaite, L. A., Gulliford, A., & Pitchford, N. J. (2019). A new methodological approach for evaluating the impact of educational intervention implementation on learning outcomes. *International Journal of Research & Method in Education*, 43(3), 225–242. <https://doi.org/10.1080/1743727X.2019.1657081>
- Park, J., Bouck, E. C., & Duenas, A. (2020). Using video modeling to teach social skills for employment to youth with intellectual disability. *Career Development and Transition for Exceptional Individuals*, 43(1), 40-52. <https://doi.org/10.1177/2165143418810671>
- Pearson, A., Webb, T., Milligan, G., & Miller-Dicks, M. (2023). The use of video feedback as a facet of performance analysis: An integrative review. *International Review of Sport and Exercise Psychology*, 1–23. <https://doi.org/10.1080/1750984X.2023.2156789>
- Romer, K., Vladescu, J. C., Marano, K. E., Reeve, S. A., Sidener, T. M., & Campanaro, A. M. (2021). The influence of observations and ratings on implementation of discrete trial

instruction. *Journal of Applied Behavior Analysis*, 54(4), 1639-1651.

<https://doi.org/10.1002/jaba.868>

Schenk, M., & Miltenberger, R. (2019). A review of behavioural interventions to enhance sports performance. *Behavioural Interventions*, 34, 248–279. <https://doi.org/10.1002/bin.1659>

Stone, J. A., Rothwell, M., Shuttleworth, R., & Davids, K. (2020). Exploring sports coaches' experiences of using a contemporary pedagogical approach to coaching: an international perspective. *Qualitative Research in Sport, Exercise and Health*, 13(4), 639–657.

<https://doi.org/10.1080/2159676X.2020.1765194>

Wahoski, J. (2015). Video modelling: An intervention for autism. *BU Journal of Graduate Studies in Education*, 7(1), 54-58. <https://eric.ed.gov/?id=EJ1230688>

Walker, S. G., Mattson, S. L., & Sellers, T. P. (2020). Increasing accuracy of rock-climbing techniques in novice athletes using expert modeling and video feedback. *Journal of Applied Behavior Analysis*, 53(4), 2260-2270. <https://doi.org/10.1002/jaba.694>

Weiss, P., Hochhauser, M., Rosen, R., Zlotnik, S., & Gal, E. (2015). Simulating the practice of daily life social and vocational situations via video modeling. *Proceedings of the 2015 International Conference on Virtual Rehabilitation (ICVR)*.

<https://doi.org/10.1109/ICVR.2015.7358595>

Wilkes-Gillan, S., Cordier, R., Chen, Y.-W., Swanton, R., Mahoney, N., Trimboli, C., Yule, E., & Tam, E. (2021). A systematic review of video-modelling interventions for children and adolescents with attention-deficit hyperactivity disorder. *Australian Occupational Therapy Journal*, 68(5), 454–471. <https://doi.org/10.1111/1440-1630.12747>

Williams, W., & Gallinat, J. (2011). The effects of evaluating video examples of staffs' own versus others' performance on discrete-trial training skills in a human service setting. *Behavioural Interventions*, 26(2), 69–82. <https://doi.org/10.1080/01608061.2011.570099>

## Appendix A: Information Sheet

# Information sheet

**Project Title:**

Enhancing Athletic Performance: The Impact of Video Modelling on Forehand Hitting as a Passing Technique to Increase Accuracy

**Principal Investigator:**

Dylan Platt

**Supervisor:**

Dr. Rebecca Sargisson, Expert in Behavioural Analysis Research

**Introduction**

Thank you for considering participating in this innovative research study designed to enhance athletic performance through the use of video modelling. I am conducting this study as part of my Master's thesis at the University of Waikato. This study aims to refine and improve the techniques of field hockey players, with a particular focus on the accuracy and execution of forehand hitting. Your involvement is critical to advancing our understanding of effective training strategies and could significantly contribute to the field of sports education and training.

**Study Purpose**

The primary goal of this research is to systematically assess how video modelling can be employed to enhance the forehand hitting technique in field hockey.

**Study Procedures**

Your participation in this study will involve several key activities:

**Initial Evaluation:** We will conduct a detailed assessment of your current forehand hitting technique to establish a baseline for comparison.

**Video Modelling Intervention:** You will be shown a series of professionally produced videos that demonstrate the forehand hitting technique by expert players. These sessions are designed to provide clear, actionable examples for you to emulate.

**Practice Sessions:** Post video viewing, you will participate in structured practice sessions where you can apply what you've learned. These sessions will be closely monitored to provide real-time feedback and adjustments.

**Follow-Up Assessments:** At the conclusion of the training period, your technique will be re-evaluated to measure any improvements or changes in your skill level.

Each session will last approximately 15 minutes and will be integrated into your regular training schedule over a period of 6 weeks.

**Potential Risks and Benefits**

**Risks:** The risks associated with this study are minimal, aligning closely with those encountered during regular field hockey practice, such as the general risk of sports-related injuries.

**Benefits:** Participants are likely to experience improvement in their forehand hitting technique, which could enhance their overall game performance. Additionally, the findings from this study

will contribute to the broader understanding of effective sports training techniques, potentially influencing training practices on a wider scale.

### **Participant Eligibility**

We are seeking field hockey players who are actively participating in structured competition.

### **Confidentiality and Privacy**

All personal information will be strictly confidential and used solely for the purpose of this research. Data will be anonymised in any publications or presentations resulting from this study. Your personal data will be securely stored for a minimum of 5 years. Secure data handling and storage protocols are in place to protect your privacy, in accordance with university guidelines and legal requirements.

### **Voluntary Participation and Rights**

Participation in this study is entirely voluntary. There is no penalty if you choose not to participate. You have the right to withdraw from the study at any point without any adverse effects or penalties. Should you choose to withdraw, you can decide whether your data collected to that point can be used in the study's analysis.

### **How to Participate**

If you are interested in participating or have any questions, please contact the principal investigator, Dylan Platt, at [Dpdylanplatt5@gmail.com](mailto:Dpdylanplatt5@gmail.com). Further details and consent forms will be provided upon expression of interest.

### **Informed Consent**

All participants will be required to sign an informed consent form which details the study procedures, risks, and benefits, as well as your rights as a participant. For participants under the age of 16, parental consent will be required in addition to participant assent.

We deeply appreciate your consideration of this opportunity to contribute to a ground-breaking study in the field of sports training. Your participation is invaluable to us and to the advancement of sports science and behavioural analysis.

This research project has been approved by the Human Research Ethics Committee of the Division of Arts, Law, Psychology and Social Sciences. Any questions about the ethical conduct of this research may be sent to the Secretary of the Committee, email [alpss-ethics@waikato.ac.nz](mailto:alpss-ethics@waikato.ac.nz).

## Appendix B: Recruitment Mail

### Recruitment email

Subject: Invitation to Participate in Field Hockey Performance Enhancement Study

Kia Ora to whomever this may concern,

I hope this message finds you well. My name is Dylan Platt, and I am a masters student at the University of Waikato and I am currently doing my masters project, titled "Enhancing Athletic Performance: The Impact of Video Modelling on Forehand Hitting as a Passing Technique to Increase Accuracy." This research is supervised by Dr. Rebecca Sargisson, an expert in behavioural analysis.

We are currently seeking field hockey players to participate in an exciting study aimed at improving forehand hitting techniques through video modelling. This method has shown promising results in other sports disciplines, and we are eager to explore its benefits in field hockey.

#### **Study Overview:**

This study will involve:

An initial assessment to establish a baseline of the player's forehand hitting technique.  
A series of training sessions where the player will watch carefully selected videos demonstrating expert techniques.

Practice sessions where the player will apply what they've learned.

A final assessment to measure improvements in accuracy and technique.

**Commitment:**

The study will span approximately 10 weeks with 4 weeks to collect baseline data and 6 weeks for the intervention process, with sessions integrated into your regular training schedule. Each session is designed to be a single baseline session is expected to take approximately 5 minutes per participant and an intervention session approximately 15 minutes and will be conducted at the player's usual training venue.

#### **Benefits:**

Participants will have the unique opportunity to receive personalised feedback and training based on the effect of video modelling. While helping advance our understanding of athletic training, the player may also see substantial improvements in their own playing technique.

#### **Eligibility:**

We are looking for players who are part of the \*insert name of club/team\*. Players should be dedicated to improving their skills and able to commit to the full duration of the study.

#### **How to Participate:**

If you are interested in participating or would like more information, please reply to this email or contact me directly at 0277755515. We will then provide you with more detailed information and arrange a time to discuss the study further.

Your participation would be highly valuable to our research and could potentially be beneficial in enhancing your own skills and performance. We hope you consider joining us for this innovative study.

Thank you for considering this opportunity. I look forward to potentially working with you and exploring the powerful impact of video modelling on field hockey performance.

Ngā mihi nui,

Dylan Platt  
Principal Investigator  
University of Waikato  
No: 0277755515

## Appendix C: Email to Management

### Email to Management

Subject: Request for Collaboration: Field Hockey Performance Enhancement Study

Dear [Manager's Name or Club Management],

I hope this message finds you in good health and high spirits. I am Dylan Platt, a Masters student at the University of Waikato, working under the supervision of Dr. Rebecca Sargisson, an expert in behavioural analysis. We are conducting a pioneering study entitled "Enhancing Athletic Performance: The Impact of Video Modelling on Forehand Hitting as a Passing Technique to Increase Accuracy," aimed at advancing field hockey techniques through innovative methods.

We seek your esteemed collaboration to recruit players from [Club/Team Name] who might be eager to enhance their forehand hitting skills while contributing to valuable research. The study is designed to integrate seamlessly with regular training schedules, requiring minimal time commitment yet promising significant improvement in player performance.

Study Overview:

Initial Assessment: Baseline evaluation of players' forehand hitting techniques.

Training Sessions: Observing videos showcasing expert techniques.

Practice Sessions: Application of learned techniques.

Final Assessment: Comparison of initial and post-intervention skills to measure improvement.

Commitment:

The entire study will span approximately 10 weeks, with each session tailored to fit within normal training routines at the players' usual venues.

Participant Benefits:

Personalised feedback and advanced training insights.

Opportunity to significantly enhance personal playing technique and accuracy.

How to Collaborate:

Should you agree to support this study, we would appreciate if you could share the following call-to-participate with your members:

**Appendix D: Email to members from the Club Management****Email to members from the Club Management**

Subject: Join Our Field Hockey Performance Enhancement Study!

Dear [Club/Team Name] Members,

Enhance your field hockey skills through our upcoming study on forehand hitting techniques! Led by Dylan Platt from the University of Waikato, this research offers a unique opportunity to receive personalized training and feedback. The sessions are designed to perfectly align with your regular training schedules, ensuring a smooth integration.

Benefits:

Tailored feedback from leading experts.

Visible improvements in technique and accuracy.

Interested? Please contact Dylan at 0277755515 or reply to this email for more details and to express your interest.

Let's elevate our game together!

We believe that your support in this study could lead to substantial advancements in the skills and techniques of your players, ultimately benefiting the whole team. I am available at your earliest convenience to discuss this exciting opportunity further.

Thank you for considering this collaboration. I look forward to your positive response.

Ngā mihi nui,

Dylan Platt

Masters Student, University of Waikato

Email: [Dpdylanplatt5@gmail.com](mailto:Dpdylanplatt5@gmail.com)

Phone: 0277755515

## Appendix E: Consent Form for Guardians of Under 16-year-old Participants

# CONSENT FORM

## For Guardians of Under 16-year-old Participants

### Contact information:

Principal Investigator,  
Dylan Platt  
Email: [Dpdylanplatt5@gmail.com](mailto:Dpdylanplatt5@gmail.com)

Overseeing Supervisor,  
Dr. Rebecca Sargisson  
Email: [rebecca.sargisson@waikato.ac.nz](mailto:rebecca.sargisson@waikato.ac.nz)

Project Title: Enhancing Athletic Performance: The Impact of Video Modelling on Forehand Hitting as a Passing Technique to Increase Accuracy.

| Please complete the following checklist. Tick (✓) the appropriate box for each point.   | YES | NO |
|---|-----|----|
| 1. I have read the Information Sheet (or it has been read to me) and I understand it.   |     |    |
| 2. I am willing to consent to _____ (child's name) participation in this study  |     |    |
| 3. I have been given sufficient time to consider whether or not to allow _____ (child's name) to participate.   |     |    |
| 4. I am satisfied with the answers I have been given regarding the study and I have a copy of the information sheet and this consent form.  |     |    |
| 5. I understand that being part of the study is voluntary (my choice), that there is no penalty for choosing not to participate, and that I may withdraw consent for _____ (child's name) to participate at any time without penalty. |     |    |
| 6. I understand that I have the right to decline consent for _____ (child's name) to participate in the study.  |     |    |
| 7. I know who to contact if I have any questions about the study in general.  |     |    |
| 8. I consent to the researcher videoing my child's pass attempts.   |     |    |

|  |  |  |
|--|--|--|
| 9. I would like a copy of the final report emailed to me, my email address is _____.   |  |  |
| 10. I understand that the coaches, coaching staff, and the club will not have access to my data and will not know that I am a participant. |  |  |

Guardians name (Please print): \_\_\_\_\_

Name (Please print): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Dylan Platt  
Principal Investigator  
University of Waikato  
No: 0277755515  
Email: Dpdylanplatt5@gmail.com

## Appendix F: Consent Form for Participants

### **CONSENT FORM** **For Participants**

**Contact information:**

Principal Investigator,  
Dylan Platt  
Email: [Dpdylanplatt5@gmail.com](mailto:Dpdylanplatt5@gmail.com)

Overseeing Supervisor,  
Dr. Rebecca Sargisson  
Email: [rebecca.sargisson@waikato.ac.nz](mailto:rebecca.sargisson@waikato.ac.nz)

Project Title: Enhancing Athletic Performance: The Impact of Video Modeling on Forehand Hitting as a Passing Technique to Increase Accuracy.

| <b>Please complete the following checklist. Tick (✓) the appropriate box for each point.</b>  | <b>YES</b> | <b>NO</b> |
|---|------------|-----------|
| 1. I have read the Information Sheet (or it has been read to me) and I understand it.   |            |           |
| 2. I am willing to consent to participate in this study   |            |           |
| 3. I understand that being part of the study is voluntary (my choice), that there is no penalty for choosing not to participate, and that I may withdraw consent at any time without penalty. |            |           |
| 4. I know who to contact if I have any questions about the study in general.  |            |           |
| 5. I would like a copy of the final report emailed to me, my email address is _____.  |            |           |
| 6. I consent to the researcher videoing my pass attempts.   |            |           |
| 7. I understand that the coaches, coaching staff, and the club will not have access to my data and will not know that I am a participant.   |            |           |

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix G: Approval from Ethics Letter

*Te Wānanga o Ngā Kete* | **Division of Arts,  
Law, Psychology & Social Sciences**

The University of Waikato  
Private Bag 3105  
Hamilton 3240  
New Zealand

Te Kura Whatu Oho Mauri  
School of Psychology  
Dr Oleg Medvedev  
Tel: +64 7 837 9212  
Email: [oleg.medvedev@waikato.ac.nz](mailto:oleg.medvedev@waikato.ac.nz)  
[www.waikato.ac.nz](http://www.waikato.ac.nz)



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Dylan Platt  
[Dpdylanplatt5@gmail.com](mailto:Dpdylanplatt5@gmail.com)

Dr Rebecca Sargisson

Te Kura Oho Mauri  
School of Psychology

23 May 2024

Dear Dylan

**Re: FS2024-19: Enhancing Athletic Performance: The Impact of Video Modeling on Forehand Hitting as a Passing Technique to Increase Accuracy in Field Hockey Players**

Thank you for submitting your revised application to the ALPSS Human Research Ethics Committee. We have reviewed the final electronic version of your application and the Committee is now pleased to offer formal approval for your research activities.

We encourage you to contact the committee should issues arise during your data collection, or should you wish to add further research activities or make changes to your project as it unfolds. We wish you all the best with your research. Thank-you for engaging with the process of Ethical Review.

Kind regards,

A handwritten signature in black ink, appearing to be 'Oleg Medvedev'.

Dr Oleg Medvedev, Convenor  
*Division of Arts, Law, Psychology & Social Sciences Human Research Ethics*

## Appendix H: Standardised Checklists

### Player Information

- Player ID: \_\_\_\_\_

Accurate Pass: Ball lands within stick reach of the receiving player

Inaccurate Pass: Ball lands outside stick reach of the receiving player

### Checklist Table

Trial # Pass Outcome (✓ = Accurate, ✗ = Inaccurate) Notes (Optional)

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20

Total Accurate Passes: \_\_\_\_ / 20

