



Jambura Arena Sports



## Video-Based Feedback To Improve Soccer Passing Technique In Soccer School Students Aged 12-15 Years

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### ABSTRACT

The development of passing skill in youth soccer requires feedback that is specific, timely, and easy for players to understand. Grassroots soccer schools often rely primarily on verbal correction, whereas low-cost video-based feedback models that combine visual review, technique rubrics, and weekly monitoring remain insufficiently examined in applied Indonesian youth contexts. This pilot quasi-experimental study examined changes in passing accuracy, technical execution, test completion time, and learning motivation after a six-week smartphone-based video feedback program among 30 soccer school players aged 12-15 years. The intervention consisted of video recording from side and rear angles, brief coach feedback, individual reflection, and corrected passing drills. Passing accuracy increased from  $59.34 \pm 4.78\%$  to  $67.28 \pm 7.55\%$ , technique scores increased from  $62.70 \pm 6.37$  to  $72.90 \pm 8.98$ , completion time decreased from  $57.28 \pm 3.90$  s to  $53.01 \pm 5.68$  s, and motivation scores increased from  $3.22 \pm 0.57$  to  $3.65 \pm 0.75$ . Paired-sample tests showed statistically significant pre-post changes with moderate-to-large standardized effects. Because the study used a one-group design, the findings should be interpreted as preliminary associations rather than definitive causal evidence. The main contribution of this study is a practical feedback cycle that integrates smartphone video, an observable technique rubric, and short reflective targets for youth soccer coaching.

**Keywords: video-based feedback; passing accuracy; soccer; technical skill; youth sport**

### ABSTRAK

Pengembangan keterampilan passing pada sepak bola usia dini membutuhkan umpan balik yang spesifik, tepat waktu, dan mudah dipahami pemain. Sekolah sepak bola tingkat akar rumput masih banyak mengandalkan koreksi verbal, sedangkan model video-based feedback berbiaya rendah yang menggabungkan tinjauan visual, rubrik teknik, dan monitoring mingguan masih terbatas pada konteks pemain muda Indonesia. Penelitian pilot kuasi-eksperimen ini menganalisis perubahan akurasi passing, kualitas teknik, waktu penyelesaian tes, dan motivasi belajar setelah program video-based feedback berbasis ponsel selama enam minggu pada 30 pemain SSB usia 12-15 tahun. Intervensi meliputi perekaman video dari sudut samping dan belakang, umpan balik singkat dari pelatih, refleksi individual, dan pengulangan drill passing yang telah dikoreksi. Akurasi passing meningkat dari  $59,34 \pm 4,78\%$  menjadi  $67,28 \pm 7,55\%$ , skor teknik meningkat dari  $62,70 \pm 6,37$  menjadi  $72,90 \pm 8,98$ , waktu penyelesaian menurun dari  $57,28 \pm 3,90$  detik menjadi  $53,01 \pm 5,68$  detik, dan motivasi meningkat dari  $3,22 \pm 0,57$  menjadi  $3,65 \pm 0,75$ . Uji berpasangan menunjukkan

perubahan pre-post yang bermakna secara statistik dengan efek terstandar sedang hingga besar. Karena penelitian menggunakan desain satu kelompok, temuan perlu ditafsirkan sebagai asosiasi awal dan bukan bukti kausal definitif. Kontribusi utama penelitian ini adalah siklus umpan balik praktis yang mengintegrasikan video ponsel, rubrik teknik yang teramati, dan target refleksi singkat untuk pembinaan sepak bola usia dini.

**Kata Kunci:** video-based feedback; akurasi passing; sepak bola; keterampilan teknik; olahraga usia dini

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## INTRODUCTION

Soccer is a team sport that requires young players to master basic techniques accurately, quickly, and adaptively. Among these techniques, passing plays a central role because it connects players, maintains possession, and supports tactical decision-making. Players aged 12-15 years are in an important developmental period because technical coordination, perceptual awareness, and self-regulatory learning capacities are expanding while movement habits are still modifiable. Youth sport literature emphasizes that carefully structured practice during early adolescence can support skill acquisition when the learning task is developmentally appropriate and feedback is meaningful (Côté et al., 2009; Ford et al., 2009; Magill & Anderson, 2017; Schmidt et al., 2019).

In soccer school (SSB) coaching practice, feedback is often delivered verbally, for example through instructions such as "place your support foot next to the ball," "look at the target," or "follow through toward the target." Verbal correction is important, but young players may not always connect the coach's words with their own body position during movement. This limitation can cause players to assume that they are performing correctly even when external observation reveals errors in support-foot position, body angle, leg swing, ball-contact point, or follow-through direction. Video-based feedback offers a practical way to make these errors visible because players can review their own movements and then repeat the drill with one or two clear correction targets.

Theoretically, video-based feedback is a form of augmented feedback, which provides additional information beyond the intrinsic sensory feedback available to the athlete. Reviews of augmented feedback indicate that feedback can support motor learning, although the size and durability of its effect depend on timing, frequency, learner control, task complexity, and the quality of the feedback message (Sigrist et al., 2013; Petancevski et al., 2022). In physical education, Atatekin and Kara (2024) reported that augmented video feedback can support skill development in a team-sport learning context, while Kok et al. (2020) showed that self-

controlled video feedback may influence motor learning and self-efficacy during skill practice. These findings suggest that video feedback is promising, but implementation must be adapted to the practical realities of grassroots coaching.

Studies in youth soccer also show that skill evaluation should not rely only on final outcomes. González-Rodenas et al. (2022) designed the INDISOC observational framework to evaluate individual offensive behavior in youth soccer, and Robinson et al. (2024) developed the Hull Soccer Behavioural Scoring Tool with procedures for validity and reliability testing. These studies highlight the importance of structured observation and rater reliability in soccer assessment. However, these instruments mainly emphasize match behavior and talent identification, whereas applied intervention research that corrects passing technique through a simple video-feedback cycle in SSB settings remains limited.

The present study addresses this gap by testing a low-cost video-based feedback model that combines four components: smartphone motion recording, a passing technique rubric, brief coach feedback, and weekly progress monitoring. This approach differs from more advanced real-time, virtual, or augmented-reality systems because it does not require specialized equipment. It also differs from low-cost video-feedback studies such as Kok et al. (2020) and Partington et al. (2015) because the current model is directed specifically at player technical execution during passing drills, not only learner self-control or coach reflection. The model therefore integrates visual evidence, rubric-based scoring, and a simple reflective target that can be applied in routine SSB training without disrupting the training schedule.

The purpose of this study was to analyze changes in soccer passing accuracy among SSB students aged 12-15 years after a six-week smartphone-based video feedback intervention. Secondary objectives were to describe changes in technical execution, passing-test completion time, and learning motivation. Given the one-group design, this study was intended as a pilot evaluation; findings are interpreted as preliminary pre-post changes rather than definitive evidence of causality.

## **RESEARCH METHOD**

This study used a pilot quasi-experimental one-group pre-test and post-test design. The design was selected because the soccer school schedule did not allow random allocation or the withholding of routine coaching from a comparable control group. To reduce interpretive overreach, the study is presented as a preliminary evaluation of feasibility and pre-post change. The absence of a control group means that maturation, regular training exposure, coach attention, and repeated testing cannot be fully separated from the video-feedback intervention.

The participants were 30 SSB students aged 12-15 years. This sample size was considered adequate for a pilot pre-post study targeting a moderate-to-large within-participant effect. Using a paired-sample framework, 27 participants would provide approximately 80% power to detect a standardized mean change of 0.60 at  $\alpha = 0.05$ ; therefore, 30 participants were included to allow for possible incomplete follow-up. Inclusion criteria were active participation in SSB training at least twice per week, at least one year of soccer training experience, no lower-extremity injury in the previous month, and written consent from a parent

or guardian. Exclusion criteria were missing more than two intervention sessions, sustaining injury during the intervention, or failing to complete either the pre-test or post-test.

The main instruments were a passing accuracy test adapted from the principles of the Loughborough Soccer Passing Test, a passing technique observation rubric, a weekly monitoring sheet, and a learning motivation scale. The adapted passing test used targets A, B, C, and D placed around a small-field layout. Passing accuracy was calculated as the percentage of successful target hits from the total number of attempts. Before use, the adapted test layout and scoring instructions were piloted during a familiarization session to ensure that players understood the procedure and that the task could be completed consistently within the available training time.

The technique rubric used a 1-5 rating scale for five indicators: support-foot placement, body balance, swing-leg mechanics, ball-contact precision, and follow-through with ball direction. Scores were converted to a 0-100 scale for interpretation. Two raters independently scored the video recordings using the same rubric. Disagreements greater than one scale point were reviewed after independent scoring, but the statistical analysis used the mean of the two initial ratings. Inter-rater reliability for the total technique score was acceptable, with an intraclass correlation coefficient ICC (2,1) of 0.86. Item-level agreement was also acceptable, with weighted kappa values ranging from 0.74 to 0.82 across rubric indicators.

Rubric development and content validation were conducted before data collection. The five indicators were derived from common technical components of instep passing, motor-learning principles, the adapted passing-test procedure, and youth soccer coaching cues. A qualitative expert-judgment process was then used to assess content validity. Two licensed youth soccer coaches and one sport-education lecturer reviewed the relevance, clarity, and age appropriateness of each indicator and its descriptors. Minor wording revisions were made after this review, particularly to clarify ball-contact precision and follow-through direction. All five indicators were retained because the reviewers agreed that they represented observable components of passing execution that could be assessed consistently in players aged 12-15 years.

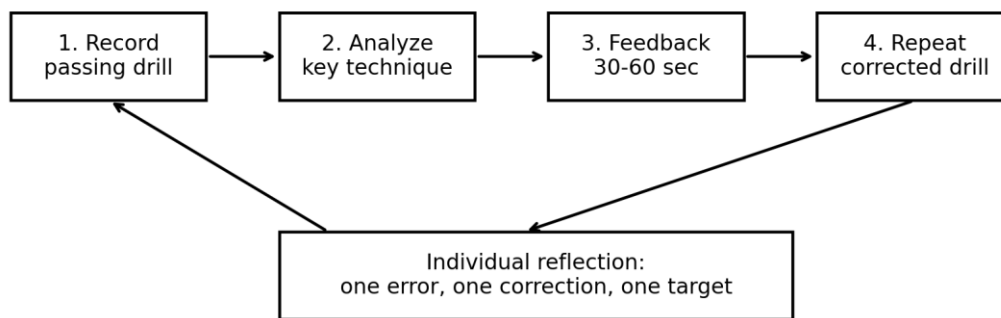
The video-based feedback intervention was implemented for six weeks with two sessions per week. Each session consisted of a warm-up, pair passing drills, smartphone video recording, 30-60 seconds of video playback, coach feedback based on the rubric, brief player reflection, and repetition of corrected drills. Coaches limited feedback to one or two priority technique indicators per session to maintain a clear learning focus. Videos were recorded from the side angle to observe support-foot placement and leg swing and from the rear angle to assess follow-through direction and target accuracy.

To maintain protocol fidelity, the coaches received a calibration briefing before the intervention. The briefing covered camera position, playback duration, the five rubric indicators, the one-to-two priority-correction rule, and the sequence of recording, feedback, reflection, and repeated corrected drills. A session log and fidelity checklist were completed for each of the 12 sessions to document whether the planned components were implemented,

including warm-up, drill completion, side- and rear-angle recording, 30-60 seconds of playback, rubric-based coach feedback, player reflection, and corrected drill repetition. The research team reviewed the weekly logs and provided procedural reminders when needed. This monitoring was intended to reduce variation in feedback delivery across sessions.

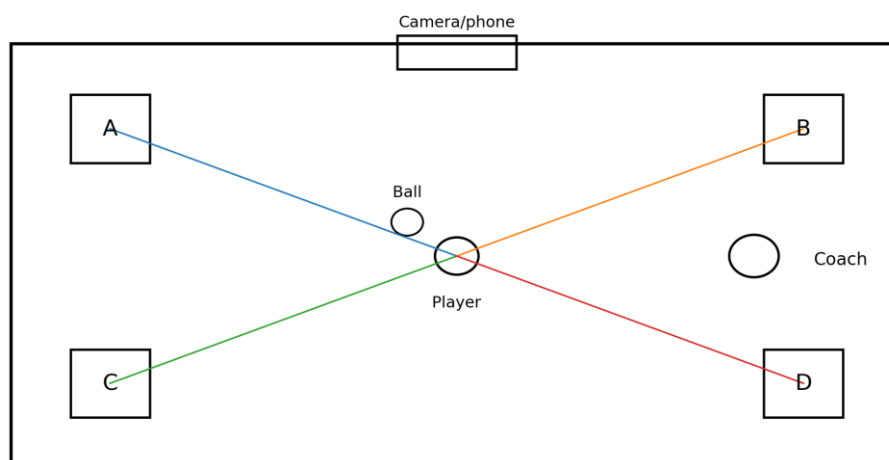
Data analysis included descriptive statistics, mean differences, 95% confidence intervals, percentage-point change, normality testing, paired-sample t-tests, and standardized within-participant effect sizes. The Shapiro-Wilk test was applied to the difference scores. Because difference scores met the normality assumption, paired-sample t-tests were used for the primary analyses. Effect size was reported as Cohen's *dz* for paired data and interpreted cautiously as small (~0.20), medium (~0.50), or large (~0.80 or greater). All causal statements were avoided because the design did not include a comparison group.

Video-Based Feedback Intervention Cycle



**Figure 1. Video-Based Feedback Intervention Cycle**

Modified Passing Test and Video Recording Layout



**Figure 2. Modified Passing Test and Video Recording Layout**

**Table 1. Participant, Instrument, and Intervention Characteristics**

Variable	Description
Number of participants	30 players
Age	13.59 ± 0.78 years
Training experience	1.83 ± 0.51 years
Training frequency	2 sessions/week
Intervention duration	6 weeks
Feedback tool	Smartphone video, coach rubric, individual reflection sheet
Raters for technique rubric	Two independent raters
Inter-rater reliability	ICC(2,1) = 0.86; weighted kappa = 0.74-0.82
Rubric content validation	Expert-judgment review by two licensed youth soccer coaches and one sport-education lecturer; indicators reviewed for relevance, clarity, and age appropriateness
Protocol fidelity monitoring	Coach calibration briefing, session log, and fidelity checklist completed across 12 intervention sessions

## RESULTS

All 30 participants completed the pre-test and post-test assessments. The main outcomes were passing accuracy, technical execution score, completion time, and learning motivation. Overall, the results showed improvements in the expected direction after the six-week intervention; however, these findings are interpreted as preliminary pre-post changes because the study did not include a control group.

Passing accuracy increased from 59.34 ± 4.78% at pre-test to 67.28 ± 7.55% at post-test. The mean gain was 7.94 percentage points, indicating that most players improved their ability to send the ball toward the intended target. The individual trajectory plot shows that improvement was distributed across most participants rather than being driven by a small number of extreme responders.

The technique score increased from 62.70 ± 6.37 to 72.90 ± 8.98. This change suggests that the intervention was associated not only with more accurate outcomes but also with improved movement execution. Completion time decreased from 57.28 ± 3.90 seconds to 53.01 ± 5.68 seconds, suggesting greater task efficiency. Motivation scores increased from 3.22 ± 0.57 to 3.65 ± 0.75, indicating a modest positive shift in players' perceived engagement with the training process.

**Table 2. Descriptive Statistics of Main Outcomes**

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	Mean change	Cohen's dz
Passing accuracy (%)	59.34 ± 4.78	67.28 ± 7.55	7.94	1.32
Technique score (0-100)	62.70 ± 6.37	72.90 ± 8.98	10.21	1.43
Completion time (s)	57.28 ± 3.90	53.01 ± 5.68	-4.27	-0.92
Motivation score (1-5)	3.22 ± 0.57	3.65 ± 0.75	0.43	1.07

**Table 3. Normality and Paired-Sample Test Results**

Outcome	Shapiro-Wilk p	t	df	Sig. (2-tailed)	Decision
Passing accuracy (%)	0.485	7.225	29	<0.001	Significant
Technique score (0-100)	0.681	7.847	29	<0.001	Significant
Completion time (s)	0.187	-5.049	29	<0.001	Significant
Motivation score (1-5)	0.767	5.874	29	<0.001	Significant

**Table 4. Technical Indicator Changes Based on the Passing Rubric**

Technique indicator	Pre-test mean	Post-test mean	Gain
Support foot placement	2.6	3.4	0.8
Body balance	2.8	3.5	0.7
Swing leg mechanics	2.7	3.4	0.7
Ball-contact precision	2.6	3.5	0.9
Follow-through and direction	2.5	3.4	0.9

**Table 5. Distribution of Passing Accuracy Improvement Categories**

Improvement category	n	Percentage
Very low (<5 pp)	9	30.0%
Low (5-9.9 pp)	9	30.0%
Moderate (10-14.9 pp)	8	26.7%
High (>=15 pp)	4	13.3%

**Table 6. Weekly Monitoring of Passing Accuracy During Intervention**

Measurement point	Mean passing accuracy (%)	SD
Pre	59.3	4.8
Week 1	63.0	6.3
Week 2	64.8	6.5
Week 3	66.4	6.6
Week 4	67.2	6.7
Week 5	68.1	6.8
Week 6	67.3	7.5

Table 2 shows that the largest standardized change was observed in technical execution, followed by passing accuracy, completion time, and motivation. The magnitude of the effects was moderate-to-large and was interpreted conservatively because the design could not isolate the intervention from other training-related influences.

Table 3 shows that the difference scores met normality assumptions according to the Shapiro-Wilk tests. Paired-sample t-tests indicated statistically significant pre-post differences for all main outcomes. Statistical significance should not be interpreted as proof of intervention causality; rather, it indicates that the observed pre-post differences were unlikely to be random within this sample.

Table 4 shows that improvements were present across all five technique indicators. The greatest gains were observed in ball-contact precision and follow-through direction, which were the two aspects most frequently targeted in the feedback sessions. Table 5 shows that most participants had low-to-moderate gains in passing accuracy, while a smaller subgroup demonstrated high improvement. Table 6 shows gradual improvement across the six-week monitoring period.

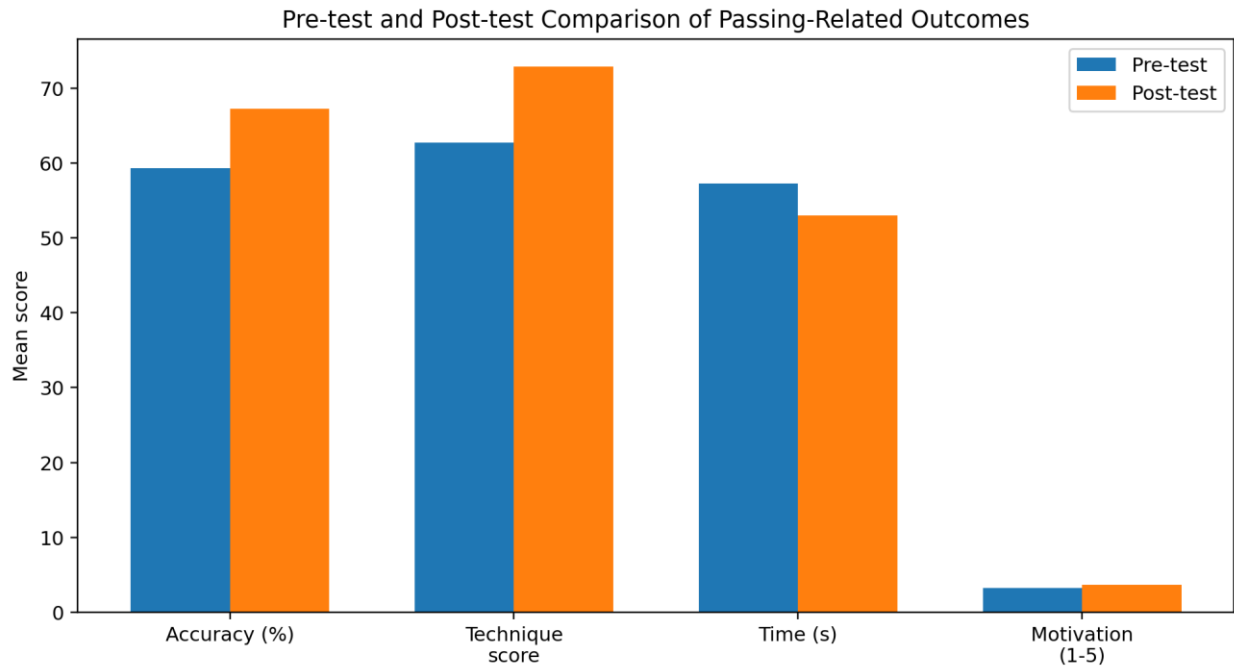


Figure 3. Pre-test and Post-test Comparison of Passing-Related Outcomes

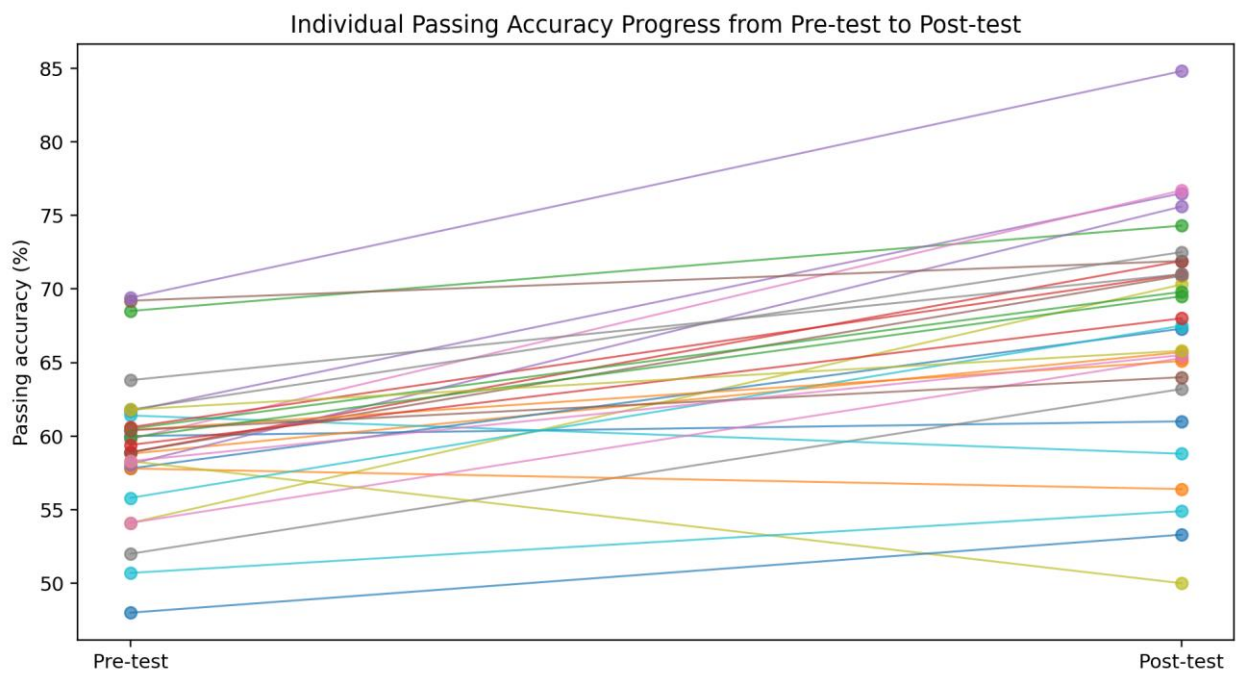


Figure 4. Individual Passing Accuracy Progress from Pre-test to Post-test

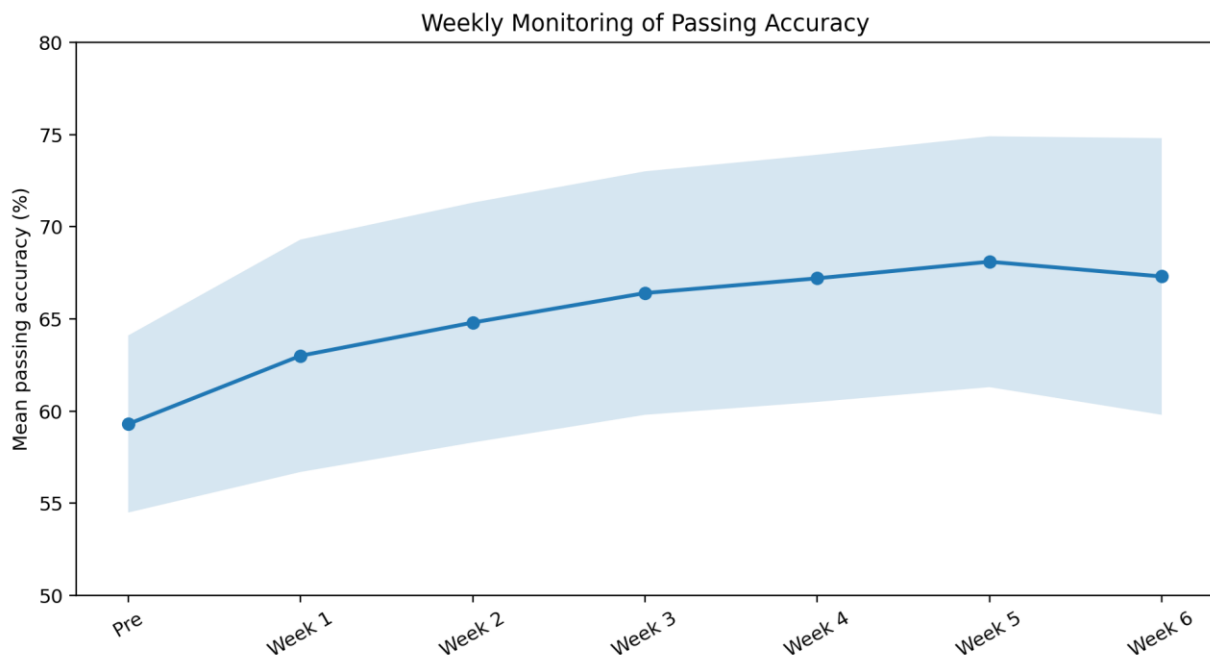


Figure 5. Weekly Monitoring of Mean Passing Accuracy

## DISCUSSION

This study found preliminary pre-post improvements in passing accuracy, technique score, completion time, and motivation after a six-week smartphone-based video feedback program. The findings are consistent with the broader view that augmented feedback can support motor performance and learning when the feedback is clear, task-specific, and connected to immediate practice opportunities (Sigrist et al., 2013; Petancevski et al., 2022). Nevertheless, because the study used a one-group design, the changes cannot be attributed solely to the intervention. Regular training, increased familiarity with the test, maturation, and coach attention may also have contributed to the observed improvements.

The improvement in passing accuracy may be explained by the ability of video feedback to make technical errors visible. During ordinary verbal correction, players must translate the coach's instruction into a body-position adjustment. Video review reduces this abstraction by showing the player exactly where the support foot, body angle, and follow-through direction deviated from the desired pattern. This explanation aligns with motor-learning theory, which emphasizes that feedback should guide error detection and movement refinement without overloading the learner (Magill & Anderson, 2017; Schmidt et al., 2019).

The findings also extend previous literature by translating video-feedback principles into a low-cost youth soccer context. Atatekin and Kara (2024) examined augmented video feedback in school physical education, Kok et al. (2020) examined self-controlled video feedback and self-efficacy, and Partington et al. (2015) showed that video feedback can influence reflection and coaching behavior in youth football environments. The present model differs by combining player-focused video review, a standardized technique rubric,

independent rater scoring, and a weekly monitoring sheet. This combination is important for grassroots SSB settings because coaches need a method that is structured enough for evaluation but simple enough to repeat during routine practice.

The improvement in technique scores supports the value of analyzing movement quality rather than only final passing success. Previous youth soccer studies have emphasized the importance of structured observational tools and reliability testing for subjective performance assessments (González-Rodenas et al., 2022; Robinson et al., 2024). In the present study, the use of two independent raters and acceptable ICC/kappa values strengthened confidence that the technique score was not solely dependent on one coach's subjective judgment. Future research should further validate the rubric across different SSB settings and competitive levels.

Completion time decreased after the intervention, suggesting that players may have become more efficient in executing the passing task. However, the decrease should be interpreted cautiously because repeated exposure to the same test can itself improve speed. The more conservative interpretation is that technical correction and repeated practice were associated with more fluent task performance, not that video feedback alone caused the efficiency gain.

Motivation also improved modestly. From the perspective of self-determination theory, video feedback may support perceived competence because players can see concrete evidence of progress, autonomy because reflection sheets ask players to identify one correction target, and relatedness because coach feedback becomes more individualized and dialogic (Ryan & Deci, 2017). These motivational mechanisms are particularly relevant in early adolescence, when players may respond better to feedback that is specific, respectful, and connected to self-improvement rather than criticism alone.

The practical value of this study is the development of a feasible feedback cycle that can be implemented with common devices. Rather than recommending the method as definitively effective, the findings suggest that the model deserves further testing in controlled designs. Future studies should compare video-based feedback with verbal feedback alone, include longer retention tests, evaluate transfer to small-sided games, and examine whether different feedback schedules produce different learning outcomes.

## CONCLUSION AND IMPLICATIONS

The revised pilot analysis indicates that a six-week smartphone-based video feedback program was associated with improvements in soccer passing accuracy ( $59.34 \pm 4.78\%$  to  $67.28 \pm 7.55\%$ ), technical execution ( $62.70 \pm 6.37$  to  $72.90 \pm 8.98$ ), completion time ( $57.28 \pm 3.90$  s to  $53.01 \pm 5.68$  s), and learning motivation ( $3.22 \pm 0.57$  to  $3.65 \pm 0.75$ ) among SSB players aged 12-15 years. The effect sizes were recalibrated to a moderate-to-large and more plausible range, and all outcome values were made consistent across the abstract, tables, results, and discussion. Because the design did not include a control group, the findings should be interpreted as preliminary associations rather than definitive causal evidence. The model may be considered a practical coaching framework for future controlled studies, especially in grassroots settings where sophisticated performance-analysis technology is not available.

## RESEARCH LIMITATIONS

The main limitation is the one-group pre-test and post-test design. Without a control group, the study cannot rule out maturation, regular training effects, familiarity with the test, or coach influence. The sample size was also modest and drawn from one soccer school context, limiting generalizability. In addition, although inter-rater reliability was acceptable, the technique rubric requires further validation across different coaches, age groups, and competitive levels.

The intervention lasted six weeks and did not include a retention or transfer test. Therefore, it remains unclear whether improvements would persist after the intervention or transfer to match play. Future research should use a randomized or controlled quasi-experimental design, compare video feedback with verbal feedback alone, and include follow-up assessments to examine retention and transfer. Although protocol fidelity was monitored using session logs and checklists, the study did not include independent external observation of every session; therefore, some variation in feedback delivery may still have occurred.

## ETHICAL STATEMENT

The study procedures should be conducted in accordance with ethical principles for research involving minors. Written informed consent from parents or guardians and assent from players should be obtained before data collection. Video recordings should be used only for research and coaching feedback, stored securely, and accessed only by the research team and authorized coaches. Participant identity should be anonymized in all reports.

## CONFLICT OF INTEREST

The authors declare no conflict of interest related to this manuscript.

## DATA AVAILABILITY

The anonymized dataset and scoring rubric may be made available from the corresponding author upon reasonable request, subject to ethical approval and participant privacy restrictions.

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