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Review Article

Smartphone Video Capture as a Feedback Channel in Higher Education: A Dual-Loop Model of Feedback Uptake

Ai Jingming[1]*
[1]School of Liberal Education, Liaoning University of International Business and Economics, China

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Abstract: Consumer-grade video capture has made detailed performance evidence cheap and abundant in higher education settings, but the availability of evidence is not the same as its use. The open question is not whether video can support learning in principle, since controlled studies report gains from self-regulated video feedback, but how learners interpret recorded evidence, select a next action and reduce dependence on instructor prompts. This paper proposes a dual-loop model for mixed-ability university classes. The first loop, Capture–Compare–Commit–Check, structures the immediate performance problem as an information cycle: record the event, compare it against an intended referent, commit to a single change, and verify the result. The second loop tracks the development of feedback literacy across lessons through judgment accuracy, action specificity and independent rechecking. The model draws on higher-education feedback theory, self-regulated learning, motor-learning research and domain-specific evidence. It supplies a low-equipment lesson routine, an eight-week integration schedule, a fidelity log, a draft uptake rubric, privacy safeguards and a matched-condition study design that separates the contribution of video from the quality of instructional dialogue. The contribution is the integration of feedback-use assessment into performance assessment, not a claim that smartphone recording is a novel technology. No recordings, survey data or intervention results are reported; the model is intended for piloting and validation before conclusions about effectiveness or fairness are drawn.

Keywords: Technology-Enhanced Learning, Video Capture, Feedback Uptake, Feedback Literacy, Digital Feedback, Self-Regulated Learning.

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1. INTRODUCTION

Tennis teachers have always leaned on observation, demonstration, and verbal feedback. The smartphone camera adds something else: a way to revisit events the learner cannot see while hitting. A student may believe recovery started the moment the ball left the racket, then find on replay that they watched their own shot's flight before moving. Another may blame a missed forehand on the racket face when the more informative event was arriving late to the bounce. Used carefully, video makes the gap between intention and observable action available for discussion.

A camera, though, is not a pedagogical model. A learner who watches unannotated footage on loop may gain little direction. Slow-motion attention to every joint can overload conscious control. The broader feedback and motor-learning literature makes the point clearly: learning depends on the content, timing, interpretation, and use of information—not its mere availability (Hattie & Timperley, 2007; Sigrist., 2013). Universities also have to face uneven device ownership, consent, storage, and the time teachers can spend reviewing recordings.

This article proposes a dual-loop feedback framework that connects short, purposeful video or live observation with a second, longer cycle of getting better at interpreting and acting on feedback. Its aims are to specify evidence quality and uptake, offer a manageable classroom routine, separate performance improvement from feedback literacy, and identify tests that can isolate the added value of video from high-quality coaching dialogue. It is a conceptual synthesis, not an intervention report.

Any credible account of digital feedback in tennis has to acknowledge prior tennis-specific

***Corresponding Author:** Ai Jingming
School of Liberal Education, Liaoning University of International Business and Economics, China

experiments. Van der Meer., (2024) studied 23 intermediately skilled players practicing serve-and-volley over three sessions. Compared with a yoked video-feedback schedule, learner-controlled requests were associated with larger changes in a tactical tennis score at posttest and one-week retention. The authors noted the need to compare self-controlled schedules with genuine coach-controlled feedback in future work. These results cannot be generalized carelessly to all university novices, every stroke, or large mixed-ability classes. But they also rule out treating learner-controlled video feedback as an unexplored novelty.

The contribution proposed here concerns two connected but distinct outcomes. The performance loop asks whether a chosen tennis action changes in a functional way. The learning-to-use-feedback loop asks whether the student becomes able to identify valid evidence, reject weak inference, choose a feasible response, and revisit that response once feedback is withdrawn. Carless and Boud (2018) and Boud and Molloy (2013) position learners as active interpreters and users of feedback. Nicol and Macfarlane-Dick (2006) connect that activity to self-regulation. The dual-loop combination is an instructional synthesis and a testable measurement strategy, not a result demonstrated by the cited tennis trial.

This is a narrative conceptual analysis informed by targeted searches of peer-reviewed bibliographic and publisher sources, including directly relevant tennis experiments, through October 2026. It is not a systematic review or a registered intervention. Evidence from workplace and professional video training (Fukkink., 2011) is treated as indirectly relevant, not as proof that a phone-based tennis lesson will improve stroke learning. The examples, checklists, and rubrics are explicitly proposed instruments, not validated outcomes from participating students.

2. A Pedagogical Rationale for Feedback That Students Can Use

2.1. Feedback is a Process, Not a Delivered Verdict

Hattie and Timperley (2007) distinguished questions about learning goals, current progress, and next steps. Nicol and Macfarlane-Dick (2006) positioned formative feedback as part of a student's growing ability to regulate their own learning. Applied to tennis, the instructor should avoid replacing the learning question with a stream of comments about joint positions. A useful feedback event names the target task, the evidence of present performance, and a manageable next action.

Think of a student learning to place a second serve. "Your technique is wrong" has no criterion, no observable evidence, and no action. A stronger exchange starts with "Our goal is a safe serve to the backhand-side target," looks at where five attempted serves landed, then settles on a single adjustment the learner can rehearse and test. Add a short video showing contact and the ball flight that followed, and the feedback becomes a hypothesis about performance rather than a judgment of the student as a person.

Carless and Boud (2018) described student feedback literacy as the capacity to appreciate feedback, make judgments, manage affect, and take action. Those ideas apply directly to sport classes, where visible errors, public comparison, and peer evaluation can threaten confidence. A teacher can model describing an event without assigning blame: "The ball landed short in three of four rallies" is observable; "You are not committed" is an unsupported inference. The conversation should end in a testable decision, not in praise or criticism.

2.2. Self-Regulation and the Value of Comparison over Time

Self-regulated learning refers to cycles of planning, monitoring, and evaluating one's own actions (Zimmerman, 2002). Panadero (2017) reviewed several models and stressed the interaction of cognitive, motivational, and emotional dimensions. For tennis, a suitably small goal, an observation of performance, and a decision about the next practice can form an accessible self-regulatory cycle. Students do not need to become biomechanics analysts. They need to learn to notice a limitation, choose evidence, and judge whether a change was functional.

Video is especially useful when the recorded event can be compared with an observable standard—the player's position when the opponent hits, the height and depth of ball flight, or the presence of balanced recovery steps after contact. The criterion should tie to the lesson goal and stay interpretable without advanced software. A large library of slow-motion angles is unnecessary if one stable camera position can answer the instructional question.

2.3. Motor-Learning Research Requires Restraint in Visual Feedback

Sigrist., (2013) reviewed visual, auditory, haptic, and multimodal augmented feedback, noting the promise of technology as well as the importance of task and feedback-design choices. Their review is not evidence that more video always yields better tennis learning. Fukkink., (2011) meta-analyzed professional interaction skills across contact professions. It establishes broader educational interest in video feedback but cannot be read as a tennis intervention trial. The precise benefits, costs, and optimal frequency of video in mixed-ability university tennis remain open empirical questions.

Instructional attention is another reason for selectivity. Wulf (2013) reviewed evidence favoring external attentional focus for many motor tasks. A student watching forehand video may therefore gain more from examining ball placement, the racket-ball relationship, and recovery outcome than from tracking

many internal body positions at once. There are times when an internal cue is necessary—a safety-related or persistent coordination problem. But the teacher should tie technical observations to an outcome and avoid encouraging permanent self-surveillance of the stroke.

3. A Dual-Loop Feedback Model: Performance and Feedback Literacy

The four-stage model is designed for ordinary lessons with limited staff and no specialist motion-capture system. A feedback cycle can run in roughly five to ten minutes at a practice station, with students rotating roles. Those timings are practical suggestions, not evidence-based minimum or maximum exposures.

3.1. Capture: Record a Relevant Event

Capture begins with one question—for example, "Do I recover before my partner contacts the next ball?" Students record three to five rallies from a stable lateral or rear-oblique position that shows both contact and recovery space. They should avoid filming unrelated students and check that the recording spot is safe and out of play. If a task depends mainly on tactical decisions, the frame must show the opponent and the relevant court. A close-up of a single limb would not preserve the needed evidence.

One device per small group is usually enough, but participation cannot depend on owning a smartphone. A teacher-controlled device, a shared institutional tablet, live peer observation, or a non-recorded demonstration can all serve as alternatives. Recording should be optional when an equivalent educational pathway is available, subject to institutional requirements.

3.2. Compare: Describe a Small Amount of Evidence

At the comparison stage, the student first states the intended result, then the observer describes one or two visible features. A clip gets reviewed at normal speed before slow motion. For a forehand depth task, the most relevant evidence may be bounce position and recovery time—not every aspect of the backswing. For a serve-placement task, serve legality and target outcome can be checked against a short, task-specific checklist.

The instructor may supply an expert exemplar, but comparison should rest on functional principles, not on the assumption that an elite player's movement is the ideal shape for every body and capacity. Student models of success under appropriately scaled conditions may be more achievable and more relevant. The group should separate description from explanation: "Contact occurred behind the front hip" is a description; "this caused every error" is a causal claim needing more evidence.

3.3. Commit: Select One Change That Can Be Tested

After comparison, the learner chooses a single adjustment tied to the criterion—target selection, an earlier preparation cue, a better recovery location, or a change in task difficulty. A written or spoken "if-then" plan makes the next attempt concrete: "If my partner sends a deep crosscourt ball, I will use a higher reply and move back toward a balanced recovery position."

Peer feedback is valuable only when peers know what to observe and how to communicate respectfully. Early on, partners should use teacher-provided examples of accurate description and requests for clarification. The teacher keeps responsibility for correcting unsafe or systematically misleading advice. Students should be encouraged to disagree constructively with a peer's interpretation and propose a more relevant test.

3.4. Check: Test the Decision and Revisit it later

The checking stage needs a fresh performance sample after the learner tries the chosen adjustment. Immediate improvement is useful but not enough. A learner may improve because the next five balls are predictable, because the camera is present, or because a peer simplified the task. A later check should occur without continuous prompting and, where feasible, against a different feed, opponent, or scoring rule. This split between practice performance and more durable learning is especially salient in tennis coaching (Reid ., 2007).

The loop closes only when the student interprets the second sample: Was the intended function achieved? Under which conditions? What remains uncertain? If the adjustment did not help, the feedback process should not automatically blame the student. The original diagnosis, task constraint, or cue may have been unsuitable. Productive self-regulation includes revising the question.

Table 1: Operational steps in the four-stage video-feedback cycle

Stage	Learner prompt	Teacher/peer action	Output
Capture	What performance question am I recording?	Frame task-relevant action; obtain consent	Short, relevant evidence sample
Compare	What can I see, and what is inference?	Use one or two agreed criteria	Evidence statement
Commit	What single adjustment will I test?	Help formulate an actionable cue	Specific if-then plan
Check	Does the adjustment work beyond one repetition?	Re-sample; vary a constraint; schedule delayed look	Decision to retain, revise, or abandon

3.5. The Second Loop: Developing Accurate Feedback Judgment

The Capture–Compare–Commit–Check sequence is Loop A, a short episode in which a tennis problem is diagnosed and retested. Loop B operates across several lessons. In its first stage, a teacher models the difference between observable description and causal speculation. In the second, students identify a relevant clip and explain which evidence is sufficient and which remains unknown. In the third, they independently request or decline feedback and formulate a limited action. In the fourth, they revisit an earlier claim after a delayed attempt or a changed partner. The long-loop outcome is improved feedback judgment, not simply more frequent filming.

Because students may ask for video mainly after mistakes, raw clip frequency is not a defensible feedback-literacy score. One learner could request many clips and still make no valid distinction between intention, evidence, and action. Another could request one well-timed clip, pick a useful adjustment, and independently test it later. A record of judgments and follow-up decisions is more informative than camera usage. The proposal also does not assume every learner should have unrestricted control of feedback timing. Teacher-controlled and jointly negotiated schedules remain meaningful comparators.

Feedback discussions should include a deliberate chance to reject an unsupported explanation. If a peer claims the wrist caused every missed serve, the learner can ask whether the camera angle, multiple attempts, and ball outcomes are enough to support that inference. The teacher models a conservative response: name what is visible, name what remains unclear, and decide which evidence would distinguish between explanations. That protects the social process from turning into a contest to offer confident-sounding mechanical diagnoses.

Table 2: Proposed dual-loop evidence: tennis learning and feedback literacy are not the same construct

Level	What is observed	Illustrative evidence	Interpretation limit
Loop A: task performance	Outcome of the targeted stroke or tactical function	Serve target, deep rally, recovery timing	Immediate gain is not retention
Loop A: changed condition	Performance under another feed, partner, or delay	Same purpose without continuous prompting	Difficulty may differ across contexts
Loop B: evidence judgment	Separating what is seen from inferred causes	One accurate description; uncertainty recorded	Agreement requires independently trained coding
Loop B: action and review	Reasoned adjustment followed by reassessment	If-then plan and delayed reflection	Strong reflection does not guarantee stroke gain

3.6. Worked Example: Feedback Uptake after a Missed Return

A hypothetical student watches a return-of-serve clip and concludes, "My racket swing is too small." The partner can see that the student was still adjusting court position as the ball approached, but the camera cannot establish the causal role of swing size. In Loop A the student tests an earlier ready position across several varied serves and then revisits return placement. In Loop B the teacher records whether the student moved from a broad unsupported explanation to a limited evidence statement and a testable decision. The example does not claim the change will improve every return. It shows why judging the evidence is an assessable learning behavior independent of hitting success.

4. Application to Forehand, Serve, and Point Play

For the forehand, the main teaching problem may be controlling depth in an exchange. Video should include the player's movement to the ball, the contact zone, and the ball trajectory where visible. A student might notice that hitting flatter to gain depth repeatedly shortens the rally. The actionable next step could be aiming for greater clearance with a larger target zone. Here, observing the task outcome is likely more instructive than counting degrees of shoulder rotation from an unreliable camera angle.

For a serve, the teacher can focus on a small set of outcomes: a legal and repeatable start, direction to an attainable target, and recovery readiness. Videos recorded from behind should avoid trip hazards or blocking adjacent players. Side-view footage can help spot a gross sequencing issue when it clearly affects the serve's function. Smartphone recordings should not be used to estimate precise joint angles or diagnose medical conditions without validated methods and expertise.

For point play, video can connect tactics with movement. A wide-camera observation may ask whether the player chose a safe defensive option when displaced, returned to an appropriate position, and prepared for the opponent's next action. Some events will be unobservable because of framing or obstruction. Students should record uncertainty explicitly instead of filling gaps with confident judgments.

Table 3: Example criterion-based peer observation prompts

Tennis task	Primary criterion	Evidence to record	Student's next-step prompt
Rally depth	Keep playable balls beyond the service line	Count of deep, in-court contacts	Which trajectory produced more depth?
Serve placement	Start a legal point toward chosen zone	Landing zone across a short sample	Which cue helped target control?
Recovery after wide ball	Prepare for the opponent's next contact	Position and readiness at opponent contact	What could create more recovery time?
Attack selection	Choose an attack only when opportunity is credible	Ball depth, player balance, chosen target	When was a safer option preferable?

5. An Eight-Week Integration Plan

The framework can be embedded in an existing semester without making video the center of every class. In weeks one and two, the teacher models descriptive observation and obtains appropriate recording permissions. In weeks three and four, pairs use brief clips to compare a single agreed stroke outcome against a criterion. In weeks five and six, learners choose more of their own feedback questions and practice explaining decisions. In weeks seven and eight, reduced prompts and changed practice conditions test whether students can run the process with growing independence.

Table 4: An illustrative implementation and evaluation schedule

Weeks	Main learning activity	Teacher safeguard	Evidence collected
1–2	Model observation; compare video with live notes	Consent, camera position, respectful language	Baseline observation and student understanding
3–4	Apply guided Capture–Compare–Commit–Check	Limit to one criterion and one adjustment	Goal, clip observation, next-step record
5–6	Student-selected goal and peer dialogue	Spot-check feedback quality and technical safety	Feedback uptake and task-function measures
7–8	Reduced prompting; delayed or transfer checks	Preserve alternative non-video pathway	Retention, transfer, self-regulation reflection

The proposed routine keeps instructor workload down by having the teacher monitor processes instead of reviewing every clip. A small number of teacher-audited examples can anchor peer judgments. In large classes, clips can be selected in advance for discussion rather than auto-uploaded for individual grading. Students should never be encouraged to post classmates' movements to social media as part of coursework.

5.1. Implementation Fidelity and Unequal Access

The routine is hard to interpret unless teachers record whether its essential elements actually happened. A weekly fidelity log can note whether the learner defined a tennis question before filming, whether the clip showed relevant play, whether one criterion was used, whether the learner chose an action, and whether a later check occurred. The log should also record use of the no-video pathway and any abandonment due to consent, equipment failure, or time. Fidelity is not rigid uniformity. Equivalent live-observation tasks should be documented, not coded as noncompliance.

In a class where one device serves several pairs, the teacher can allocate one recording opportunity per pair and let learners choose when to use it. The same teaching question must remain available through live partner observation. A participant who declines filming should not receive a lower grade for exercising a legitimate privacy preference. These design choices can also be studied as implementation outcomes: how much supervision is needed, what share of learners complete a delayed feedback cycle, and whether patterns differ by baseline skill or digital familiarity.

6. Assessment and Ethical Data Stewardship

A course can assess two related but distinct things: improvement in tennis performance, and the student's capacity to work productively with feedback. A student who makes an insightful, evidence-based adjustment but shows only modest short-term accuracy gains may still demonstrate valuable learning behavior. An experienced player may already perform well yet show little willingness to evaluate or adapt. A balanced rubric should not confuse initial talent with progress in self-regulation.

Possible indicators include clarity of the performance goal, accuracy of observable description, feasibility of the selected action, evidence of a subsequent test, and the ability to judge transfer to new conditions. Tennis outcomes should be measured separately through appropriate standardized and game-based tasks. These scores are not interchangeable, and the proposed feedback-literacy rubric has not been validated for university tennis. In a study, coders should be trained and interrater agreement reported.

Video introduces identifiable personal information. Teachers should obtain informed permission consistent with institutional policy, define

who may record and view clips, prohibit unauthorized sharing, clarify retention and deletion arrangements, and provide an equivalent non-recorded option where feasible. Recording should be limited to what the instructional question requires. Students must be able to ask that recording stop without being humiliated or unfairly graded. Local policy and disability accommodation requirements may impose further protections.

Technology also creates inequalities that should be addressed early. Some students have older devices, limited storage, unreliable data, or strong concerns about being filmed. Offline viewing on a shared device and paper observation sheets can preserve the educational function. Instructors should also make clear that no commercial app or automated score is required. Algorithmic predictions about technique can look authoritative without being valid or fair for diverse bodies.

7. Evaluation Design and Falsifiable Research Questions

The key comparison is not video versus no teaching. Hypothesis H1 is that, with coaching dialogue and practice time matched, the video pathway may improve delayed tennis performance on tasks where replay reveals otherwise inaccessible information. Hypothesis H2 is that explicit practice in judging evidence and testing an action may improve independently rated feedback literacy even when video itself adds no stroke-performance advantage. A third, equally important possibility is that recording increases pressure or workload for some learners. These are prospective hypotheses; this article contains no measurements of their outcomes.

A future study could compare video-supported feedback cycles against a matched condition using live criterion-based peer feedback. That contrast is more informative than comparing a rich new teaching package with an unsupported no-feedback control. Both conditions should receive comparable instruction time, and researchers should record the frequency, specificity, and uptake of feedback. Baseline technical proficiency, digital familiarity, attendance, and instructor effects should be considered.

A primary outcome could be delayed performance on a pre-specified, representative tennis task. Secondary outcomes might include transfer to altered feeds or opponents, the quality of students' feedback explanations, their confidence in self-directed practice, and discomfort with recording. A qualitative component could examine when video clarified a problem, when it distracted from the game, and when peer interpretations proved useful or misleading. The study should document permissions and data procedures as carefully as task protocols.

The real question is not whether students enjoy watching their strokes, but whether structured reflection changes how they perceive, decide, act, and keep learning once the video is gone. That distinction keeps educators from treating technology adoption as an educational outcome in itself.

7.1. A Matched-Comparison Study Able to Test Added Value

A strong first test would compare structured video-plus-dialogue with structured live observation-plus-dialogue—not with a low-support control receiving almost no explanation. Both arms should receive comparable practice time, task goals, partner rotations, and teacher contact. Learners could be allocated by class section where individual randomization would create contamination; the assignment mechanism and the number of independent classes should be disclosed. Pre-specified primary outcomes might include delayed performance on a representative return or rally task and, separately, independently coded feedback-judgment quality.

Secondary outcomes should address variation with a new partner, the proportion of students who complete the delayed check, perceptions of filming, instructor workload, and missing data. Video raters evaluating tennis performance should be masked to teaching arm where feasible; feedback-literacy raters should receive anonymized action records rather than knowing who chose video. The analysis must not merge gains in reflection and gains in stroke accuracy into one opaque index. Soderstrom and Bjork (2015) caution that immediate improvement can diverge from retention, so a later probe is indispensable.

Table 5: Prospective comparison logic; outcomes below are hypotheses, not findings

Study question	Video + structured dialogue	Live observation + structured dialogue	What would count as disconfirmation
Does video add to tennis learning?	Same task and teacher attention plus short replay	Same task and attention without recording	No delayed/transfer advantage despite sufficient fidelity
Does video improve judgment?	Evidence statement using replay	Evidence statement using live notes	No independent improvement in rating accuracy
Is the approach equitable?	Opt-in recording and alternative pathway	Non-recorded default	Greater exclusion, burden, or attrition in one pathway
Is implementation feasible?	Time and completion tracked	Time and completion tracked	Feedback cycles frequently unfinished

The theoretical expectation is conditional: replay should help chiefly when the clip provides information not already available through peer observation and when the learner can act on it. If a well-structured non-video discussion is equally effective, that is an informative result, not a failure of educational technology. The design must also permit negative findings on anxiety, privacy, workload, or overattention to body mechanics.

8. CONCLUSION

Video can support university tennis learning when it creates a disciplined conversation between an observable task goal, evidence of performance, and an actionable next step. The Capture–Compare–Commit–Check model combines recording with feedback literacy and self-regulation instead of assuming the camera supplies instruction. It also acknowledges the limits of visual evidence, the importance of transfer checks, and the practical duties attached to filming students. Evaluation of this framework should prioritize durable tennis function, responsible feedback use, equity of access, and learner independence.

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