

Research Article:

The Effect of Vocational Technical Module F-WBL4C on Trainers in Malaysia

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ABSTRACT

The study evaluated the Football Work-Based Learning for the Community (F-WBL4C) module for enhancing community football coaches' technical competencies. The module comprises five progressive levels (ball mastery; passing/receiving; 1v1 and running with the ball; speed/agility; finishing) and was delivered in a blended format (Google Classroom/Meet plus face-to-face workshop). Using a pilot, single-group repeated-measures design, 20 coaches from Penang (academies and secondary schools) completed three assessments: pre-test, post-test, and extended post-test, each requiring 17 video artefacts scored on a five-point rubric. Repeated-Measures ANOVA indicated significant improvements across time, with mean scores increasing from pre- to post- and further at the extended post-test, suggesting that structured, blended WBL may support measurable gains in coaching technique. However, findings are preliminary: the small convenience sample (N = 20), single-site Penang context, non-randomised single-group design, short (three-week) follow-up, and absence of formal inter-rater reliability and content-validation procedures limit generalisability and causal inference. Within these constraints, the results indicate the feasibility and promise of artefact-based, blended work-based learning for grassroots coach development, and motivate larger, multi-site-controlled trials with longer follow-up, expert content validation, assessor reliability checks, and fidelity monitoring to establish effectiveness and scalability within TVET-aligned sports education.

Keywords: Football Work-Based Learning, community coaching, technical competencies, blended learning, TVET

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INTRODUCTION

Work-Based Learning (WBL) links classroom knowledge to authentic practice by situating learning in real work settings under guided supervision (Stephen & Festus, 2022). In football, WBL can close the persistent gap between decontextualised theory and the demands of real match situations, where coaches must design practices that transfer to decision-rich play (Redgate et al., 2022; Hodges & Lohse, 2022). Digital delivery further expands access to coaching development by enabling structured content, feedback, and artefact submission at scale while retaining practice-based assessment (Chen et al., 2017).

Despite national attention to Technical and Vocational Education and Training (TVET) principles, community-level football coaching in Penang remains weakly served by structured, evidence-based modules (Abdul Rahman et al., 2019). Much existing coach education is formal and centralised, optimised for certification pathways, and elite contexts rather than grassroots realities (Dempsey et al., 2021). As a result, community coaches—often balancing school and academy roles—face fragmented materials, minimal competency benchmarking, and limited support to translate drills into measurable technical improvements among their trainees.

This study introduces and evaluates Football Work-Based Learning for the Community (F-WBL4C), a five-level module that sequences ball mastery, passing/receiving, 1v1 and running with the ball, speed/agility, and finishing. It is delivered blended via Google Classroom/Meet plus face-to-face workshops and requires coaches to submit 17 technique videos at multiple time points for competency scoring. The module with 20 Penang community coaches (academies and secondary schools) are tested, using a repeated-measures design (pre-test, post-test, extended post-test) to determine whether structured, blended, WBL can measurably raise coaches' technical coaching competencies.

Although WBL has been widely promoted in TVET, community-level football coaching in Penang remains under-researched and underserved by structured, validated modules. Existing coach education tends to be:

1. Centralised and certification-oriented, often prioritising elite player development over grassroots contexts.
2. Fragmented in delivery, with limited use of blended approaches that integrate digital platforms and hands-on practice.
3. Weak in evaluation design, offering few competency-based assessments that track sustained improvement over time.

Consequently, community coaches, particularly those in schools and local academies, lack practical, evidence-driven guidance to improve technical football training. This persistent gap highlights the need for a context-specific, blended, and competency-focused module that addresses both the structural weaknesses of prior WBL initiatives and the local realities of Penang's grassroots coaching environment.

To address this gap, the present study introduces and evaluates the F-WBL4C module, designed to sequence five progressive levels of football skills and delivered in a blended format using both Google Classroom/Meet and face-to-face training. The study specifically seeks to determine whether structured, blended WBL can lead to measurable improvements in coaches' technical competencies when assessed through repeated measures (pre-test, post-test, and extended post-test).

LITERATURE REVIEW

WBL has been widely recognised in vocational and technical education as a strategy to bridge the gap between theoretical instruction and workplace practice (Stephen & Festus, 2022). However, many existing studies in TVET and coach education remain largely descriptive, focusing on programme design and delivery rather than empirically validated outcomes. For instance, prior WBL initiatives often highlight employability or curriculum alignment but rarely measure tangible skill improvements through systematic evaluation. In sports education, coach development programmes are frequently formal, centralised, and oriented toward elite certification pathways, which limits their transferability to grassroots contexts (Dempsey et al., 2021). This lack of critical empirical validation leaves an evidence gap on how WBL can sustainably enhance the technical competencies of community-level coaches.

The shortcomings of previous WBL approaches are particularly evident in community football coaching. While modules exist in formal training structures, they often rely on standardised curricula that are not adapted to the realities of school- or academy-based coaches, who must balance resource constraints, varying player ability levels, and inconsistent access to training infrastructure (Md Baharuddin et al., 2023). Moreover, earlier sports WBL programmes have tended to emphasise one-off workshops or theoretical instruction without incorporating authentic artefacts of practice that could capture real competency growth. This narrow focus weakens their ability to provide sustained evidence of coach development, especially when measured beyond immediate post-training assessments Lee (2025). Hence, there remains a pressing need for a structured, blended, and context-sensitive WBL module that not only guides coaches through progressive skill levels but also generates verifiable evidence of improvement.

To strengthen the theoretical justification of such a module, this study draws on Kolb's Experiential Learning Cycle (Kolb, 2015), which explains learning as a cyclical process

of concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Applied to football pedagogy, this framework aligns with contemporary sports coaching research that emphasises representative learning design and challenge-based practice (Hodges & Lohse, 2022). The F-WBL4C module operationalises this cycle by providing coaches with on-field skill drills (concrete experience), video-based review and feedback via Google Classroom (reflective observation), integration of insights into practice plans (abstract conceptualisation), and re-implementation of revised training sessions (active experimentation). By explicitly embedding experiential learning into a blended WBL design, this study addresses both the theoretical call for context-driven pedagogy and the empirical gap in validated, longitudinal assessment of community coaches' technical skill development.

Guided by constructivist theory and Kolb's experiential learning cycle, this study conceptualises the F-WBL4C module as an intervention that triggers measurable changes in coaches' technical competencies through blended, challenge-based practice. The causal logic underpinning this framework positions the F-WBL4C module as the independent variable, coaches' technical skill performance as the dependent variable, and repeated assessment cycles as the mechanism linking intervention to outcomes. This relationship is illustrated in Figure 1.

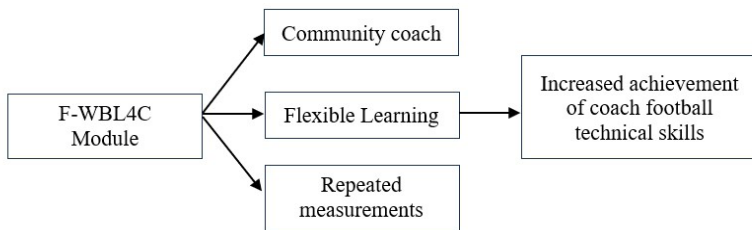


Figure 1. Cause and effect model (Causal) Module F-WBL4C on the achievement of coach football technical skills

METHODOLOGY

Design and Participants

This study employed a single-group, repeated-measures, quasi-experimental design with three time points (pre-test, post-test, extended post-test). Participants were 20 community football coaches in Penang drawn by convenience sampling: 10 from local football academies and 10 from secondary schools. No control/comparison group was

used; this is a pilot evaluation intended to generate preliminary evidence of change and feasibility in a real-world setting.

Sample size ($N = 20$) is small for detecting modest effects, but this study was designed as a pilot, single-group repeated-measures evaluation to establish feasibility and estimate preliminary effects. Pilot studies commonly use small samples for parameter estimation and process testing, with ≈ 10 – 40 participants often adequate and 10 per group a widely cited rule-of-thumb (Julious, 2005; Hertzog, 2008; Chua, 2021). Given the within-subjects design, which reduces error by controlling between-person variance and thus increases statistical power with fewer participants an $N = 20$ was deemed appropriate to detect medium-to-large within-coach changes and to inform a larger, controlled study (Charness et al., 2012; Guo et al., 2013; Sullivan, 2008). Effect sizes and 95% CIs alongside p -values and explicitly acknowledge limited power for small effects was reported.

Intervention (F-WBL4C) and Delivery

The intervention was the F-WBL4C module delivered in a blended format over three weeks: Guided virtual activities via Google Classroom/Meet and a face-to-face practical workshop. The module sequences five progressive skill levels (ball mastery; passing/receiving; 1v1 and running with the ball; speed and agility; finishing) and requires coaches to produce standardised artefacts of practice.

Procedures and Assessment Artefacts

1. Week 1 (Pre-test; virtual): Coaches received orientation, registered on Google Classroom, and uploaded 17 short videos demonstrating level-specific techniques (see Appendix A for level summaries and technique codes).
2. Week 2 (Post-test; face-to-face): Coaches attended a structured practical workshop covering levels 1–5; a formative post-test was conducted at session end.
3. Week 3 (Extended post-test; virtual): Coaches re-uploaded the same set of 17 techniques following on-field implementation and reflection, providing a measure of short-term durability/sustainment.

Outcome Measure and Scoring

Each of the 17 technique videos was scored on a 5-point anchored rubric (1 = Weak, 2 = Less satisfactory, 3 = Moderate, 4 = Good, 5 = Excellent) focusing on execution accuracy, consistency, and task appropriateness across levels. Prior to formal scoring, assessors completed a calibration briefing using exemplary clips and anchor descriptors

to improve scoring consistency (Given the pilot nature, formal inter-rater reliability estimates were not computed; this is noted as a limitation and a priority for subsequent studies).

Statistical Analysis

Primary analysis used repeated-measures ANOVA with time (3 levels: pre, post, extended post) as the within-subjects factor. Mauchly’s test of sphericity was conducted; Greenhouse–Geisser corrections were applied as needed. Partial η^2 and 95% CIs and conduct Bonferroni-adjusted pairwise comparisons to locate differences over time are reported. Assumption checks included inspection of skewness–kurtosis for approximate normality ($|z| < 2$ deemed acceptable), consistent with the pilot’s analytic plan.

Table 1. Study design, sampling, and assessment schedule (for replicability)

Phase/Week	Delivery mode	Core activities	Assessment artefacts	Outputs captured
Phase 1/ Week 1 (Pre-test)	Virtual (Google Classroom/Meet)	Orientation; platform onboarding; instructions and exemplars; Q&A	17 technique videos across Levels 1–5 (see Appendix A)	Individual video files; timestamps; self-reported issues
Phase 2/ Week 2 (Post-test)	Face-to-face practical workshop	On-grass practice for Levels 1–5 with coaching cues; immediate feedback; formative check	Post-test scoring of the 17 techniques (standardised conditions)	Post-test scores per technique; facilitator notes
Phase 3/ Week 3 (Extended post-test)	Virtual (field implementation)	Coaches re-implement sessions in home contexts; reflective notes; re-submission	Re-upload 17 technique videos; brief reflection per level	Extended post-test scores; reflections; adherence notes
Notes	-	Design: single-group repeated measures; no control group (pilot feasibility) Sampling: convenience (10 academy, 10 school). Scoring: 5-point anchored rubric; assessor calibration	-	-

RESULTS

The third normality analysis of pre-test, post-test, and post-extension tests data for 17 coaches' technical soccer skills from level 1 to level 5 shows a normal distribution when the value of the skewness-kurtosis ratio is between -2 and +2 as shown in Table 2.

Table 2. Normality test of pre-test, post-test and post-extension tests of Football Technical Skills using Skewness-Kurtosis ($N = 20$)

Test	Skewness statistic	Std. error	Ratio skewness	Kurtosis statistic	Std. error	Ratio skewness
Pre-test	0.246	0.512	0.480469	-0.332	0.992	-0.33468
Post test	0.545	0.512	1.064453	-0.412	0.992	-0.41532
Advanced post-test	-0.662	0.512	-1.29297	-0.572	0.992	-0.57661
Valid N (listwise)						

Table 2 shows the skewness ratio and kurtosis ratio of the pre-test (0.5, -0.3), post-test (1.1, -0.4), and post-extension tests (-1.3, -0.6) for the measurement of football technical skills of Level 1 to Level 5 coaches are normally distributed when the skewness ratio-Kurtosis is between -2 and +2, respectively. Thus, this measurement data meets the requirements of repeated measurements ANOVA (Repeated Measures ANOVA).

Repeated measurement ANOVA involves three time periods namely pre-test, post-test, and extended post-testis homogeneous based on the results of Mauchly's test of sphericity, which is $p, 0.28 > 0.05$, then the equality of variants has been fulfilled in this study. The results of the ANOVA repeated measurement test show that Greenhouse-Geisser is not significant when the value shows $p, 0.00 < 0.05$ as in Table 3.

Table 3. Tests of within-subjects effects for the repeated measurement of football coaches' technical skills pre-, post-, and post-advanced tests

Test		Type III sum of squares	df	Mean square	F	Sig.
Test	Sphericity assumed	85.891	2	42.946	1497.648	0.00
	Greenhouse-Geisser	85.891	1.766	48.632	1497.648	0.00

Therefore, based on the results from Table 3, H_0 is rejected, then there is a significant difference in the performance of coaches' football technical skills in the pre-test, post-test, and post-extension tests after using the F-WBL4C module in a blended manner. With that, it can be concluded that the F-WBL4C Technical Vocational module can improve the performance of football technical skills among community coaches.

The improvement in the coaches’ performance can be seen through the results of the mean comparison at the time of the test as shown in Table 4.

Table 4. Mean difference on the pre-, post-, and post-extension tests of soccer technical skills using the results of pairwise comparisons

Time		Mean difference	Std. error	Sig. ^b
Pre test	Post test	-1.6	0.051	0.000
	Advanced pre-post	-2.9	0.062	0.000
Post test	Pre test	1.6	0.051	0.000
	Advanced pre-post	-1.4	0.046	0.000
Advance pre-post	Pre test	2.9	0.062	0.000
	Post test	1.4	0.046	0.000

Table 4 shows the difference mean total scores of pre-tests, post-test, and post-extension tests of football technical skills from Level 1 to Level 5 (17 techniques). The coach’s mean score on the post-extension tests increased from the post-test by 1.4, while from the pre-test it was 2.9. It also shows the improvement in the improvement of the trainer because of repeated measurements of the pre-test, post-test, and extended post-test.

DISCUSSION

This pilot provides preliminary evidence that a blended, work-based module (F-WBL4C) can be associated with within-coach improvements in technical coaching competency across pre-, post-, and extended post-tests, as captured through standardised video artefacts and a five-point rubric. The largest gains were observed after the face-to-face workshop, with further consolidation one week later during re-implementation in coaches’ own contexts. These patterns are consistent with the intended logic of the module—structured progression across five skill bands delivered in a blended format—and align with experiential learning processes emphasising practice, reflection on video evidence, conceptual consolidation, and re-testing *in situ*. At the same time, the results should be interpreted as signals of promise rather than definitive effects.

Several alternative explanations warrant consideration. First, a novelty/Hawthorne effect may have elevated engagement because this was the coaches’ first exposure to a structured, video-documented WBL module, coupled with researcher attention. Second, a practice/reactivity effect is plausible: repeating the same 17 techniques at each time point may itself improve scores through familiarity with task demands and with the scoring anchors. Third, the small sample ($N = 20$) increases sampling error and the chance that large mean changes reflect idiosyncratic variation rather than true

effects; the single-group design further limits causal attribution because concurrent factors (e.g., other training, seasonal routines) were not controlled. Finally, although assessors received a calibration briefing, formal inter-rater reliability was not estimated in this pilot, so some proportion of gain could reflect scorer drift rather than genuine competency change.

It is also important to reflect on which aspects appeared less effective or contextually constrained. Coaches generally found early levels (ball mastery; passing/receiving) easier to implement consistently, while speed/agility ladder work and finishing under pressure were more variable—often due to equipment availability, space limitations, or scheduling constraints at schools and academies. The digital layer (Google Classroom/Meet) enabled timely submissions and feedback but introduced bandwidth and time-on-task friction for some coaches, which may have reduced the depth of reflective commenting between time points. These constraints suggest that future iterations should supply minimal equipment kits, provide offline upload options, and scaffold reflection with brief, structured prompts linked to each technique.

Taken together, the study's strengths include authentic artefacts of practice (17 technique videos across five levels), repeated measurement over three weeks, and delivery within real community settings that the module is designed to serve. The limitations are equally clear: single-group, pre–post design, small convenience sample concentrated in Penang, short follow-up, absence of formal content validation and inter-rater reliability, and no linkage to downstream player outcomes. These features temper claims and frame the present findings as feasibility-oriented rather than confirmatory.

Looking ahead, the implications are twofold. For coach education, a blended, artefact-based WBL design appears feasible and acceptable for community coaches and may support measurable skill development when paired with on-grass workshops and structured video tasks. For TVET in sport, the approach demonstrates how work-based principles can be operationalised with clear performance evidence, but robust evaluation will require more rigorous designs that separate intervention effects from novelty and practice influences.

CONCLUSION

In this pilot, a blended work-based module (F-WBL4C) implemented with 20 community coaches showed progressive improvements in rubric-based technical coaching scores from pre- to post- and extended post-tests, suggesting that a structured progression of drills, paired with video artefacts and brief feedback, is a promising pathway for grassroots coach development. However, conclusions must be tempered by methodological constraints: small, single-site convenience sample, no control group, short (three-week) observation window, and absence of formal content validity

and inter-rater reliability procedures. These results therefore constitute preliminary evidence of feasibility and potential efficacy rather than definitive proof of impact.

Future research should implement larger, multi-site trials—ideally cluster-randomised or matched comparison designs—powered a priori and incorporating:

1. Expert panel content validation of tasks and rubrics.
2. Assessor training with inter-rater reliability estimation (e.g., ICC).
3. Fidelity checks for dosage and adherence.
4. Longer follow-up (≥ 3 –6 months) to test durability.
5. Moderator analyses by coach background (school vs. academy) and resource context.
6. Mediation tests to examine whether engagement in the experiential cycle (practice \rightarrow reflection \rightarrow planning \rightarrow re-practice) explains improvements.
7. Where feasible, player-level outcomes to establish practical significance beyond coach scores.

Such a design would more convincingly isolate the module's effect and guide scalable implementation.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

DATA AVAILABILITY

The datasets generated and/or analysed during the current study are not publicly available due to participant confidentiality but are available from the corresponding author on reasonable request.

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CONTRIBUTIONS OF AUTHORS

Md Baharuddin Abdul Rahman: Conceptualisation, methodology, writing – original draft preparation.

Ummu Sakinah Subri: Writing – review and editing.

Fadzila Azni Ahmad: Methodology, investigation (e.g. data collection).

Sun Qimeng and Nurhashimah Muhamed Fauzi: Data curation, formal analysis.

STATEMENT OF ARTIFICIAL INTELLIGENCE (AI) USE

AI tools (ChatGPT, OpenAI) were used during the writing process to generate outlines, summarise relevant literature, and provide language support. The authors critically reviewed, validated, and revised all AI-generated text to ensure accuracy and academic integrity.

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