Contents list available at PELTA

Physical Education Learning, Teaching, and Assessment (PELTA)

Publisher: Perkumpulan Pengelola Jurnal Keolahragaan Indonesia (PJKI)

Improving short-distance sprint performance through the Teaching at the Right Level approach

Peningkatan performa sprint jarak pendek melalui pendekatan Teaching at the Right Level

Putri Diana Sari[1], Wahyu Indra Bayu[1,*], Herri Yusfi[1], Meirizal Usra[1]

[1] *Physical Education Department, Faculty of Teacher Training and Education, Sriwijaya University, Indonesia*
email: wahyu.indra@fkip.unsri.ac.id

ARTICLE INFO

Received 14 July 2026
Revised 21 August 2026
Accepted 1 September 2026
Published 10 September 2026

Keywords:
Fartlek training
Continuous run
Cardiorespiratory endurance
Pencak silat

***Kata kunci*:**
Latihan fartlek
Continuous run
Daya tahan kardiorespirasi Pencak silat

APA style in citing this article:
Sari, P. D., Bayu, W. I., Yusfi, H., & Usra, M. (2026). Improving short-distance sprint performance through the Teaching at the Right Level approach. *Physical Education Learning, Teaching, and Assessment (PELTA), 1*(1), 1-7.
https://doi.org/10.68536/pelta.v1i1.5

ABSTRACT

Background: Students' learning outcomes in short-distance sprinting often remain suboptimal due to unaddressed variations in individual physical abilities.
Objective: This study aimed to investigate the effect of the Teaching at the Right Level (TaRL) approach on short-distance sprinting instruction, evaluated through the 40-meter dash performance of eighth-grade students.
Methods: A quantitative method utilizing a One-Group Pretest-Posttest design was employed. The sample consisted of 30 students (13 males, 17 females; age: 13.6 ± 0.5 years; weight: 46.5 ± 5.4 kg; height: 154.2 ± 6.8 cm) selected through purposive sampling. Data were collected using the 40-meter dash as a performance metric, measured in seconds. Statistical analysis included descriptive statistics, the Shapiro–Wilk test of paired difference scores, and the Wilcoxon signed-rank test, conducted using SPSS version 26.
Results: The 40-meter sprint time showed modest improvement following the TaRL-based learning process. The mean sprint time increased from 6.25 to 6.16 seconds, corresponding to a mean paired reduction of 0.096 seconds (approximately 1.54%). Because the paired difference scores were not normally distributed (Shapiro–Wilk W = 0.616, $p < 0.001$), a Wilcoxon signed-rank test was used. The test indicated a statistically significant change in sprint performance ($Z = -2.41$, $p = 0.016$), with an effect size of $r = 0.44$.
Conclusion: The results indicate that TaRL-based sprint instruction was associated with a modest but statistically significant improvement in 40-meter sprint performance among eighth-grade students. Given the one-group pretest–post-test design, the findings should be interpreted as evidence of within-group change rather than definitive causal evidence of the intervention.

ABSTRAK

Latar belakang: Hasil belajar peserta didik dalam lari jarak pendek masih sering belum optimal karena adanya variasi kemampuan fisik individu yang belum sepenuhnya terakomodasi dalam proses pembelajaran.
Tujuan: Penelitian ini bertujuan untuk menginvestigasi pengaruh pendekatan *Teaching at the Right Level (TaRL)* dalam pembelajaran lari jarak pendek yang dievaluasi melalui performa lari 40 meter pada peserta didik kelas VIII.
Metode: Penelitian ini menggunakan pendekatan kuantitatif dengan desain *One-Group Pretest–Posttest*. Sampel terdiri atas 30 peserta didik (13 laki-laki dan 17 perempuan; usia: 13,6 ± 0,5 tahun; berat badan: 46,5 ± 5,4 kg; tinggi badan: 154,2 ± 6,8 cm) yang dipilih menggunakan teknik *purposive sampling*. Data dikumpulkan menggunakan tes lari 40 meter sebagai ukuran performa dan dinyatakan dalam satuan detik. Analisis statistik meliputi statistik deskriptif, uji *Shapiro–Wilk* terhadap skor selisih berpasangan, dan uji *Wilcoxon signed-rank* menggunakan SPSS versi 26.
Hasil: Waktu tempuh lari 40 meter menunjukkan peningkatan moderat setelah penerapan pembelajaran berbasis TaRL. Rerata waktu *sprint* meningkat dari 6,25 menjadi 6,16 detik, dengan rerata penurunan berpasangan sebesar 0,096 detik (sekitar 1,54%). Karena skor selisih berpasangan tidak berdistribusi normal *(Shapiro–Wilk W* = 0,616; $p < 0,001$), analisis dilanjutkan menggunakan uji *Wilcoxon signed-rank*. Hasil uji menunjukkan adanya perubahan yang signifikan secara statistik pada performa *sprint* ($Z = -2,41$; $p = 0,016$), dengan ukuran efek sebesar $r = 0,44$.
Kesimpulan: Hasil penelitian menunjukkan bahwa pembelajaran *sprint* berbasis TaRL berkaitan dengan peningkatan performa lari 40 meter yang moderat tetapi signifikan

Sari, Bayu, Yusfi, & Usra; PELTA 1(1) 2026 1-7 ISSN 3164-7987 (Online)

secara statistik pada peserta didik kelas VIII. Mengingat penelitian ini menggunakan desain *one-group pretest–posttest*, temuan tersebut perlu diinterpretasikan sebagai bukti adanya perubahan dalam kelompok, bukan sebagai bukti kausal yang definitif mengenai pengaruh intervensi.

© 2026 The Author. Licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Highlights

- ✓ Teaching at the Right Level (TaRL) was associated with improved 40-m sprint performance in eighth-grade students.
- ✓ Mean sprint time increased from 6.25 to 6.16 s, with a significant pretest–post-test change (p = 0.016).
- ✓ TaRL may offer a practical ability-responsive approach for differentiated sprint instruction in physical education.

Introduction

Physical Education (PE) is an integral component of education that contributes to students' physical, motor, cognitive, affective, and social development. Through appropriately designed physical activities, PE can promote physical fitness, motor competence, self-confidence, cooperation, and positive attitudes toward an active lifestyle. Systematic reviews have shown that curriculum-based PE interventions can improve motor competence in children and adolescents, while higher levels of motor competence are also associated with better health-related fitness and executive functioning (Lorås, 2020; Bao et al., 2024; Liu et al., 2023).

Athletics represents a fundamental component of PE because activities such as running, jumping, and throwing contribute to the development of basic locomotor abilities that underpin more complex movement and sport-specific skills. Among these activities, sprinting is commonly used both as a learning activity and as an indicator of short-distance running performance. Sprint performance is influenced by several interacting factors, including acceleration, running speed, lower-limb power, coordination, balance, reaction ability, and running technique. Accordingly, sprint instruction should emphasize the progressive development of movement competence rather than focusing solely on completion time.

However, students enter PE classes with varying levels of physical fitness, motor competence, prior movement experience, motivation, and learning readiness. Research conducted in Indonesia has demonstrated considerable variation in children's motor competence, with many students exhibiting low-to-moderate levels of proficiency (Baharuddin et al., 2026). When identical tasks, intensities, and performance expectations are applied to all students, instructional activities may not adequately correspond to individual readiness. Students with higher levels of competence may receive insufficient challenge, whereas those with lower levels of competence may experience tasks that are excessively difficult. Instructional approaches that accommodate such individual differences are therefore important for supporting the development of movement skills (Liu et al., 2023).

Differentiated and student-centered instruction offers one means of addressing this variability by adapting learning content, instructional processes, and performance expectations to students' readiness and learning needs. Recent literature in PE has highlighted differentiated instruction as a relevant strategy for accommodating learner diversity and supporting motivation and participation (Prabawanata et al., 2025). This approach is particularly relevant in PE settings, where students of the same age and grade level may differ substantially in their physical capacities, motor competence, and readiness to perform specific movement tasks.

One systematic approach to tailoring instruction to students' current levels of competence is Teaching at the Right Level (TaRL). Originally developed to support foundational literacy and numeracy, TaRL is based on assessing students' actual level of competence, grouping them according to their current abilities, providing appropriately targeted instruction, and periodically reassessing their progress. Randomized evaluations have demonstrated that instruction aligned with students' actual learning levels can improve educational outcomes (Banerjee et al., 2017). The Global Education Evidence Advisory Panel has likewise identified targeted instruction based on students' learning levels as an evidence-supported approach, while the World Bank has highlighted its relevance to differentiated learning within the Indonesian educational context (Banerjee et al., 2023).

Although TaRL has traditionally been applied in academic domains, its core principles—diagnostic assessment, ability-based grouping, differentiated instruction, targeted practice, and continuous reassessment—may also be applicable to psychomotor learning. In PE, teachers can assess students' initial movement performance, identify differences in physical and technical readiness, and provide learning tasks that correspond to each student's current level of ability. For example, students who are still developing basic sprint mechanics may benefit from activities emphasizing starting technique, posture, and arm–leg coordination, whereas more advanced students may undertake progressively challenging tasks targeting acceleration, coordination, and sprint performance. Such an approach is consistent with the broader principle of providing developmentally appropriate movement experiences in PE (Barnett et al., 2023; Lorås, 2020).

Recent studies in Indonesia have begun to investigate the application of TaRL in educational settings, particularly as a means of improving learning outcomes and accommodating differences in students' readiness (Ananda & Adi, 2024; Mahisna et al., 2024; Shabrina et al., 2024). TaRL has also been explored in Indonesian PE contexts, including its implementation within the Merdeka Curriculum. However, the available literature has largely focused on implementation processes, learning contexts, and instructional challenges rather than objectively measured psychomotor outcomes such as sprint performance (Nindyatama & Maliki, 2024; Prayogo & Herlambang, 2024).

This limitation highlights an important gap in the literature concerning the application of TaRL to specific psychomotor outcomes in athletics, particularly 40-m sprint performance among junior high school students. Unlike literacy and numeracy, psychomotor learning requires students to repeatedly perform, refine, and demonstrate movement skills through physical tasks that are appropriately matched to their level of competence. Consequently, applying TaRL in PE requires contextual adaptation to account for the physical, technical, and developmental characteristics of movement-based learning.

In 40-m sprint instruction, TaRL can be operationalized through an initial diagnostic assessment, ability-based grouping, differentiated tasks and exercise intensity, targeted feedback, and periodic reassessment. Such an approach may enable teachers to provide students with an appropriate level of challenge while accommodating individual differences in movement competence and performance. This form of instructional adaptation is consistent with evidence linking appropriately structured movement experiences with motor competence, physical activity, and health-related fitness (Liu et al., 2023; Lorås, 2020).

Sari, Bayu, Yusfi, & Usra; PELTA 1(1) 2026 1-7 ISSN 3164-7987 (Online)

Accordingly, this study aimed to examine changes in 40-m sprint performance following the implementation of the Teaching at the Right Level (TaRL) approach among eighth-grade junior high school students. By applying an ability-responsive instructional framework to a specific and objectively measurable psychomotor outcome, this study seeks to provide empirical evidence regarding the applicability of TaRL in athletics instruction and to contribute to the development of differentiated, inclusive, and student-centered practices in physical education.

Materials and Methods

Study Design

This study employed a quantitative, pre-experimental approach using a one-group pretest–posttest design. The design was selected to examine changes in students' 40-m sprint performance following the implementation of the Teaching at the Right Level (TaRL) approach. A single group of participants was assessed before and after the intervention, allowing within-group comparisons across the two measurement occasions (Creswell & Creswell, 2018; Sugiyono, 2022). The study design is illustrated in Figure 1.

The pretest was administered before the intervention to determine students' initial sprint performance and to provide a basis for grouping them according to their current level of ability. The TaRL-based intervention was then implemented through differentiated sprint-learning activities aligned with students' initial performance levels. Following completion of the intervention, the same 40-m sprint test was administered as the posttest under standardized conditions.

Because the study did not include a control group, observed pretest–posttest changes cannot be attributed exclusively to the intervention with the same level of causal confidence as would be possible in a randomized controlled or quasi-experimental design (Creswell & Creswell, 2018). Accordingly, the findings were interpreted as evidence of within-group changes in sprint performance following the implementation of TaRL.

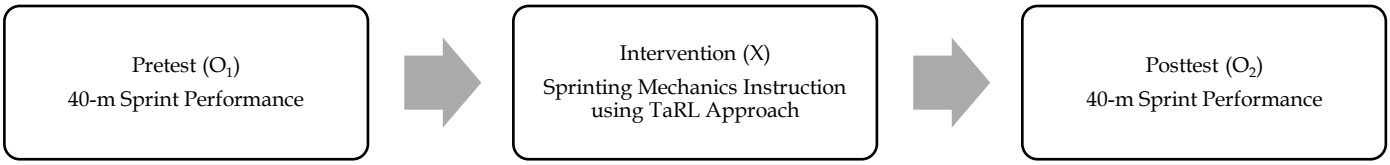


Figure 1. One-group pretest–posttest design

Participants

The study population comprised 150 Grade VIII students enrolled at the selected junior high school during the academic year in which the study was conducted. Grade VIII students were selected because short-distance sprinting forms part of the athletics content taught in Physical Education and represents a fundamental locomotor skill that can be assessed objectively through sprint performance.

The final sample consisted of 30 Grade VIII students, including 13 males and 17 females, with a mean age of 13.6 ± 0.5 years, body mass of 46.5 ± 5.4 kg, and height of 154.2 ± 6.8 cm. Participants were selected using purposive sampling, a non-probability sampling technique based on predetermined characteristics relevant to the study objectives (Sugiyono, 2022).

The inclusion criteria were: (1) official enrollment in Grade VIII; (2) participation in Physical Education classes during the study period; (3) ability to safely complete the 40-m sprint test; (4) completion of both the pretest and posttest assessments; and (5) willingness to participate in the intervention. Students who were unable to complete the testing procedures because of temporary physical limitations or who did not complete both measurement sessions were excluded from the final analysis.

Participant characteristics were recorded according to sex, age, body mass, and height. Sex was included for descriptive purposes only and was not treated as an independent variable because the primary objective was to examine within-group changes in 40-m sprint performance following the TaRL-based learning process. Given the use of purposive sampling and a one-group design, the sample should be considered context-specific rather than statistically representative of all Grade VIII students. Therefore, the generalizability of the findings should be interpreted with appropriate caution.

Interventions

The intervention was implemented over four instructional meetings, with each meeting scheduled for three 45-min periods. The first meeting was used for baseline assessment and ability-level classification, the second and third meetings comprised the TaRL-based instructional intervention, and the fourth meeting was used for post-intervention assessment. Before the intervention, all participants completed a 40-m sprint pretest. The pretest results were then used to classify students into low-, moderate-, and high-performance groups according to their initial sprint performance. This classification formed the basis for differentiating the learning activities provided during the intervention.

During the second and third meetings, students received sprint instruction tailored to their initial performance level. Students in the low-performance group completed 30–40-m sprint activities emphasizing fundamental sprint mechanics, including starting position, acceleration, and movement coordination. These activities were supplemented with modified group games, particularly bentengan, to provide repeated running opportunities in an engaging and less demanding learning environment. Students in the moderate-performance group performed reaction drills in response to the teacher's starting cues. These activities focused on improving reaction to the start signal and acceleration during the initial phase of the sprint. Students in the high-performance group completed more challenging variations of sprint practice combined with relay-based activities. These tasks were intended to further develop running speed, coordination, movement accuracy, concentration, and sprint performance.

Throughout the intervention, the teacher supervised practice and provided feedback according to the students' performance and learning needs. The differentiated activities were designed so that students with lower initial performance received greater emphasis on basic movement execution, whereas students with higher initial performance were provided with progressively more demanding sprint-related tasks. This structure reflected the central principle of TaRL by matching instructional content and task difficulty to students' demonstrated performance rather than applying identical activities to the entire class.

Following the intervention, all participants completed the 40-m sprint posttest during the fourth meeting using the same testing procedures as those employed at baseline. Completion time was recorded using a stopwatch and subsequently compared with

the pretest measurement to determine within-participant changes in sprint performance.

Outcome measures

The primary outcome was 40-m sprint performance, measured as the time required to complete a 40-m maximal sprint. Sprint testing over short distances is widely used to assess acceleration and running speed in children and adolescents, and previous research has reported high test–retest reliability for sprint tests over distances ranging from 30 to 50 m (Altmann et al., 2019; Rumpf et al., 2012). Each participant completed the 40-m sprint at maximal effort, and completion time was recorded in seconds using a stopwatch. Lower completion times indicated better sprint performance. The same testing conditions were maintained during both the pretest and posttest, including sprint distance, starting procedure, running surface, equipment, and measurement procedures.

Before each test, students received standardized instructions and completed an appropriate warm-up. Participants began from behind the starting line and were instructed to sprint as quickly as possible toward the finish line following the starting signal. Timing began at the starting signal and stopped when the participant's torso crossed the finish line. The recorded sprint time was then entered into the research data sheet.

Standardized testing procedures were maintained across both measurement occasions to minimize measurement error and improve comparability between pretest and posttest performance (American College of Sports Medicine [ACSM], 2021). Pretest results also served as the diagnostic basis for organizing students into differentiated instructional groups during the TaRL intervention.

Statistical analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics were calculated to summarize 40-m sprint performance at pretest and posttest. Mean, standard deviation, minimum, and maximum values were reported to describe the overall distribution of sprint times. Because the inferential analysis was nonparametric, median and interquartile range values were also reported for the pretest and posttest measurements.

The Shapiro–Wilk test was used to assess the normality of the paired difference scores between pretest and posttest. Because the difference scores were not normally distributed, the Wilcoxon signed-rank test was used to examine changes in 40-m sprint performance between the two measurement occasions. Statistical significance was set at $\alpha = .05$. Effect size was calculated as $r = |Z|/\sqrt{N}$, where Z represents the standardized Wilcoxon test statistic and N represents the number of paired observations.

Results

Descriptive statistics indicated a modest improvement in 40-m sprint performance following the TaRL-based learning process. As shown in Table 1, mean sprint time increased from 6.25 ± 0.87 s at pretest to 6.16 ± 0.76 s at posttest. The mean paired reduction in sprint time was 0.096 s, corresponding to an improvement of approximately 1.54% relative to the pretest mean. The minimum sprint time changed slightly from 4.63 to 4.65 s, whereas the maximum increased from 8.00 to 7.40 s. Because shorter completion times indicate better sprint performance, the overall descriptive pattern suggests a modest improvement following the TaRL-based learning process. Individual pretest–posttest changes are illustrated in Figure 2.

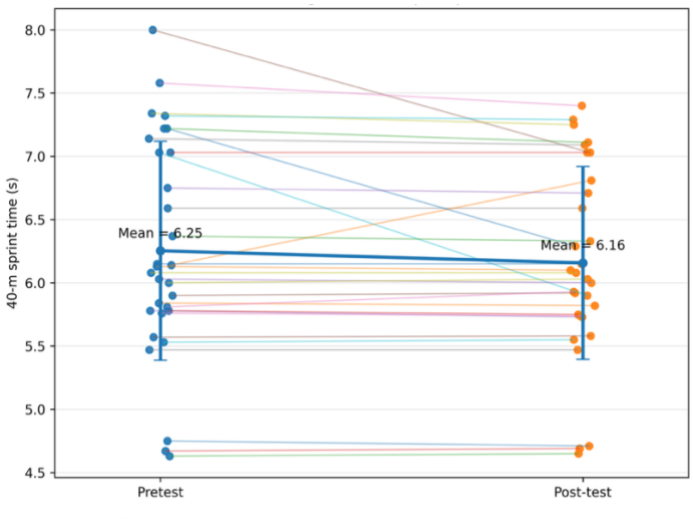
The Shapiro–Wilk test indicated that the paired difference scores were not normally distributed ($W = 0.616$, $p < 0.001$) (Table 2). Therefore, the normality assumption required for a paired-samples t test was not met, and a Wilcoxon signed-rank test was used for the inferential analysis.

Because the paired difference scores were not normally distributed, the Wilcoxon signed-rank test was used to determine whether 40-m sprint performance differed significantly between pretest and posttest.

The Wilcoxon signed-rank test indicated a statistically significant change in 40-m sprint performance from pretest to posttest ($Z = -2.41$, $p = 0.016$) (Table 3). Median sprint time increased from 6.11 s at pretest to 6.06 s at posttest. Because shorter sprint times indicate better performance, this finding indicates an overall improvement in sprint performance following the TaRL-based learning process.

Table 1
Descriptive statistics for 40-m sprint performance

Measurement	N	Mean (s)	SD	Minimum (s)	Maximum (s)
Pretest	30	6.25	0.87	4.63	8.00
Post-test	30	6.16	0.76	4.65	7.40



Note. Each line represents one participant. Lower sprint times indicate better performance.

Figure 2. Individual changes in 40-m sprint performance from pretest to posttest.

Sari, Bayu, Yusfi, & Usra; PELTA 1(1) 2026 1-7 ISSN 3164-7987 (Online)

Table 2
Shapiro–Wilk normality test for paired difference scores

Variable	Shapiro–Wilk p	Decision
Pretest–post-test difference	< 0.001	Non-normal

Table 3
Wilcoxon signed-rank test for 40-m sprint performance

Variable	Pretest Median (IQR)	Post-test Median (IQR)	Z	p	r
40-m Sprint	6.11 (5.78–7.03)	6.06 (5.74–6.79)	-2.41	0.016	0.44

The median paired reduction in sprint time was approximately 0.03 s, with an effect size of r = 0.44. Taken together, the inferential analysis indicated a statistically significant within-participant change, although the absolute magnitude of the observed reduction in sprint time was modest.

Discussion

The principal finding of this study was a modest but statistically significant within-participant improvement in 40-m sprint performance following the TaRL-based learning process. Mean sprint time decreased from 6.25 to 6.16 s, corresponding to a mean paired reduction of 0.096 s, or approximately 1.54%. The Wilcoxon signed-rank test confirmed a significant pretest–posttest change ($Z = -2.41$, $p = 0.016$), with an effect size of r = 0.44. These findings indicate that the TaRL-based learning process was associated with improved sprint performance, although the absolute magnitude of the change was relatively small and causal interpretation remains limited by the one-group design.

These findings extend the emerging evidence on the application of TaRL in physical education. Hartono et al. (2025) demonstrated that TaRL could be implemented in junior high school PE by organizing students according to their ability levels during soccer-skill instruction, with positive responses from both teachers and students. Pangestu and Pratama (2025) also reported the application of TaRL in Indonesian PE and its association with learning outcomes among vocational high school students. The present study extends this line of research to athletics by examining a specific psychomotor outcome that was objectively quantified using 40-m sprint time.

One possible explanation for the improvement observed lies in the way TaRL aligns instructional activities with students' initial performance levels. Sprint performance in children and adolescents is influenced by multiple interacting factors, including acceleration, stride characteristics, neuromuscular coordination, muscular power, and anthropometric characteristics (Rumpf et al., 2012). Although these factors were not measured directly in the present study, the differentiated structure of the intervention allowed instructional emphasis to vary according to students' baseline sprint performance.

In the present intervention, students with lower initial performance received greater emphasis on basic sprint mechanics and 30–40-m running activities, whereas those at intermediate performance levels completed activities emphasizing reaction to starting cues and acceleration. Students with higher initial performance were exposed to more challenging sprint-related and relay activities. This instructional differentiation may have provided a more appropriate level of challenge for each group and may partly explain the observed reduction in sprint times. However, because biomechanical and physiological variables were not directly assessed, the mechanisms underlying the improvement cannot be determined from the present data.

This interpretation is broadly consistent with evidence supporting differentiated and tailored approaches in PE. Dutrisac et al. (2023) reported that a tailored PE program was associated with improvements in students' motivation, attitudes, and perceptions of physical ability. More broadly, differentiated instruction has been proposed as a means of accommodating variability in students' readiness, competence, and learning needs. The present findings add to this literature by suggesting that an ability-responsive instructional approach may also be applicable to an objectively measured athletics outcome, although the magnitude of performance change observed in this study was modest.

The results are also consistent with broader evidence indicating that appropriately designed PE interventions can support motor-related outcomes. Lorås (2020) reported beneficial effects of PE interventions on motor competence, while Dudley et al. (2022), in a large synthesis of PE-based intervention studies, found that the quality and structure of PE interventions were associated with psychomotor and other developmental outcomes. In this context, TaRL may be useful not because it represents a specific sprint-training method, but because it provides a framework for matching learning tasks and instructional demands to students' current level of performance.

The 40-m sprint was also useful as both a diagnostic and an outcome measure. At baseline, sprint performance was used to classify students according to their current level of ability and to inform subsequent instructional decisions. Following the intervention, the same measure provided an objective indication of within-participant change. This assessment–instruction–reassessment sequence reflects a key feature of TaRL, in which assessment is not treated solely as an endpoint but also as a basis for adapting instruction.

Although the observed reduction in sprint time was statistically significant, its practical magnitude should be interpreted carefully. The mean reduction was less than one tenth of a second, and the median paired reduction was approximately 0.03 s. Therefore, statistical significance should not be interpreted as evidence of a large improvement in performance. Rather, the findings indicate a small absolute change accompanied by a detectable overall shift in the distribution of paired observations. This distinction is important when interpreting short-duration school-based interventions in which individual responses may vary considerably.

The findings may have broader relevance to the development of motor competence because movement competence has been associated with other developmental domains, including health-related fitness and executive functioning (Bao et al., 2024). Nevertheless, such broader effects cannot be inferred from the present study because only 40-m sprint performance was measured. The contribution of the current study is therefore specifically related to the application of an ability-responsive instructional process to a measurable athletics outcome in school-based PE.

Clinical implications

Although this study was conducted in an educational rather than a clinical setting, the findings have practical implications for professionals involved in school-based physical activity, motor development, and youth performance. The results suggest that baseline performance assessment may be used to inform differentiated sprint instruction rather than applying identical tasks

and performance expectations to all students. Within the TaRL framework, students with lower initial performance can receive greater emphasis on fundamental movement execution and progressive practice, whereas students with higher initial performance can be provided with more demanding activities that maintain an appropriate level of challenge.

For PE teachers and practitioners working with adolescents, this approach may provide a feasible method of integrating assessment with instructional planning. A simple sequence of assess → classify → differentiate → practice and provide feedback → reassess may help teachers accommodate heterogeneity in students' physical and motor abilities without requiring sophisticated equipment or laboratory-based testing. Importantly, the present findings should not be interpreted as evidence that TaRL is superior to other instructional approaches, because no comparison group was included. Rather, they indicate that ability-responsive instruction is feasible within a school-based sprint-learning context and may support modest improvements in performance.

From a broader youth-development perspective, differentiated instruction may also help ensure that students are exposed to tasks that are neither excessively difficult nor insufficiently challenging. Such matching may be particularly relevant in PE, where large differences in motor competence and physical readiness can exist among students of the same age and grade level. Future controlled studies are needed to determine whether this approach also influences movement quality, motivation, perceived competence, participation, and longer-term engagement in physical activity.

Study limitations

Several limitations should be considered. First, the study used a one-group pretest–posttest design without a control group, so the observed improvement cannot be attributed exclusively to the TaRL-based intervention. Second, the small purposively selected sample of 30 students from one school limits generalizability. Third, sprint performance was measured manually using a stopwatch, which may introduce timing error. In addition, only 40-m sprint time was assessed, so potential changes in sprint mechanics, acceleration, muscular power, motivation, or other related outcomes could not be examined.

The intervention was also brief, consisting of only two instructional sessions between pretest and posttest, so the findings primarily reflect short-term changes. Because different activities were provided according to baseline performance level, the study also cannot determine which specific component of the differentiated intervention contributed most to the observed improvement. Future studies should use controlled designs, larger and more diverse samples, more precise timing systems, longer intervention periods, and broader outcome measures. Overall, the findings provide preliminary evidence that TaRL-based instruction may support modest improvements in 40-m sprint performance and may offer a practical framework for ability-responsive physical education.

Conclusions

The findings suggest that Teaching at the Right Level (TaRL)-based sprint instruction was associated with improved 40-m sprint performance among eighth-grade students. By tailoring instructional activities to students' initial performance levels, the TaRL approach may provide a practical framework for accommodating differences in ability within physical education settings. However, these findings should be interpreted with caution because the study used a one-group pretest–posttest design without a control group and involved a relatively small sample from a single school. Therefore, future research should employ larger and more diverse samples, controlled or randomized designs, and longer intervention periods to determine the effectiveness and sustainability of TaRL-based sprint instruction. Future studies should also incorporate broader outcomes, including sprint technique, acceleration, reaction time, motor competence, motivation, and perceived competence, to better understand how ability-responsive instruction influences psychomotor learning in physical education.

Author contributions

Conceptualization: P.D.S. and W.I.B.; Methodology: P.D.S., W.I.B., H.Y., and M.U.; Investigation: P.D.S.; Data curation: P.D.S.; Formal analysis: P.D.S. and W.I.B.; Project administration: P.D.S.; Supervision: W.I.B., H.Y., and M.U.; Visualization: P.D.S.; Writing – original draft: P.D.S.; Writing – review & editing: P.D.S., W.I.B., H.Y., and M.U. All authors have read and approved the final version of the manuscript and agree to be accountable for the integrity and accuracy of the work.

Ethical statement

The study was conducted in accordance with ethical principles for research involving human participants. Formal permission to conduct the study was obtained from the relevant educational authorities and SMP Negeri 10 Palembang prior to data collection. The research procedures were coordinated with the school and Physical Education teacher before the study was conducted.

Informed consent

Written informed consent was obtained from the participants' parents or legal guardians prior to participation in the study. In addition, assent was obtained from all participating students. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without penalty.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) solely to improve language, grammar, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the accuracy, integrity, and content of the publication.

Funding

This research received no external funding.

Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to appropriate ethical and privacy considerations.

References

Altmann, S., Ringhof, S., Neumann, R., Woll, A., & Rumpf, M. C. (2019). Validity and reliability of speed tests used in soccer: A systematic review. *PloS one*, *14*(8), e0220982. https://doi.org/10.1371/journal.pone.0220982

American College of Sports Medicine. (2021). *ACSM's guidelines for exercise testing and prescription (11th ed.)*. Wolters Kluwer.

Ananda, D., & Adi, P. (2024). Implementasi Pembelajaran Berdiferensiasi Dengan Pendekatan Teaching At The Right Level Dalam Pembelajaran Memaknai Informasi Teks Berita Kelas VII SMPN 2 Pakis. *Jurnal Pembelajaran,*

Bimbingan, Dan Pengelolaan Pendidikan, *4*(2), 1-10. https://doi.org/10.17977/um065.v4.i2.2024.8

Baharuddin, S. H., Herdiansyah, H., Mahendra, A., Aswar, M., & Dwiwahyudi, D. (2026). Fundamental movement skills in Indonesian elementary school children: a systematic review of assessment, pedagogy, and motor competence. *Edu Sportivo: Indonesian Journal of Physical Education*, *7*(2), 127-151. https://doi.org/10.25299/esijope.2026.vol7(2).19682

Banerjee, A., Banerji, R., Berry, J., Duflo, E., Kannan, H., Mukerji, S., Shotland, M., & Walton, M. (2017). From proof of concept to scalable policies: Challenges and solutions, with an application. *Journal of Economic Perspectives*, *31*(4), 73-102. https://doi.org/10.1257/jep.31.4.73

Banerjee, A., Grantham-McGregor, S., Banerji, R., Muralidharan, K., Yoshikawa, H., Saavedra, J., ... & Glennerster, R. (2023). *Cost-Effective Approaches to Improve Global Learning: Smart Buys for Low-Income Countries* (p. 37). Foreign, Commonwealth & Development Office (FCDO), the World Bank, the United Nations International Children's Emergency Fund (UNICEF), the United States Agency for International Development (USAID).

Bao, R., Wade, L., Leahy, A. A., Owen, K. B., Hillman, C. H., Jaakkola, T., & Lubans, D. R. (2024). Associations between motor competence and executive functions in children and adolescents: A systematic review and meta-analysis. *Sports Medicine*, *54*, 2141-2156. https://doi.org/10.1007/s40279-024-02040-1

Barnett, L. M., Jerebine, A., Keegan, R., Watson-Mackie, K., Arundell, L., Ridgers, N. D., Salmon, J., & Dudley, D. (2023). Validity, reliability, and feasibility of physical literacy assessments designed for school children: A systematic review. *Sports Medicine*, *53*(10), 1905-1929. https://doi.org/10.1007/s40279-023-01867-4

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.).* SAGE Publications.

Dudley, D., Mackenzie, E., Van Bergen, P., Cairney, J., & Barnett, L. (2022). What drives quality physical education? A systematic review and meta-analysis of learning and development effects from physical education-based interventions. *Frontiers in Psychology*, *13*, 799330. https://doi.org/10.3389/fpsyg.2022.799330

Dutrisac, S., Bearden, A. G., Borgel, J., Weddell, R., Jones, M., & Oddie, S. (2023). A tailored physical education program enhances elementary students' self-efficacy, attitudes, and motivation to engage in physical activity. *Psychology in the Schools*, *60*(9), 3419-3434. https://doi.org/10.1002/pits.22927

Hartono, M., Kurniawan, W. R., Wijayanti, D. G. S., & Amran, A. (2025). Implementing TaRL in physical education: Mastering specific skills in soccer games for junior high school students. *Cakrawala Pendidikan*, *44*(1), 156-168. https://doi.org/10.21831/cp.v44i1.78524

Liu, C. L., Cao, Y., Zhang, Z., Gao, R., & Qu, G. (2023). Correlation of fundamental movement skills with health-related fitness elements in children and adolescents: A systematic review. *Frontiers in Public Health*, *11*, 1129258. https://doi.org/10.3389/fpubh.2023.1129258

Lorås, H. (2020). The effects of physical education on motor competence in children and adolescents: A systematic review and meta-analysis. *Sports*, *8*(6), 88. https://doi.org/10.3390/sports8060088

Mahisna, A. B., Faridli, E. M., & Soimah. (2024). Penerapan pendekatan Teaching at the Right Level untuk meningkatkan prestasi belajar peserta didik kelas IV SD. *Indonesian Journal of Elementary School*, *4*(2), 481-494. https://doi.org/10.26877/ijes.v4i2.19777

Nindyatama, M. L., & Maliki, O. (2024). Using the Teaching at the Right Level (TaRL) approach at SMA Negeri 2 Semarang, Independent Curriculum in Physical Education learning implementation. *Musamus Journal of Physical Education and Sport*, *6*(4), 793-807. https://ejournal.unmus.ac.id/index.php/physical/article/view/6570

Pangestu, A. Y., & Pratama, D. S. (2025). The influence of Teaching at the Right Level (TaRL) learning strategy on physical education learning outcomes: A mixed method study in vocational high schools. *Sang Pencerah: Jurnal Ilmiah Universitas Muhammadiyah Buton*, *11*(1), 122-131. https://doi.org/10.35326/pencerah.v11i1.6970

Prabawanata, I. K. A., Lesmana, K. Y. P., & Satyawan, I. M. (2025). A literature analysis of differentiated instruction as a learning management strategy in physical education. *Journal of Physical Education, Health and Sport*, *12*(2), 661-666. https://doi.org/10.15294/jpehs.v12i2.39967

Prayogo, W. K., & Herlambang, T. (2024). Application of the Teaching at the Right Level (TaRL) learning method in the physical education curriculum at SMK Negeri 8 Semarang. *Musamus Journal of Physical Education and Sport*, *6*(4), 774-786. https://ejournal.unmus.ac.id/index.php/physical/article/view/6560

Rumpf, M. C., Cronin, J. B., Pinder, S. D., Oliver, J., & Hughes, M. (2012). Effect of different training methods on running sprint times in male youth. *Pediatric Exercise Science*, *24*(2), 170-186. https://doi.org/10.1123/pes.24.2.170

Shabrina, Z. ., Sukoriyanto, S., & Wibisono, A. B. . (2024). Systematic Literature Review: Pendekatan Teaching At The Right Level (Tarl) Terhadap Hasil Belajar Matematika Siswa. *Jurnal MIPA Dan Pembelajarannya*, *4*(8), 1. https://doi.org/10.17977/um067v4i8p1

Sugiyono. (2022). *Metode penelitian kuantitatif*. Alfabeta.

Yeniarti, C. A., Padli, P., Arsil, A., & Ardo Okilanda. (2025). Differentiated instruction, physical fitness, and motivation on PE learning outcomes: a literature review. *JPPI (Jurnal Penelitian Pendidikan Indonesia)*, *11*(4), 200–208. https://doi.org/10.29210/020256678