© IJARW | ISSN (O) - 2582-1008
November 2026 | Vol. 8 Issue. 5
www.ijarw.com

DEVELOPING A SYSTEM OF SPEED-DEVELOPMENT EXERCISES TO IMPROVE 100-M PERFORMANCE IN MALE COHORT-60 STUDENTS AT THAI NGUYEN UNIVERSITY OF TECHNOLOGY, VIETNAM

M.A. Ho Ba Dung

Thai Nguyen University of Technology – Thai Nguyen University, Vietnam

ABSTRACT

This study aimed to assess the current level of speed performance and to select and experimentally implement a system of speed-development exercises to improve 100-m performance among male Cohort-60 students at Thai Nguyen University of Technology, Thai Nguyen University. The study employed commonly used scientific research methods in physical education and sports, including document synthesis and analysis, expert interviews and discussions, pedagogical testing, and mathematical statistics. The assessment of the current situation showed that the 100-m performance of male Cohort-60 students remained limited, with 23.6% failing to meet the required standard. Based on expert interviews, six specialized speed-development exercises were selected, with an agreement rate of 70% or higher. Following a three-month pedagogical experiment involving 90 students (an experimental group, nA = 45, and a control group, nB = 45), the experimental group demonstrated clear improvement and statistically significant superiority over the control group. The selected six-exercise system proved feasible and pedagogically effective, contributing to improvements in the quality of physical education teaching and learning at the university.

Keyword: speed; 100-m sprint; specific physical fitness exercises; physical education.

1. INTRODUCTION

In physical education programs at higher education institutions, sprinting—particularly the 100-m sprint—is a fundamental and compulsory teaching component. It plays an important role in the comprehensive development of physical fitness, the cultivation of willpower, and the formation of basic motor skills among university students. Performance in the 100-m sprint depends on a combination of technical proficiency, psychological capacity, and, in particular, the comprehensive development of speed-related fitness components, including motor reaction, movement frequency, and locomotor speed.

Thai Nguyen University of Technology, Thai Nguyen University, is an institution specializing in engineering education. Observations from teaching practice and preliminary assessments indicate that a large proportion of male Cohort-60 students have difficulty meeting the required performance standard in the 100-m sprint. The main reasons include an inadequate foundation of specific physical fitness, a lack of appropriately targeted speed-development exercises, and the need to adapt training to the institution's actual facilities. The high proportion of students who fail to meet the standard not only directly affects their academic results in physical education but may also reduce their motivation to participate in sports training.

In light of these theoretical and practical considerations, developing a system of speed-development exercises to improve 100-m performance among male Cohort-60 students at Thai Nguyen University of Technology, Thai Nguyen University, is an urgent undertaking of both scientific and practical significance. It may contribute to innovation in teaching methods and improvement in the quality of physical education at the university.

2. RESEARCH METHODS

The study was conducted from August 2023 to December 2024, using the following conventional research methods in physical education:

– Document synthesis and analysis: Research studies, textbooks, legal documents, and specialized materials on speed-training methods and track-and-field teaching were collected, reviewed, and synthesized.

– Expert interview method: A questionnaire based on an importance-rating scale was used to obtain opinions from 30 physical education lecturers and experts at Thai Nguyen University of Technology and other member institutions of Thai Nguyen University, with the aim of selecting the most appropriate exercises.

– Pedagogical testing: Speed-related performance indicators were measured using two standardized tests: the 60-m sprint from a standing start (s) and the 100-m sprint from a crouch start (s), in accordance with current track-and-field competition regulations.

– Pedagogical experiment: A parallel-group comparative experiment was conducted with 90 male Cohort-60 students over twelve weeks (two sessions per week, 30 minutes per session, incorporated into the specific physical fitness component of the lesson plan). Participants were randomly assigned to two groups with comparable initial physical fitness levels:

+ Experimental group (nA = 45): trained using the proposed system of six speed-development exercises.

+ Control group (nB = 45): followed the university's current physical education curriculum.

– Mathematical statistics: The collected data were processed using SPSS software (or a specialized statistical tool). The calculated parameters included the arithmetic mean ($\bar{X}$) and standard deviation (SD). Student's t-tests for independent and paired samples were used to compare differences. Statistical significance was set at $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1. Assessment of the current speed performance of male Cohort-60 students at Thai Nguyen University of Technology, Thai Nguyen University

To establish a practical basis for developing the exercise system, the study initially assessed speed performance in 195 male Cohort-60 students. The results are summarized in Table 1.

Table 1. Results of the assessment of current speed performance among male Cohort-60 students (n = 195)

No.	Test	Performance ($\bar{X}$ ± SD)	Met standard (students)	Rate (%)	Did not meet standard (students)	Rate (%)
1	60-m sprint (s)	8.65 ± 0.81	155	79.5	40	20.5
2	100-m sprint (s)	14.25 ± 0.72	149	76.4	46	23.6

Note: The assessment criteria were based on the Ministry of Education and Training's regulations on the assessment and classification of students' physical fitness.

The results in Table 1 indicate that students' speed performance remains limited. The proportion of students who failed to meet the standard was 20.5% for the 60-m sprint and as high as 23.6% for the 100-m sprint. The mean 100-m performance (14.25 s) suggests that students' explosive speed capacity and speed endurance are not yet well developed, highlighting the urgent need for appropriate pedagogical intervention.

3.2. Basis and requirements for developing speed exercises

– The objectives of education in general and physical education in higher education institutions in particular.

– The training objectives and requirements of Thai Nguyen University of Technology.

– The assessment showing that considerable limitations remain in the speed performance of male Cohort-60 students.

– The available facilities, equipment and training materials, as well as the time and funding allocated to the training process.

– The teaching staff and the university's capacity to organize and manage activities.

– The results of interviews with lecturers and staff currently working at the university and in Thai Nguyen.

– The selected exercises must have a clear orientation toward speed development.

– The exercises must be easy to perform and compatible with the existing facilities and equipment.

– The selected exercises must be appropriate and reasonable.

3.3. Selection of a system of speed-development exercises for male Cohort-60 students

3.3.1. Principles for exercise selection

The speed-development exercise system was designed on the basis of fundamental principles of physical education theory and sports training:

– Ensuring a strong sport-specific orientation toward the 100-m sprint.

– Matching students' physical fitness levels and the physiological characteristics of university-age individuals.

– Being compatible with the university's existing sports facilities and equipment.

– Being easy to organize and allowing training volume and intensity to be monitored.

3.3.2. Results of the exercise-selection interviews

The study developed a preliminary list of 15 commonly used speed-development exercises and conducted interviews with 30 experts and lecturers. The results are presented in Table 2.

Table 2. Results of the interviews on the selection of speed-development exercises (n = 30)

No.	Exercise	Very important/Important (n)	Rate (%)	Not important (n)	Rate (%)	Decision
1	30-m sprint from a standing start	27	90.0	3	10.0	Selected
2	30-m slalom run between poles	16	53.3	14	46.7	Rejected
3	Short-step running	13	43.3	17	56.7	Rejected
4	High-knee running in place/moving	21	70.0	9	30.0	Selected
5	50-m bounding/stride-running drill	22	73.3	8	26.7	Selected
6	60-m sprint at high speed	28	93.3	2	6.7	Selected
7	Stair running	9	30.0	21	70.0	Rejected

8	Rapid alternating-leg jumps	15	50.0	15	50.0	Rejected
9	Downhill running	7	23.3	23	76.7	Rejected
10	Crouch start and 15-m acceleration run	14	46.7	16	53.3	Rejected
11	Finish-line sprint over 10–20 m	12	40.0	18	60.0	Rejected
12	Arm-action drills in place	10	33.3	20	66.7	Rejected
13	Variable-pace running (30 m fast + 30 m slow)	22	73.3	8	26.7	Selected
14	Movement games for speed development	6	20.0	24	80.0	Rejected
15	Repeated 100-m runs	30	100.0	0	0.0	Selected

Using an agreement threshold of 70% as the selection criterion, the study selected six specialized speed-development exercises for inclusion in the experimental training program:

Exercise 1: 30-m sprint from a standing start (targeting motor reaction and initial acceleration).

Exercise 2: High-knee running over 20–30 m (developing stride frequency and explosive strength of the lower limbs).

Exercise 3: 50-m bounding/stride-running drill (enhancing stride length and the effectiveness of the backward push-off).

Exercise 4: 60-m sprint at high speed (developing maximal speed).

Exercise 5: Variable-pace running—30 m at high speed followed by 30 m at a maintained pace (developing speed endurance and the ability to relax the muscles).

Exercise 6: Repeated 100-m runs (improving pace distribution and technique over the full distance).

3.4. Evaluation of the effectiveness of the exercise system through a pedagogical experiment

Before the experiment, the research team assessed the initial speed-related indicators of the two groups. The results in Table 3 show that the groups had comparable baseline performance.

Table 3. Comparison of speed-performance indicators between the two groups before the experiment (nA = nB = 45)

No.	Test	Control group ($\bar{X} \pm SD$)	Experimental group ($\bar{X} \pm SD$)	t-value	p-value
1	60-m sprint (s)	8.63 ± 0.84	8.66 ± 0.78	1.21	> 0.05
2	100-m sprint (s)	14.26 ± 0.75	14.23 ± 0.69	1.09	> 0.05

Comment: The calculated t-values were lower than the critical t-value (t0.05;88 = 1.987). Thus, the differences in performance between the experimental and control groups before the experiment were not statistically significant (p > 0.05). The experimental sample was therefore considered sufficiently homogeneous.

After 12 weeks of applying the new exercise system to the experimental group while maintaining the standard program for the control group, the post-test results are presented in Tables 4 and 5.

Table 4. Comparison of speed-performance indicators between the two groups after the experiment (nA = nB = 45)

No.	Test	Control group ($\bar{X}$ ± SD)	Experimental group ($\bar{X}$ ± SD)	t-value	p-value
1	60-m sprint (s)	8.59 ± 0.78	8.05 ± 0.98	3.05	< 0.05
2	100-m sprint (s)	14.21 ± 0.84	13.85 ± 0.91	2.67	< 0.05

Table 5. Comparison of changes in speed performance in the two groups before and after the experiment

No.	Test	Control group: Pre-test	Control group: Post-test	Experimental group: Pre-test	Experimental group: Post-test
1	60-m sprint (s)	8.63 ± 0.84	8.59 ± 0.78	8.66 ± 0.78	8.05 ± 0.98
2	100-m sprint (s)	14.26 ± 0.75	14.21 ± 0.84	14.23 ± 0.69	13.85 ± 0.91

The results in Tables 4 and 5 show that, after the experimental period, the experimental group improved more markedly than the control group in both tests:

For the 60-m test, the experimental group's time decreased from 8.66 s to 8.05 s (a reduction of 0.61 s), whereas the control group's time decreased by only 0.04 s. The post-test difference between the two groups was statistically significant (t = 3.05, p < 0.05).

For the 100-m test, the experimental group showed a notable improvement, with running time decreasing from 14.23 s to 13.85 s (a reduction of 0.38 s). The control group showed only a negligible change. The between-group difference was statistically significant (t = 2.67, p < 0.05).

The greater improvement observed in the experimental group suggests that the selected system of six speed-development exercises had a positive effect on several components of speed-related fitness, including explosive speed, stride frequency, and speed endurance. Combining short acceleration sprints (30 m and 60 m) with supplementary technical drills (high-knee running, bounding/stride-running, and variable-pace running) may help students optimize their movement cycles and maintain near-maximal speed more effectively during the final segment of the 100-m sprint.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

– The current 100-m sprint performance of male Cohort-60 students at Thai Nguyen University of Technology, Thai Nguyen University, remains relatively low, with 23.6% of students failing to meet the required standard.

– The study selected and systematized six speed-development exercises suited to the student

population and the university's practical conditions: (1) 30-m sprint from a standing start; (2) high-knee running over 20–30 m; (3) 50-m bounding/stride-running drill; (4) 60-m sprint at high speed; (5) variable-pace running; and (6) repeated 100-m runs.

– After the 12-week experiment, the proposed exercise system demonstrated clear pedagogical effectiveness. The experimental group achieved significantly greater improvements than the control group ($p < 0.05$) in both the 60-m sprint ($t = 3.05$) and the 100-m sprint ($t = 2.67$).

4.2. Recommendations

– The six-exercise speed-development system should be more widely incorporated into the physical education curriculum (track-and-field component) for subsequent student cohorts at Thai Nguyen University of Technology, Thai Nguyen University.

– Lecturers may flexibly adjust exercise volume and intensity according to the actual fitness levels of each student group to achieve the best possible outcomes.

REFERENCES

[1]. Ministry of Education and Training (2008). Decision No. 53/2008/QD-BGDDT dated 18 September 2008 promulgating the Regulations on the Assessment and Classification of Students' Physical Fitness. Hanoi.
[2]. Ministry of Education and Training (2018). General Education Curriculum: Physical Education. Vietnam Education Publishing House.
[3]. Ministry of Education and Training (2020). Circular No. 48/2020/TT-BGDDT dated 31 December 2020 on Sports Activities in Schools. Hanoi.
[4]. Government of Vietnam (2015). Decree No. 11/2015/ND-CP dated 31 January 2015 on Physical Education and Sports Activities in Schools. Hanoi.
[5]. Duong Nghiep Chi (2002). Sports Measurement. Sports Publishing House, Hanoi.
[6]. Le Van Lam et al (2007). The Current State of Students' Physical Development at the Turn of the Twenty-First Century. Sports Publishing House, Hanoi.
[7]. Nguyen Trong Hai, Vu Duc Thu, Phung Thi Hoa, & Vu Bich Hue (1998). A study assessing the current state of physical education and sports development in schools at all levels. In Proceedings on Physical Education in Schools at All Levels. Sports Publishing House, Hanoi.
[8]. Dong Van Trieu, & Le Anh Tho (2010). Theory and Methodology of Physical Education in Schools. Sports Publishing House, Hanoi.