



## BUILDING CRITERION FOR EVALUATING AND CLASSIFYING STUDENTS' PHYSICAL FITNESS HO CHI MINH CITY UNIVERSITY OF TECHNICAL AND EDUCATION, VIETNAM<sup>i</sup>

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### Abstract:

Through reference to scientific works published in Vietnam as well as abroad, the topic has synthesized 53 tests (including 12 morphological tests; 24 fitness tests; 10 physiological tests and 7 psychological tests) to include in the selection of students' fitness assessment and classification. On the basis of the tests that are synthesized and following the selection principles, the topic has reduced the complicated and less common exercises, the remaining 41 tests are included in the interviewing step of experts. As a result, the topic has selected 15 tests that met the conventional conditions, as well as ensuring reliability and informability to be included in the physical assessment for students of Ho Chi Minh City University of Technology and Education. There are 03 morphological tests [Standing height (cm), Weight (kg), BMI]; 08 fitness tests [Lie on your back with belly flex for 30s (times), Stand flexibly flex your body (cm), Right hand squeeze force (KG), Jump away in place (cm), Jump far (cm)), Running a shuttle 4x10m (s), Running 30m high starting position (s), Running 800m/1500m (s)]; 02 physiological tests [Lung capacity (l), Cardiac function (Hw)]; ; 02 psychological tests [Tapping Test (point), Landolt ring (bit / s)]. After conducting a physical capacity assessment test of students at Ho Chi Minh City University of Technology and Education (HCMUTE) with 15 tests used to examine morphology, fitness, psychological and physiological functions. We have noted that male and female students have a normal physical state. The research results have built the physical assessment and scoreboard according to 13 criteria in morphology, physical strength and mental and physiological functions for male and female students. At the same time, the topic has also built a comprehensive assessment scoreboard of 13 survey criterion that is reliable and objective enough to be the basis for the general physical assessment for students of the HCMC University of Technical and Education.

<sup>i</sup> XÂY DỰNG TIÊU CHUẨN ĐÁNH GIÁ VÀ PHÂN LOẠI THỂ CHẤT SINH VIÊN TRƯỜNG ĐẠI HỌC KỸ THUẬT VÀ GIÁO DỤC THÀNH PHỐ HỒ CHÍ MINH

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**Keywords:** assessment, classification, students, physical, technology and education

**Tóm tắt:**

Qua tham khảo các công trình khoa học đã được công bố ở trong nước cũng như nước ngoài, đề tài đã tổng hợp được 53 test (12 test hình thái; 24 test thể lực; 10 test sinh lý và 7 test tâm lý) để đưa vào lựa chọn đánh giá, phân loại thể lực của SV. Trên cơ sở các test tổng hợp và tuân theo các nguyên tắc lựa chọn, đề tài đã lược bớt các bài tập phức tạp, ít phổ biến còn lại 41 test để đưa vào bước phỏng vấn chuyên gia. Cuối cùng đề tài đã lựa chọn được 15 test thỏa các điều kiện như quy ước, cũng như đảm bảo độ tin cậy và tính thông báo để đưa vào kiểm tra đánh giá thể chất SV Trường ĐH SPKT TPHCM, đó là: 03 test hình thái [Chiều cao đứng (cm), Cân nặng (kg), Chỉ số BMI]; 08 test thể lực [Nằm ngửa gập bụng/30s (lần), Đứng dẻo gập thân (cm), Lực bóp tay thuận (KG), Bật xa tại chỗ (cm), Nhảy xa (cm), Chạy con thoi 4x10m (s), Chạy 30m XPC (s), Chạy TB 1500m (s)]; 02 test sinh lý [Dung tích sống (l), Công năng tim (Hw)]; ; 02 test tâm lý [Test Tapping (đ), Vòng hờ LanDolt (bit/s)]. Sau khi tiến hành kiểm tra đánh giá năng lực thể chất sinh viên Trường ĐH SPKT TP.HCM với 15 test khảo sát trên các mặt hình thái, thể lực, chức năng tâm lý và sinh lý ghi nhận được: SV nam, nữ có trạng thái thể lực bình thường, Kết quả nghiên cứu đã xây dựng được các bảng phân loại đánh giá thể chất và bảng điểm theo 13 tiêu chí ở các mặt hình thái, thể lực và chức năng tâm, sinh lý cho SV nam và nữ. Đồng thời đề tài cũng đã xây dựng bảng điểm đánh giá tổng hợp của 13 tiêu chí khảo sát đủ độ tin cậy và khách quan làm cơ sở cho việc đánh giá thể chất chung cho SV trường ĐHSPTK.TPHCM.

**Từ khóa:** đánh giá, phân loại, sinh viên, phân loại, thể chất, Sư phạm kỹ thuật

## 1. Introduction

Ho Chi Minh City University of Technical and Education (HCM UTE) is a multi-disciplinary, multi-disciplinary university with career-application orientation, in which some training fields are research-oriented and development. The university brings together the advantages of a spacious and safe learning institution as well as being Vietnam's leading training and research and application center in the field of technology and vocational education, on a par with other Reputable regional and international universities.

The one also plays a role as a source of sustainable development for the vocational education system of the whole country and carries out the mission of research, technology transfer and science and vocational education; providing human resources and high-quality scientific products for national construction and development, contributing to fundamental and comprehensive innovation of Vietnamese education and training, international integration and sustainable development.

On June 30, 2017, the Prime Minister issues Decision No. 937 / QĐ-TTg approving the pilot project to change with the operating mechanism of Ho Chi Minh City University

of Technical Education which activating towards improving autonomy and comprehensive self-responsibility.

With the scale of more than 20,000 learners in different generations, but the health check and assessment of learners has not been conducted regularly and annually according to the regulations of Viet Nam Ministry of Education and Training. Ho Chi Minh City University of Technical and Education currently does not have a standard system for assessing and classifying the student's physicality. From the above reasons, it can be seen that the study "Building evaluation standards and physical classification of students at Ho Chi Minh City University of Technical and Education" is very necessary. The research results will be the basis for monitoring the physical quality of input and output to adjust and change the content of the physical education subject to suit students and the requirements of each profession which typically trained. Thereby, it contributes to the training of physically strong human resources.

## **2. Research method**

### **2.1. Research object**

Research object: Collective staff, lecturers of Center for Physical Education and National Defense (about 20 people) and 500-600 male and female students with normal health, participating in Physical Education. These students belong to the non-majors sport of Ho Chi Minh City University of Technical and Education.

### **2.2. Research scope**

Standard assessment and classification of student's physical condition.

### **2.3. Procedure**

The research was conducted from January to September 2019 to October 2020 at Ho Chi Minh City University of Technical and Education.

### **2.4. Measurement tools**

Common methods used in the implementation of research tasks include: Synthesize and analyze related documentary methods; Sociological Investigation; Examination of pedagogy; Examination of mental - physiological function; Statistics and calculations.

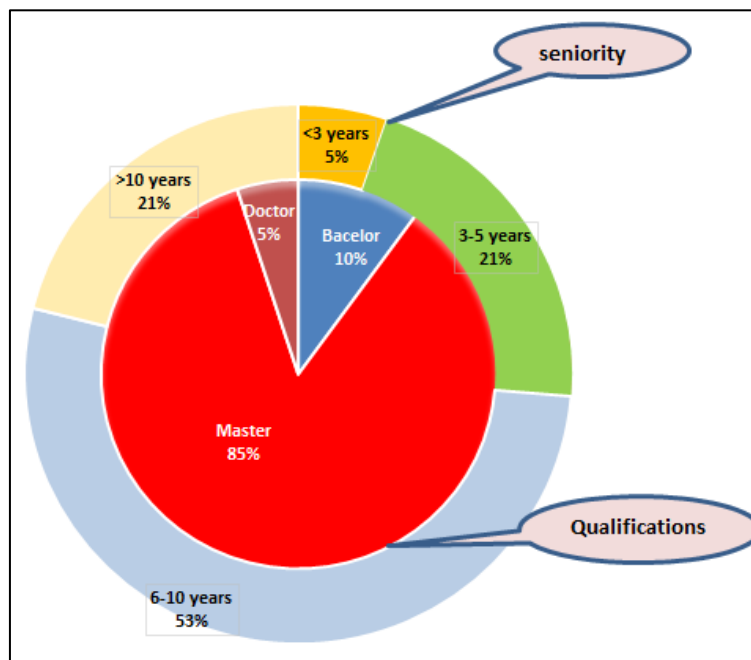
## **3. Research results**

### **3.1. Selection the student's physical assessment tests in accordance with the practical conditions of HCMUTE**

#### **3.1.1. Selection of evaluation tests**

Through reference to scientific works published in Vietnam as well as abroad, the topic has synthesized 53 tests (12 morphological tests; 24 fitness tests; 10 physiological tests

and 7 psychological tests) to put into the selection to evaluate and classify the student's fitness. [1], [4], [5], [6]



**Chart 1:** Qualifications and seniority of interviewees

On the basis of synthetic tests and following the selection principles, the topic has reduced complex exercises, less common or almost not used in assessing student fitness in universities. The results remain 41 tests to be included in the next expert interviewing step.

To ensure the objectivity in the selection of evaluation criteria, the topic interviewed experts who are staff, teachers of physical education (official and visiting lecturers) at HCMUTE. Interviews were conducted in the indirect form of 2 times using questionnaires (2 weeks apart). The interviewees are 20 lecturers of physical education with qualifications including: 01 PhD (accounting for 5%); 17 masters (accounting for 85%); 02 Bachelor (rate 10%). Working years of school include: <3 years (reaching the rate of 5%); 3-5 years (reaching 20%); 6-10 years (rate 50%); > 10 years (25%). (Chart 1)

After reducing from 53 tests to 41 tests, the topic continues to interview lecturers specialized in physical education who have been teaching at HCMUTE to choose the tests to assess students.

Each test in the interview table has 5 levels to choose from on the Likert scale to answer: Totally disagree (1 point); Disagree (2 points); Normal (3 points); Agree (4 points); Totally agree (5 points).

The selected tests must adhere to the following basic principles:

- Ensuring reliability, reporting, feasible, less expensive, easy to deploy.
- Simple, easy to implement, suitable for the current conditions of machinery for measurement of HCMUTE.

- These tests must ensure comprehensive physical assessment of students of HCMUTE and can be compared with students of other universities nationwide.

In addition, the topic also conventionally selects only the tests to assess the student's physical fitness with the rate of  $\geq 80\%$  approval by 2 interviews (eliminating the tests with  $< 80\%$  approval rate). At the same time there must be consistency (no significant difference) between the 2 interviews (Sig.  $> 0.05$ ).

From 41 tests collected, through expert opinion, the topic has selected 15 tests that satisfy the conditions as convention, they are:

**Table 1:** Collection of selected tests that satisfy the conditions by convention

Morphological tests	(1) Standing height (cm) (2) Weight (kg) (3) BMI
Fitness tests	(4) Lie on your back with belly flex for 30s (times) (5) Stand flexibly flex your body (cm) (6) Right hand squeeze force (KG) (7) Jump away in place (cm) (8) Long jump (cm) (9) Running a shuttle 4x10m (s) (10) Running 30m high starting position (s) (11) Running 800m/1500m (s)
Physiological tests	(12) Lung capacity (l) (13) Cardiac function (Hw
Psychological tests	(14) Tapping Test (point), (15) Landolt ring (bit/s)

### 3.1.2. Check reliability and reportability of selected tests

For the purpose of examining the feasibility of the selected tests, we have determined the reportability and reliability of the physical, physiological and psychological tests (morphological tests for high stability, therefore no retest is required). As follows:

#### 3.1.3 The reliability of the tests

the thesis has determined the reliability of the tests through the retest method [repeated tests, determined the reliability coefficient between the results of 2 test sets (1 week apart) in at the same time of day, the same conditions, the same subjects; 30 male students and 30 female students).

#### 3.1.4 Reportability of the tests

The reportability of the tests is expressed through the correlation coefficient between the results of the test performance and the learning results of the physical education section 1 (the average score of the course). This is the basic module with the characteristics of equipping students with baseline fitness, having all the features of the movement aspects as in the selective tests.

Through practical testing, 15 tests have been identified (including aspects: morphology, physical strength, physiology and psychology) with reliability ( $r_{tt}$ )  $\geq 0.8$  and reportability ( $r_{tc}$ )  $\geq 0.6$ . From there, it is eligible to apply these tests to assess the physical capacity of students at HCMUTE.

### 3.3. Classification and scale up to assess the physical fitness of students at HCMUTE

#### 3.2.1. Develop evaluation criterion and classify each criterion for male and female students

In order to ensure the significance of building a fitness assessment system of students of the HCMUTE, we build a system of physical assessment standards based on the  $\pm 2S$  method. We set up a rating table according to the following 5 standards:

**Table 2:** Standard of physical fitness assessment according to the  $\pm 2S$  method

Classification	Evaluation
$> (\bar{X} + 2S)$	Good
$(\bar{X} + S + \Delta) \sim (\bar{X} + 2S)$	Rather
$(\bar{X} - S) \sim (\bar{X} + S)$	medium
$(\bar{X} - S - \Delta) \sim (\bar{X} - 2S)$	Weak
$< (\bar{X} - 2S)$	Least

Because the weight test and BMI are specific (with an appropriate standard assessment) [7], we do not classify and score for these two tests. So overall there will be 13 physical assessment tests.

Below are the standard tables of classification evaluation of 13 physical tests for male students (Table 3) and female students (Table 4) of HCMUTE.

Nguyen Duc Thanh  
 BUILDING CRITERION FOR EVALUATING AND CLASSIFYING STUDENTS' PHYSICAL  
 FITNESS HO CHI MINH CITY UNIVERSITY OF TECHNICAL AND EDUCATION, VIETNAM

**Table 3: Classification by each test of the physical aspects of male students**

No	Test	Classification										
		Poor	Weak			Average			Fair		Good	
1	Standing height (cm)	<154	154	~	159	160	~	170	171	~	175	> 175
2	Lie on your back with belly flex for 30s (times)	<14	14	~	16	17	~	23	24	~	26	> 26
3	Stand flexibly flex your body (cm)	< 7	7	~	9	10	~	16	17	~	19	> 19
4	Right hand squeeze force (KG)	< 31	31	~	35	36	~	44	45	~	49	> 49
5	Jump away in place (cm)	< 160	160	~	179	180	~	220	221	~	240	> 240
6	Long jump (cm)	< 3.3	3.3	~	3.5	3.6	~	4.2	4.3	~	4.5	> 4.5
7	Running a shuttle 4x10m (s)	> 13''	13''	~	12''01	12''	~	10''	9''99	~	9''	< 9''
8	Running 30m high starting position (s)	> 6''00	6''00	~	5''51	5''50	~	4''50	4''49	~	4''00	< 4''00
9	Running 1500m (s)	> 464''	464''	~	433''	432''	~	408''	407''	~	366''	< 366''
		> 7'44	7'44	~	7'43	7'42	~	6'48	6'47	~	6'36	< 6'36
10	Lung capacity (l)	< 2.6	2.6	~	2.9	3.0	~	3.8	3.9	~	4.2	> 4.2
11	Cardiac function (Hw)	> 12.5	12.5	~	11.1	11	~	8.0	7.9	~	6.5	< 6.5
12	Tapping Test (point)	< 109	109	~	117	118	~	138	139	~	147	> 147
13	Landolt ring (bit/s)	< 0.9	0.9	~	1.0	1.1	~	1.5	1.6	~	1.7	> 1.7

**Table 4: Classification by each test of the physical aspects of female students**

No	Test	Classification										
		Poor	Weak			Average			Fair		Good	
1	Standing height (cm)	< 146	146	~	150	151	~	161	162	~	165	> 165
2	Lie on your back with belly flex for 30s (times)	< 10	10	~	12	13	~	17	18	~	19	> 19
3	Stand flexibly flex your body (cm)	< 2	2	~	5	6	~	12	13	~	16	> 16
4	Right hand squeeze force (KG)	< 18.2	18.2	~	21.5	21.6	~	28.4	28.5	~	31.8	> 31.8
5	Jump away in place (cm)	< 134	134	~	141	142	~	158	159	~	166	> 166
6	Long jump (cm)	< 181	181	~	215	216	~	284	285	~	318	> 318
7	Running a shuttle 4x10m (s)	> 13''5	13''5	~	13''1	13''0	~	12''0	11''9	~	11''5	< 11''5
8	Running 30m high starting position (s)	> 7''00	7''00	~	6''49	6''50	~	5''50	5''49	~	5''00	< 5''00
9	Running 1500m (s)	> 320''	320''	~	296''	295''	~	245''	244''	~	220''	< 220''
		> 5'20	5'20	~	4'46	4'45	~	4'05	4'04	~	3'40	< 3'40

10	Lung capacity (l)	< 1.7	1.7	~	2	<b>2.1</b>	~	<b>2.9</b>	3.0	~	3.3	> 3.3
11	Cardiac function (Hw)	> 14.4	14.4	~	12.9	<b>13</b>	~	<b>9</b>	9.1	~	7.6	< 7.6
12	Tapping Test (point)	< 95	95	~	102	<b>103</b>	~	<b>117</b>	118	~	124	> 124
13	Landolt ring (bit/s)	< 0.8	0.8	~	0.9	<b>1.0</b>	~	<b>1.4</b>	1.5	~	1.6	> 1.6

### 3.2.2. Develop evaluation criterion according to points for each criterion (morphology, fitness and mental-physiological function)

Because each criterion has different units of calculation, so in order to construct a synthetic standard for favorable physical assessment, a unified unit of measurement can be used as the score. Here we use the C scale, which is rated on 10 levels (from point 1 to point 10). Since it is the standard scale, the prerequisite when using the C scale is that the test data of the HCMUTE student's physical assessment tests must be of the normal or near-standard distribution.

Through the C-scale, the topic has built a comprehensive physical assessment scoreboard according to each criterion of HCMUTE; first year male students (table 5) and first year female students (table 6).

The classification tables support the consideration of each criteria, while the score-based tables aim to evaluate the overall criterion. [8]

**Table 5:** Scale of physical assessment by each criteria of male students

No	Test	Scores									
		1	2	3	4	5	6	7	8	9	10
1	Standing height (cm)	154	157	159	162	<b>165</b>	167	170	172	175	178
2	Lie on your back with belly flex for 30s (times)	13	15	17	18	<b>20</b>	21	23	25	26	28
3	Stand flexibly flex your body (cm)	7	8	10	11	<b>13</b>	15	16	18	19	20
4	Right hand squeeze force (KG)	31.2	33.4	35.6	37.8	<b>40</b>	42.2	44.4	46.6	48.8	51
5	Jump away in place (cm)	160	170	180	190	<b>200</b>	210	220	230	240	250
6	Long jump (cm)	3.2	3.4	3.6	3.7	<b>3.9</b>	4.1	4.2	4.4	4.6	4.7
7	Running a shuttle 4x10m (s)	13	12.5	12	11.5	<b>11</b>	10.5	10	9.5	9	8.5
8	Running 30m high starting position (s)	6'00	5'75	5'5	5'25	<b>5'0</b>	4'75	4'50	4'25	4'00	3'75
9	Running 1500m (s)	8'12	7'54	7'36	7'18	<b>7'0</b>	6'42	6'24	6'06	5'48	5'30
		492''	474''	456''	438''	<b>420''</b>	402''	384''	366''	348''	330''
10	Lung capacity (l)	2.6	2.8	3.0	3.2	<b>3.4</b>	3.6	3.4	3.8	4.0	4.2



Nguyen Duc Thanh  
 BUILDING CRITERION FOR EVALUATING AND CLASSIFYING STUDENTS' PHYSICAL  
 FITNESS HO CHI MINH CITY UNIVERSITY OF TECHNICAL AND EDUCATION, VIETNAM

11	Cardiac function (Hw	12.5	11.8	11	10.3	<b>9.5</b>	8.8	8	7.3	6.5	5.8
12	Tapping Test (point),	88	98	108	118	<b>128</b>	138	148	158	168	178
13	Landolt ring (bit/s)	0.3	0.6	0.8	1.1	<b>1.3</b>	1.6	1.8	2.1	2.3	2.6

**Table 6:** Scale of physical assessment by each criteria of female students

No	Test	Scores									
		1	2	3	4	5	6	7	8	9	10
1	Standing height (cm)	146	149	151	153	<b>156</b>	158	160	162	165	167
2	Lie on your back with belly flex for 30s (times)	10	11	13	14	<b>15</b>	16	18	19	20	21
3	Stand flexibly flex your body (cm)	0	2	4	7	<b>9</b>	11	14	16	18	21
4	Right hand squeeze force (KG)	17.8	19.6	21.4	23.2	<b>25</b>	26.8	28.6	30.4	32.2	34
5	Jump away in place (cm)	134	138	142	146	<b>150</b>	154	158	162	166	170
6	Long jump (cm)	1.8	2.0	2.2	2.3	<b>2.5</b>	2.7	2.8	3.0	3.2	3.4
7	Running a shuttle 4x10m (s)	14.2	13.8	13.4	13	<b>12.6</b>	12.2	11.8	11.4	11	10.7
8	Running 30m high starting position (s)	7''10	6''80	6''50	6''25	<b>6''00</b>	5''75	5''45	5''20	4''90	4''60
9	Running 1500m (s)	5'20	5'07	4'55	4'42	<b>4'30</b>	4'17	4'05	3'52	3'40	3'06
		320''	307''	295''	282''	<b>270''</b>	257''	244''	232''	220''	186''
10	Lung capacity (l)	1.6	1.9	2.1	2.3	<b>2.5</b>	2.7	2.5	2.9	3.1	3.4
11	Cardiac function (Hw	14.4	13.5	12.7	11.8	<b>11</b>	10.2	9.3	8.5	7.6	6.8
12	Tapping Test (point),	94	98	101	105	<b>110</b>	114	118	122	126	130
13	Landolt ring (bit/s)	0.8	0.9	1.0	1.1	<b>1.2</b>	1.3	1.4	1.5	1.6	1.8

### 3.2.3. Develop standards to evaluate the student's physical fitness according to scores

In practice, not only evaluating one side, but also evaluating many different angles of physical capacity, so it is necessary to use the integrated assessment method. Since tests are measured in different units of measurement, in order to build a general standard of fitness, only one unified unit of measurement can be used as the score.

The physical assessment of students synthesizes scores with a process that includes the following steps:

Step 1: Determine the score of each criterion according to the corresponding table (male students choose table 3, female students choose table 4).

Step 2: Sum the individual scores of each criterion together.

Step 3: Based on the combined score to evaluate and classify the general fitness level of students (Table 7).

According to the regulations of the Ministry of Education and Training, the following 5 standards are assessed and classified:

Good: 9 - 10 scores

Fair: 7 - close to 9 scores

Average: 5 - close to 7 scores

Weak: 3 - close to 5 scores

Poor: <3 scores

Applying to the test results of the total of 13 criterion (130 points), we have built a general scoreboard (table 5) as follows:

**Table 7:** Scorecard for overall assessment of HCMUTE student's fitness

Total score	Classification
≥ 117 scores	Good
92 - 117 scores	Fair
65 - 91 scores	Average
39 - 64 scores	Weak
< 39 scores	Poor

#### 4. Conclusion

Through reference to scientific works published in the country as well as abroad, the topic has synthesized 53 tests (12 morphological tests; 24 fitness tests; 10 physiological tests and 7 psychological tests) to put into the selection to evaluate and classify the student's fitness. On the basis of synthetic tests and following the selection principles, the topic has reduced the complicated and less common exercises, the remaining 41 tests to include in the expert interviewing step. In the end, the topic selected 15 tests that met the conventional conditions, as well as ensuring reliability and reportability to be included in the physical assessment of students at HCMC UTE.

Conducted a physical assessment test of HCMUTE students with 15 tests examined on the aspects of morphology, fitness, psychological function and physiology recorded: male and female students have a normal physical state. However, the physical level is not evenly developed among students (many tests have a  $Cv > 10\%$ ), which reflects the quite high differentiation, profession characteristics between faculties, training branches or interdisciplinary physical activity mode in students. In general, the physical characteristics of HCMUTE students are quite similar to those of other universities that do not specialize in physical training, but compared to students in universities specializing in physical training, it is somewhat limited.

The research results have built the physical assessment and scoreboard according to 13 criterion in morphology, physical strength and mental and physiological functions for male and female students. At the same time, the topic has also built a composite assessment scoreboard of 13 surveying criterion that is reliable and objective enough to be the basis for the overall physical assessment for HCMUTE students.

### **Conflict of Interest Statement**

I declare that there have no competing interests.

### **About the Author**

Associate Professor Thanh Nguyen Duc (PhD), place of birth: Dong Thap province, Vietnam, Manager of The Center of Defense and Physical Education, HCMC University Technology and Education, Vietnam. Research interests: teaching physical education and training sports.

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