

## Determining the presence of developmental sequences for running using the body component approach

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**Determining the presence of developmental sequences for running using the body component approach:** *The fundamental movement skills are introductory and the building block patterns to other more specialized and more complex movement patterns that are present in sport and physical activities.*

*The aim of this study is to determine the percentage of body components that define the development level of fundamental movement skill of locomotor type - running using the body component approach. Running is divided into developmental sequences. There are two body components which include steps in their development.*

*The study analyzed 460 male children 3-10 years old. All children performed three consecutive running. All trials are analyzed with qualitative analysis and after that we calculated the percentage of presents for the steps of development for both body components.*

*The highest step of development sequences which is at least present (observed) can be considered as the most difficult to perform and that which is the most present is easiest to perform.*

*According to the results the most difficult to achieve for 3 year old children are both body components which are not present at all. The most difficult for 4-10 years old is the body component which defines arm action (4,92%, 13,84%, 29,63%, 32,2%, 40,38%, 41,36%, 56,86%).*

*The results of our research also show that there is a positive increasing trend of percentage in both highest steps of body components.*

*Knowing the level of development of fundamental movement skills by teacher is crucial in order to achieve a higher level of performance. It is than recommended that the teacher should continuously monitor and record the performance of the fundamental motor skills.*

**Key Words:** *the most difficult component, body segments, qualitative analysis, performance.*

### INTRODUCTION

Fundamental movement skills are integral part of physical education curriculums for children from their early ages. Running as a fundamental movement skill of locomotor type has particular significance not only in sports but in everyday human activity.

The fundamental movement skills are introductory and the building block patterns to other more specialized and more complex movement patterns that are present in sport and physical activities. They usually emerge between 1 and 7 years of age [2]. Research shows that those who lack fundamental movement are less able and often less desire for learning and development of other more complex skills and interest in the future to practice certain physical activities that will contribute to develop less active and less healthy people [6, 3, 1,7].

### EXPOSITION

#### Working Methods

The aim of this study was to determine the percentage of steps which define the level of development in running. Participants for this study included 460 children aged 3 to 10 years of Primary School 11<sup>th</sup> Oktomvri from Skopje (3 years – 30 children, 4 – 61, 5 – 53, 6 – 81, 7 – 59, 8 – 71, 9 – 54 and 10 – 51).

Running is divided into developmental sequences (table 1) and there are two body components which included steps in their development ([5,6])

The highest step of development sequences which is at least present (observed) is considered as the most difficult to perform and that which is the most present is easiest to perform.

All children performed three consecutive running. They had to ran as fast as they can approximately 12 m. All performance are recorder with two cameras (Sony dcr-sr 300, frontal view, and High Speed Digital Camera Casio ex-fh 100, sagittal view). We

conducted qualitative analysis using Dartfish Connect 4.5 software especially slow motion mode to all performances of subjects and after that we calculated the percentage of presents for the steps of development for both body components.

**Table 1**

**Hypothesized developmental sequence for running**

<b>Leg action</b>	
Step 1	Minimal flight. The running step is short and flat-footed. On the recovery swing forward, the leg is rather stiff.
Step 2	Crossover swing. The stride is long, and the recovery leg knee flexes to at least right angle. The leg action, though, has lateral movements wherein the legs swing out and in during the recovery.
Step 3	Direct projection. The stride is long, and the recovery leg tucks to swing forward. The legs project directly backward on takeoff and swing directly forward for the touchdown.
<b>Arm action</b>	
Step 1	High or middle guard. The arms are both held up at waist to shoulder level and move very little as the legs stride forward and back.
Step 2	Bilateral arm swing. The arms swing but they are coupled, moving forward and backward together.
Step 3	Opposition, oblique. The arms drive forward in the opposition pattern, moving forward and backward with the opposition leg, so that one arm is moving forward while the other is moving backward. The arms, though, swing across the chest or out to the side, in a plane oblique to the plane of movement.
Step 4	Opposition, sagittal. The arms swing forward and back in the opposition pattern and stay nearly in the sagittal (or forward-back) plane of motion.

**RESULT AND DISCUSSION**

According to the results presents in table 2, the most difficult to achieve for 3 year old children are both body components which are not present at all. The most difficult for 4-10 years old is the body component which defines arm action – (Opposition, sagittal. The arms swing forward and back in the opposition pattern and stay nearly in the sagittal (or forward-back) plane of motion), 0 – 56,86%. It shows that among participants is more difficult to achieve the highest step of arm action than the highest step of leg action.

**Table 2**

**Percent of all steps in development sequences in running**

<b>Age (years)</b>	<b>Leg action</b>			<b>Arm action</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>3</b>	72,22	27,78	0*	24,45	61,11	14,44	0*
<b>4</b>	31,15	57,38	11,47	7,65	50,82	36,61	4,92*
<b>5</b>	21,39	57,86	20,75	4,4	30,19	51,57	13,84*
<b>6</b>	3,29	30,04	66,67	1,64	7,82	60,91	29,63*
<b>7</b>	0	28,81	71,19	0	6,78	61,02	32,2*
<b>8</b>	0	22,07	77,93	0	1,4	58,22	40,38*
<b>9</b>	0	17,28	82,72	0	2,47	56,17	41,36*
<b>10</b>	0	7,84	92,16	0	0	43,14	56,86*

The results of our research also show that there is a positive increasing trend of percentage in both highest steps of body components (figure 1 and figure 2).

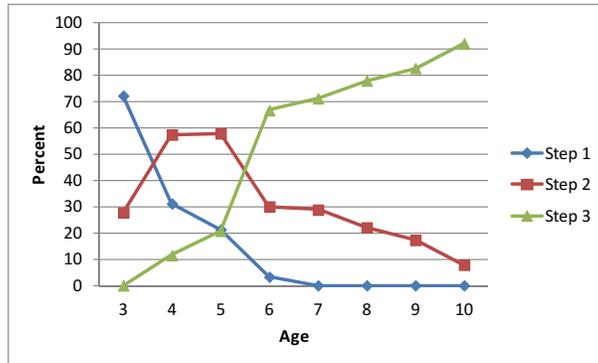


Figure 1. Positive increasing trend of percentage in the highest step in leg action – step 3

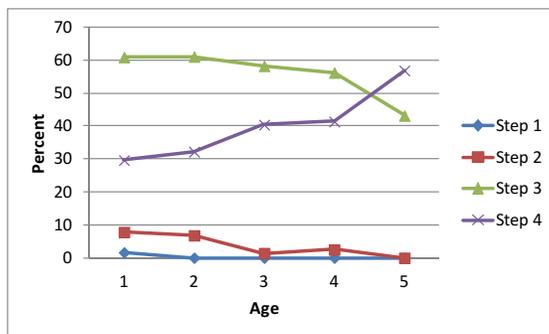


Figure 2. Positive increasing trend of percentage in the highest step of arm action – step 4

Knowing the level of development of fundamental movement skills by teacher is crucial in order to achieve a higher level of performance. It is than recommended that the physical education teacher should monitor the development level of these skills in order to assess the performance of the skills through which he can get relevant information about the strengths and weaknesses in children's performance. These information will allow the teacher to has full insight not only in the level of development, but to get real view of the need to dedicate more attention to those parts of the movement that are more difficult to achieve, so according to this it can be planned and developed the physical education curriculum.

### CONCLUSION

The results of the study show that the highest step in the level of development which defines the arm action is more difficult to achieve than the highest step of leg action. This is just one example of assessing the level of development in a small number of participants that could be extended to more schools or cities in order to obtain more relevant insight in their development especially if the study includes a large number of fundamental movement skills that would have global insight into their level of development.

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**The report has been reviewed.**