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MOBAK - 1

Basic motor competencies in first grade



TEST MANUAL



Impressum

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MOBAK - 1

Basic motor competencies in first grade

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TEST MANUAL



1 Focus of interest

Educational policy makers question the learning outcomes achieved in each academic subject. Thus, each subject has to provide empirical evidence regarding which competencies need to be achieved by each student at a specific point in time. Educational policy makers and practitioners use this information to justify their decisions (BMBF, 2007). In order to record the effects of physical education, it is necessary to develop assessment instruments that are also valid and practical for this subject. The MOBAK-1 test battery, which measures basic motor competencies in primary school, is an assessment instrument designed for this purpose. In the following, we describe the theoretical background (2), the underlying structure model (3), the development, the execution, and the evaluation of the test items, (4) and the validation study.

2 Theoretical background

The central task of Physical Education (P.E.) is the qualification of students to actively take part in the culture of sports and exercise. This contributes to the development of a physically active lifestyle. A prerequisite for this is the availability of basic motor competencies (cf. for details Herrmann & Gerlach, 2014).

For instance, there is a broad consensus among subject experts and teachers that all students need to be able to handle a ball safely in order to play ball. It is more difficult for children who do not have these competencies to participate in sports clubs or even play with their classmates on the playground. These practices are an enrichment for most people's cultural lives and an important part of active mobility and a healthy lifestyle (Kurz, Fritz, & Tscherpel, 2008).

People need basic motor competencies in order to ...

- ... take active part in the culture of sports and exercise.
- ... experience and understand sports and exercise as enriching their lives.
- ... be able to make decisions about whether to integrate sports into their own lives (Gogoll, 2012; Kurz, Fritz, & Tscherpel, 2008).

Basic motor competencies can be defined as motor performance dispositions which can be developed from situation-specific requirements and which can serve as an accomplishment strategy for requirements in the culture of sports and exercise.

Basic motor competencies ...

- ... can be learned for the long term, take into account previous experiences, and can be improved through practice.
- ... are explicitly context-dependent and refer to specific requirements in the culture of sports and exercise.
- ... are functional performance dispositions which are expressed in behavioral orientation behavior upon accomplishment (cf. Weinert, 2001).

3 Competency structure model

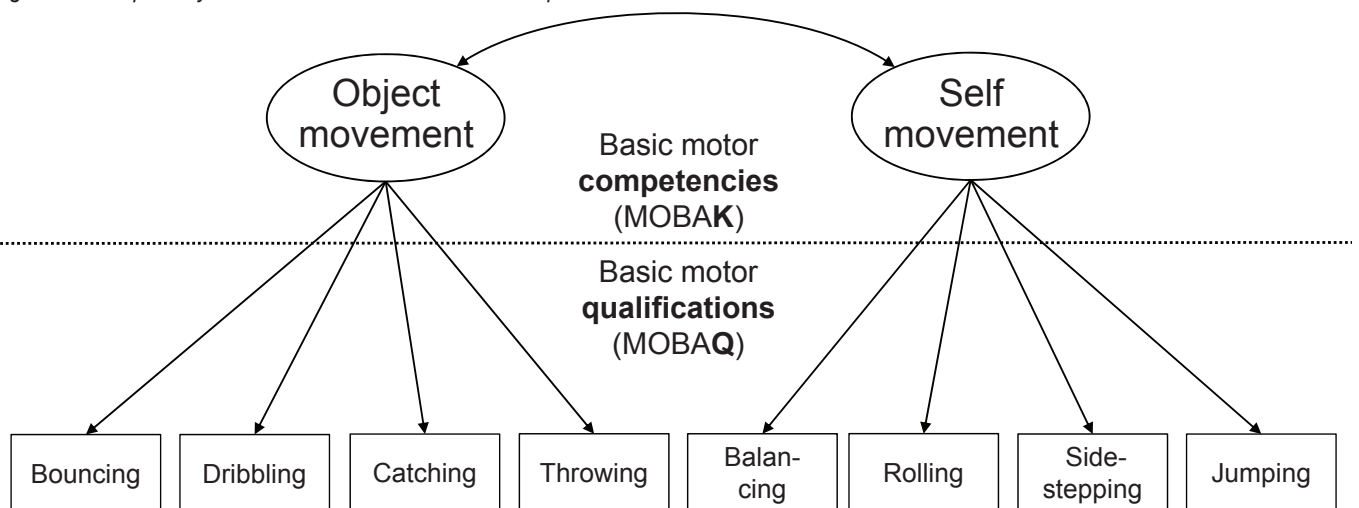
In the construction of the test battery, we differentiate between basic motor competencies (MOBAK), which are not directly observable, and basic motor qualifications (MOBAQ, cf. Kurz et al., 2008), which are observable. Basic motor qualifications (MOBAQ) formulate the educational standards as a can-do statement (e.g., “can throw,” “can catch”) and refer to the performances of students.

Basic motor qualifications are ...

- ... observable performances of athletic activities.
- ... oriented towards open motor skills (Roth & Willimczik, 1999).
- ... the basis of learning processes for sport-specific skills and techniques.

Basic motor competencies (MOBAK) are overall performance dispositions based on the observable performance behavior of the basic motor qualifications. The competence structure model (Figure 1) illustrates the relationship between basic motor qualifications and basic motor competencies. This allows the “indirect” acquisition of (latent) basic motor competencies through (manifest) basic motor qualifications.

Figure 1: Competency structure model of basic motor competencies¹



¹ This structure model was empirically confirmed by a factor analysis (see Chapter 5). Detailed information on factor values and model fits can be found in Herrmann, Gerlach, and Seelig (submitted).

4 MOBAK-1 test battery

4.1 Development of the test items

The test items for the acquisition of basic motor qualifications were developed on the basis of normative pedagogical discussions. The main question was: What should a child at a certain age be able to perform in order to take part in the culture of sports and exercise (Kurz et al., 2008)? The final arrangement of the test battery is the result of a wide selection of potential test items compiled and discussed in several expert discussions².

In order to ensure curricular validity, we developed the test items in close connection with the learning goals specified in the curriculum. The criteria for item construction were gender-specific test fairness as well as feasibility and age-appropriate item design. The eight test items are explained in detail in the appendix. These test items measure eight basic motor qualifications which can be assigned to the two basic motor competencies “object movement” and “self-movement” (Figure 1). The assignment in the competence structure model was carried out on the one hand on the empirical level (see Chapter 5) and on the other hand on the basis of the motor development theory by Clark and Metcalfe (2002) as well as the theory of “fundamental movement skills” (overview Burton & Miller, 1998).

1. The *basic motor competency “object movement”* involves the basic motor qualifications “throwing,” “catching,” “bouncing,” and “dribbling.” They are developed from requirements that include handling balls and serve as an accomplishment for requirements in various ball sports.
2. The *basic motor competency “self-movement”* involves the basic motor qualifications “balancing,” “rolling,” “jumping,” and “moving sideways.” They are developed from requirements that include handling the entire body in a room and serve as an accomplishment for requirements in gymnastics or athletics.

These two basic motor competencies are mutually dependent. A jump shot in handball is based not only on competent handling of the ball but also on the coordination of movements made by the entire body.

4.2 Execution of the test items

Each test item is explained and demonstrated by the test leader once.

- *MOBAQ test items “throwing” and “catching”*
Each child has six attempts at each test item (no trials). Each hit or catch is recorded. 0–2 hits or catches are assessed with 0 points, 3–4 hits or catches with 1 point, and 5–6 hits or catches with 2 points.
- *MOBAQ test items “bouncing,” “dribbling,” “balancing,” “rolling,” “jumping,” and “moving sideways”*
Each child has two attempts at fulfilling the task (no trials). This test item is dichotomously scaled (0 = failed, 1 = passed). The amount of times passed is recorded (both attempts failed = 0 points, one attempt passed = 1 point, both attempts passed = 2 points). The criteria for passing/failing can be seen in the description of the test items (cf. Tables 1 and 2).

During the development phase, we chose circuit operation as a form of organization. The students were divided into small groups with a test leader for each group. The test leader led the students to each testing station. This form of organization is suitable and economical for scientific purposes. However, it will be difficult to implement this method in P. E. lessons. In school, it would be preferable to implement the various test items in a course in which they are run successively and evaluated immediately, e.g., in the pairs “throwing” and “catching,” “bouncing” and “dribbling,” “balancing” and “rolling,” and “jumping” and “moving sideways.” This procedure allows students’ performances to be evaluated by a single test leader and thus also a single teacher.

² The development of the test items follows the cooperation with the FH Northwest Switzerland (the team of E. Gramespacher) and relies on preparatory work done at the University of Luxemburg (the team of W. Becker and C. Scheuer).

4.3 Evaluation of the test items

The data can be evaluated on the level of MOBAQ test items as well as on the level of MOBAK areas.

- The *MOBAQ test items* can be evaluated separately due to their point scores (0–2 points). It is possible to collect concrete information about each individual student and his or her performance on each test item. Thus, the teacher is able to assess the students' additional educational needs. This also allows teachers to match the teaching content with the children's performance levels.

- *MOBAK-areas "object movement" and "self-movement"*

The MOBAK areas are calculated as the sum of the results of the four MOBAQ test items (= factor sum value).

A maximum total of 8 points can be achieved for each area (4 test items x 2 points):

"throwing" + "catching" + "bouncing" + "dribbling" = "object movement" (maximum of 8 points)

"balancing" + "rolling" + "jumping" + "moving sideways" = "self-movement" (maximum of 8 points)

The MOBAK areas provide information on a broader range of tasks. On the basis of the scoring system (0 to 8 points), the level of a student's basic motor competencies can be determined separately. If the measurements are repeated over the course of time, the test battery can be used for the evaluation of P. E. lessons. The differences between the scores in the first and the second test provide information on the change in students' performances over a period of time. By comparing the mean value of the scores for the whole class, one can calculate the average change of the class.

5 Validation study and test fairness

The test items have been empirically reviewed in a validation study (N = 317; ♀ = 55%; M = 7.0 Jahre, SD = .36) (cf. for details Herrmann, Gerlach & Seelig, submitted; Herrmann, Gerlach, Krebs & Seelig, submitted).

- *Curricular validity:*

This aspect is fulfilled as a face validity due to the connection to the objective targets formulated in the syllabus.

- *Factorial validity:*

A two-factor analysis has been explored through factor analysis and has been confirmed with good model fitting for the MOBAK-1 test battery. The first area, "self-movement [or: locomotion]," includes the four test items "balancing," "rolling," "moving sideways," and "jumping." The second area, "object movement [or: object control]," includes the four test items "bouncing," "dribbling," "catching," and "throwing." Furthermore, it has been statistically verified that the calculation of a factor sum value (= sum of all items of an area) is acceptable for the calculation of a total value for each MOBAK area. No factor analysis has been explored through factor analysis and has been confirmed with good model fitting.

- *Discriminant validity:*

Because test items for measuring basic motor qualifications have few correlations with test items for measuring motor abilities (sprint, standing long jump, tapping, jumping sideways), they display a specific area of motor performance. The latent correlations between the MOBAK areas ("object movement" & "self-movement") and the ability factors ("speed strength" & "coordination") have a moderate correlation and show that the two constructs are mutually dependent.

- *Test fairness:*

Nested structural equation models have shown that the factorial structure does not differ depending on gender and that the test items are valid for boys and girls.

On the basis of these psychometric results, the MOBAK-1 test battery can be accepted as suitable for the evaluation of the effects that P.E. has on basic motor competencies.

The advantages of the MOBAK-1 test battery are ...

... curricular, factorial and discriminant validity.

... fast test execution due to practical test items that can be realized with material available in the gym.

... simple evaluation of the test items with dichotomous scales (passed/failed).

... easy calculation of the total value of both MOBAK areas.

... interpretability of the results at the level of single MOBAQ test items.

Literature

- *Main literature:*

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Herrmann, C., Gerlach, E., Krebs, A., & Seelig, H. (submitted). Begründung und Validierung eines Erhebungsinstruments zur Erfassung motorischer Basiskompetenzen in der Primarschule (MOBAK-1) [Explanation and validation of a test instrument for the assessment of basic motor competencies in primary school].

- *Advanced literature:*

Bundesministerium für Bildung und Forschung. (2007). Rahmenprogramm zur Förderung der empirischen Bildungsforschung [Framework program for promoting empirical education research]. Berlin: BMBF.

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Gogoll, A. (2012). Sport- und bewegungskulturelle Kompetenz - ein Modellentwurf für das Fach Sport [Sport and cultural competence – a model for Physical Education]. In A. C. Roth, E. Balz, J. Frohn, & P. Neumann (Eds.), *Kompetenzorientiert Sport unterrichten* (pp. 39–52). Herzogenrath: Shaker.

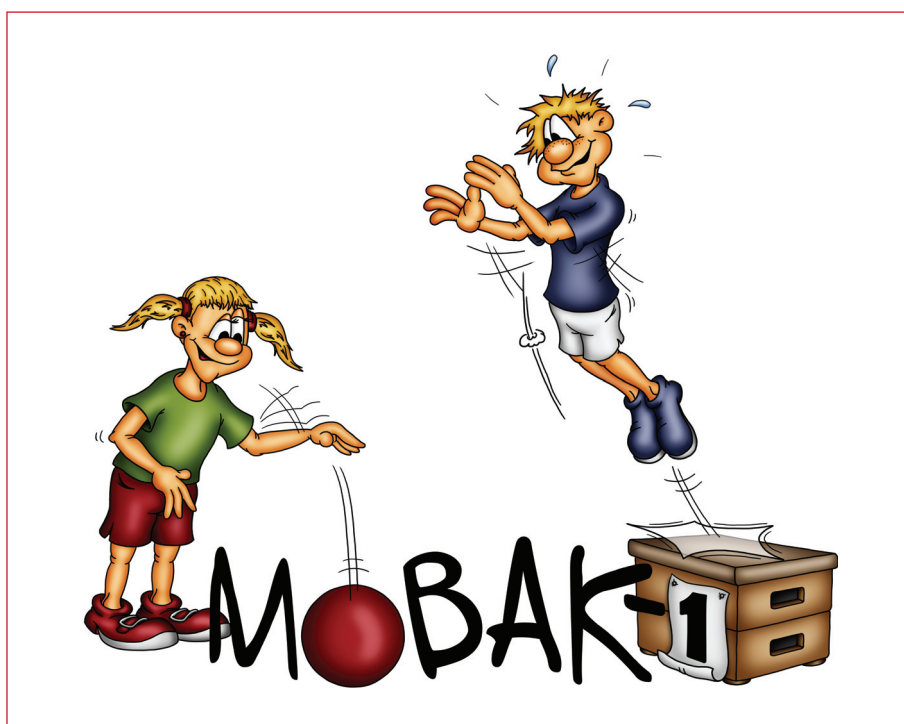
Kurz, D., Fritz, T., & Tscherpel, R. (2008). Der MOBAQ-Ansatz als Konzept für Mindeststandards für den Sportunterricht? [Using the MOBAQ approach as a concept for minimum standards for physical education?] In V. Oesterhelt, J. Hofmann, M. Schimanski, M. Scholz, & H. Altenberger (Eds.), *Sportpädagogik im Spannungsfeld gesellschaftlicher Erwartungen, wissenschaftlicher Ansprüche und empirischer Befunde* (pp. 97–106). Hamburg: Czwalina.

Roth, K., & Willimczik, K. (1999). *Bewegungswissenschaft [Exercise science]*. Reinbek bei Hamburg: Rowohlt.

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APPENDIX 1






Summary and evaluation table of the test items








TEST MANUAL



--- removable ---

Object movement				
	Throwing (1)	Catching (2)	Bouncing (3)	Dribbling (4)
				
Qualification	Hitting a small target.	Catching a ball.	Bouncing a ball without losing control.	Dribbling a ball without losing control.
Test item	The child throws from a 2 m distance at a target with 6 juggling balls.	The test leader drops the ball, the child catches the ball after the turning point.	The child stands behind a marked line and bounces a small basketball along the corridor until the finish line without losing the ball.	The child stands behind a marked line and dribbles with the ball along a corridor until the finish line without losing the ball.
Criteria	Hitting the target counts as a point. Overhead casts only (elbow high, extension of the forearm).	The ball is to be caught after the rebound when still in the air.	The ball can be bounced with two hands. The ball may not be held or lost. The child must not stop and must bounce the ball at least 5 times. The child may not leave the corridor.	The ball can be dribbled with both feet. The ball may not be lost. The child must not stop. At least 5 contacts with the ball. No side steps. The child may not leave the corridor.
Evaluation	6 attempts, amount of hits is recorded.	6 attempts, amount of balls caught is recorded.	2 attempts, amount of successful attempts is recorded.	2 attempts, amount of successful attempts is recorded.
Test set-up	A target is placed at a 1.30 m height. A scratch line is placed 2 m away from the target.	The test leader drops the ball from a 2 m height and 1.30 m distance so that the ball reaches a height of at least 1.30 m after it has touched the ground.	Marking a corridor using tape (5 m x 1 m).	Marking a corridor using tape (5 m x 1 m).
Materials	<ul style="list-style-type: none"> • 6 juggling balls • 1 target (diameter: 40 cm) • Scratch line 	<ul style="list-style-type: none"> • 1 small rubber ball or tennis ball • Ground markings 	<ul style="list-style-type: none"> • 1 small basketball (size 3, diameter: 17cm) • Ground markings 	<ul style="list-style-type: none"> • 1 (soft) ball (140g, diameter: 18 cm) • Ground markings

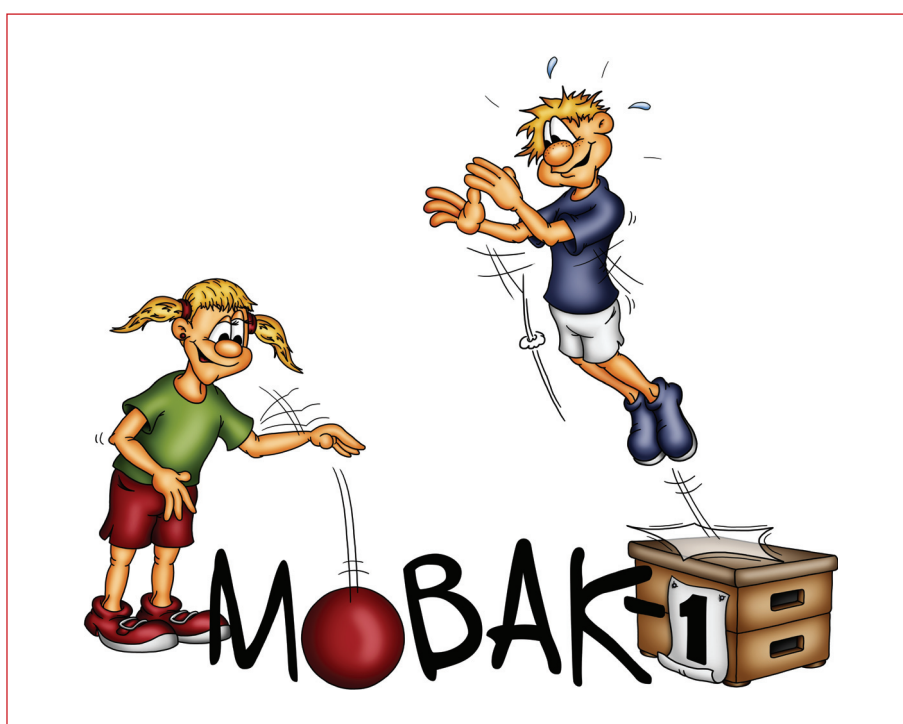
MOBARTS		Self-movement			
		Balancing (5)	Rolling	Jumping (7)	Moving sideways (8)
					
Qualification	Balancing across a see-saw.	Rolling forward.	Jumping forward continuously.	Continuous lateral stepping.	
Test item	The child balances across a see-sawing long bench without leaving the bench.	The child performs a roll forward fluently and is able to stand afterwards.	The child jumps between and beneath the carpet tiles fluently. The child has to jump on one leg between the tiles and with straddled legs beneath the tiles.	The child starts at the first cone, moves sideways to the second cone and moves sideways back to the first cone without changing his or her viewing direction. Moving back and forth twice counts as one trial.	
Criteria	Fluent crossing of the bench without stopping or leaving it. Normal walking (no half steps). The child may not speed up or jump down at the end.	Fluent execution of movement without stopping. No rolling off the sides. Hands can be used for support. The child may not roll or stand up with crossed legs	The carpet tiles are not to be touched. The child must jump fluently without stopping for more than 1 second. The takeoff leg between the tiles can be chosen freely.	Fluent side shuffles. The legs never cross; the feet stay parallel to the ground marking and at ground level. The hips stay parallel to the marking.	
Evaluation	2 attempts, amount of successful attempts is recorded.	2 attempts, amount of successful attempts is recorded.	2 attempts, amount of successful attempts is recorded.	2 attempts, amount of successful attempts is recorded.	
Test set-up	A long bench is placed upside-down on a springboard, forming a see-saw secured with gymnastic mats.	2 gymnastics mats are placed in a row.	4 carpet tiles are placed in a row with a 40 cm gap between them.	2 cones are placed on a marking at a distance of 3 m from each other. Sidelines are marked.	
Materials	<ul style="list-style-type: none"> • 1 long bench (w: 10 cm, l: 4 m) • 1 springboard (h: 18-21 cm) • 4 gymnastics mats 	• 2 gymnastics mats	<ul style="list-style-type: none"> • 4 carpet tiles (40 cm x 40 cm, 4 mm thick) 	<ul style="list-style-type: none"> • 2 marking cones • Ground markings 	

Evaluation table MOBAK-1 test battery

Area:	Object movement					Self-movement					
	(1) Throwing	(2) Catching	(3) Bouncing	(4) Dribbling	(5) Balancing	(6) Rolling	(7) Jumping	(8) Sidestep- ping	Total points		
Item:											
Trials:	6	6	2	2	2	2	2	2			
Evaluation:	0-2 hits / balls caught = 0 pts. 3-4 hits / balls caught = 1 pt. 5-6 hits / balls caught = 2 pts.	(Balls caught)	0 passed attempts = 0 pts. 1 passed attempt = 1 pt. 2 passed attempts = 2 pts.	0 passed attempts = 0 pts. 1 passed attempt = 1 pt. 2 passed attempts = 2 pts.	0 passed attempts = 0 pts. 1 passed attempt = 1 pt. 2 passed attempts = 2 pts.	0 passed attempts = 0 pts. 1 passed attempt = 1 pt. 2 passed attempts = 2 pts.					
No.	Name	f/m	(Hits)	Pts.	(Balls caught)	Pts.	Points	Points	Points	Points	Total points
Item average:											
Class average:											Self-movement:

APPENDIX 2

Description of the test items



TEST MANUAL



Additional information is available online at:
www.dsbg4public.ch

Throwing (1)

Test battery MOBAK-1

Area Object movement



Qualification Hitting a small target.

Test item The child throws from a 2 m distance at a target with 6 juggling balls.

Criteria

- Hitting the target counts as a point
- Overhead casts only (elbow high, extension of the forearm)

Evaluation 6 attempts, amount of hits is recorded.

Test set-up A target is placed at a 1.30 m height. A scratch line is placed 2 m away from the target.

Materials

- 6 juggling balls (40g, diameter: 65 mm)
- 1 target (diameter: 40 cm)
- Scratch line



Catching (2)

Test battery MOBAK-1

Area Object movement



Qualification Catching a ball.

Test item The child and the test leader face each other with a distance of 1.30 m between them. The test leader drops the ball, the child catches the ball after the turning point.

Criteria

- The ball is to be caught after the rebound when still in the air

Evaluation 6 attempts, amount of balls caught is recorded.

Test set-up The test leader drops the ball from a 2 m height and 1.30 m distance so that the ball reaches a height of at least 1.30 m after it has touched the ground.

Materials

- 1 small rubber ball or tennis ball
- Ground markings



Bouncing (3)

Test battery MOBAK-1

Area Object movement



Qualification Bouncing a ball without losing control.

Test item The child stands behind a marked line and bounces a small basketball along the corridor until the finish line without losing the ball.

Criteria

- The ball can be bounced with two hands
- The ball has to be bounced at least 5 times
- The ball may not be held or lost
- The child may not leave the corridor
- The child may not stop
- The child has to move straight ahead, hips facing the finish line

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up Marking a corridor using tape (5 m x 1 m).

Materials

- 1 small basketball (size 3, diameter: 17cm)
- Ground markings



Dribbling (4)

Test battery MOBAK-1

Area Object movement



Qualification Dribbling a ball without losing control.

Test item The child stands behind a marked line and dribbles with the ball along a corridor until the finish line without losing the ball.

Criteria

- The ball can be dribbled with both feet
- At least 5 contacts with the ball
- The ball may not be lost or touched with the hands
- The child may not leave the corridor
- The child may not stop
- The child has to move straight ahead, hips facing the finish line

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up Marking a corridor using tape (5 m x 1 m).

Materials

- 1 ball (soft, 140 g, diameter: 18 cm)
- Ground markings



Balancing (5)

Test battery MOBAK-1

Area Self-movement



Qualification Balancing across a see-saw.

Test item The child balances across a see-sawing long bench without leaving the bench.

Criteria

- The child starts with one foot on the bench
- Fluent crossing of the long bench without stopping for more than 2 seconds or leaving it
- Normal walking (no half steps)
- The child may not speed up or jump down at the end

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up A long bench is placed upside-down on a springboard, forming a see-saw secured with gymnastic mats.

Materials

- 1 long bench (4 m long, 38 cm high, 10 cm wide at the bottom)
- 1 springboard (18-21 cm high)
- 4 gymnastics mats



Rolling (6)

Test battery MOBAK-1

Area Self-movement



Qualification Rolling forward.

Test item The child performs a roll forward fluently and is able to stand afterwards.

Criteria

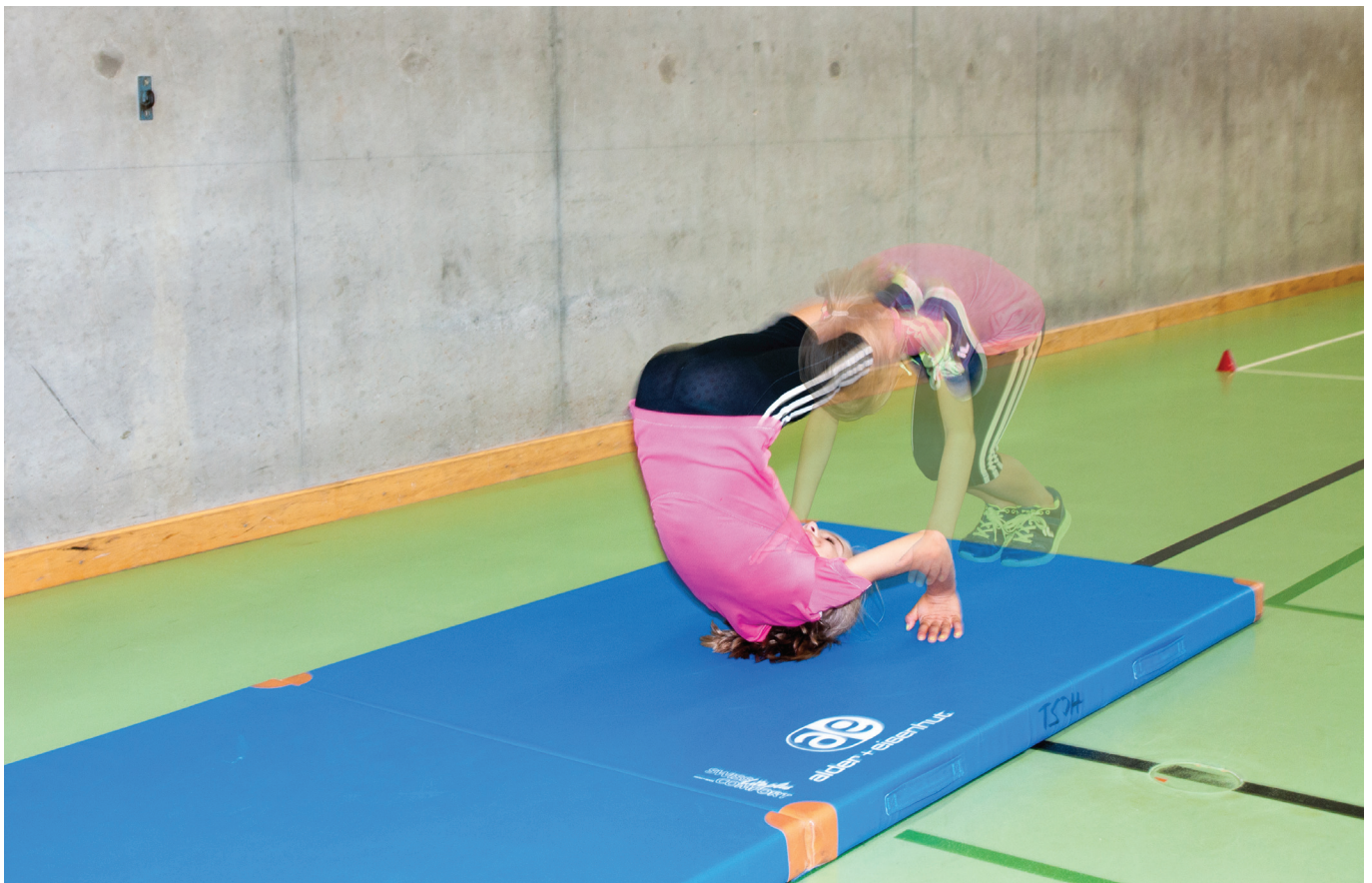
- Fluent execution of movement without stopping
- No rolling off the sides
- Hands can be used for support
- The child may not roll or stand up with crossed legs

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up 2 gymnastics mats are placed in a row.

Materials

- 2 gymnastics mats



Jumping (7)

Test battery MOBAK-1

Area Self-movement



Qualification Jumping forward continuously.

Test item The child jumps between and beneath the carpet tiles fluently. The child has to jump on one leg between the tiles and with straddled legs beneath the tiles.

Criteria

- The carpet tiles are not to be touched
- The child is required to jump fluently without stopping for more than 1 sec
- The takeoff leg between the tiles can be chosen freely
- No mistakes are allowed

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up 4 carpet tiles are placed in a row with a 40 cm gap between them.

Materials

- 4 carpet tiles (40 cm x 40 cm, 4 mm high)



Moving sideways (8)

Test battery MOBAK-1

Area Self-movement



Qualification Continuous lateral stepping.

Test item The child starts at the first cone, moves fluently sideways to the second cone and moves sideways back to the first cone without changing his or her viewing direction. Moving back and forth twice counts as one trial.

Criteria

- Fluent side shuffles
- The legs never cross; the feet stay parallel to the ground marking and at ground level
- The hips stay parallel to the marking
- The side markings have to be overstepped completely before changing direction

Evaluation 2 attempts, amount of successful attempts is recorded.

Test set-up 2 cones are placed on a marking at a distance of 3 m from each other. The position of the cones are marked with two lines.

Materials

- 2 marking cones
- Ground markings



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