

Study of Gross Motor Proficiency Co- Ordinate Abilities and Motor Educability Among School Children

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ABSTRACT

Coaches and sport scientists alike benefit from determining an athlete's anthropometric and performance characteristics since it aids in different elements of sport, such as performance enhancement, talent discovery, and training/recovery suggestions. Anthropometric and performance features of a variety of sporting populations, including basketball, rugby league, rugby union, soccer, cyclists, and runners, have previously been reported. The identification of physical characteristics in a sport modality contributes to its success and allows for the detection of differences between athletes from different sports, which is of considerable interest to both sport coaches and scientists. Differentiation ability refers to the ability to fine-tune or harmonise individual movement phases and body parts movements to a great degree. It manifests itself in a high level of precision and movement economy. The capacity to react swiftly and efficiently to numerous signals and changing situations is referred to as reaction ability. Reaction time, which comprises the time of reaction or response, is a component of reaction ability. As a result, in sports, movement speed (i.e., response) is a significant aspect of the whole reaction. The ability to learn diverse motor abilities quickly and easily is referred to as motor educability. To put it another way, motor educability refers to how easy it is to learn new motor abilities. This work is based on research into gross motor proficiency, co- coordinative abilities, and motor educability in school-aged children.

1. Introduction

Coaches and sport scientists alike benefit from determining an athlete's anthropometric and performance characteristics since it aids in different elements of sport, such as performance enhancement, talent discovery, and training/recovery suggestions. Anthropometric and performance features of a variety of sporting populations, including basketball, rugby league, rugby union, soccer, cyclists, and runners, have previously been reported. For best use of conditional talents, technical skills, and tactical skills, co-ordinative abilities are also required. A sportsperson's psycho-biological powers and reserves cannot be fully utilised without well-developed co-ordinative abilities.

The identification of physical characteristics in a sport modality contributes to its success and allows for the detection of differences between athletes from different sports, which is of considerable interest to both sport coaches and scientists. Physical (general and specialised conditions), psychological (personality and motivation), anthropometrical (body morphology, anthropometry, and body composition), and biomechanical elements all have a role in sports performance.

For best use of conditional talents, technical skills, and tactical skills, co-ordinative abilities are also required. A sportsperson's psycho-biological capacities and reserves cannot be fully utilised without well-developed co-ordinative abilities. Co-ordinative abilities, to a large extent, determine the maximum limits to which sports performance can be improved in a variety of sports, particularly those that rely heavily on technical and tactical factors. As a result, assessing co-ordinative abilities and the potential for further development is an important part of the talent identification process in sports.

Differentiation ability refers to the ability to fine-tune or harmonise individual movement phases and body parts movements to a great degree. It manifests itself in a high level of precision and movement economy. Differentiation ability is based on a conscious and exact sense of the temporal, dynamic, and spatial aspects of movement execution, as well as comparisons with similar parameters of movement conceptions at various levels of control and regulation. The degree of mastery over motor action and movement experience (i.e. motor memory) are both important factors in achieving a high level of differentiating ability. It allows the athlete to detect minute differences in the timing, dynamics, and spatial characteristics of movement execution.

The capacity to react swiftly and efficiently to numerous signals and changing situations is referred to as reaction ability. Reaction time, which comprises the time of reaction or response, is a component of reaction ability. As a result, in sports, movement speed (i.e., response) is a significant aspect of the whole reaction. The most popular metric for measuring reaction time is reaction time. However, keep in mind that response time does not include the reaction time. It's the amount of time between the signal and the movement's start. Except in a few sports, such as the 100m sprint, reaction aptitude cannot be judged only on the basis of reaction time. The reaction's quickness and accuracy must also be addressed. However, if all other factors remain constant, reaction takes on a greater significance in determining reaction ability.

The ability to learn diverse motor abilities quickly and easily is referred to as motor educability. To put it another way, motor educability refers to how easy it is to learn new motor abilities. Motor educability testing (Motor intelligence) in physical education is similar to intelligence testing in education.

Despite the fact that the validity of motor educability tests in predicting motor skill learning has yet to be demonstrated, a great number of motor educability test batteries have been published..

Objectives of study:

The purpose of this research to study of gross motor proficiency co-ordinative abilities and motor educability among school children

2. Review of related literature:

Karkare A.Y. (2015): The goal of this study was to determine how motor educability and tribe vs. non-tribal belongingness affected male participants' physical abilities. To conduct the research, 200 tribal boys' players and 200 non-tribal players were chosen as a sample from various sections of Maharashtra's Vidarbha region. As a result, a total of 400 samples were chosen for the proposed study. The sample's age group varied from 13 to 18 years old. The Metheny Johnson test was used to determine the motor educability of the samples. B. Johnson's physical skill test was used to determine the physical skill of tribal and non-tribal players. This test is extremely valid and dependable for children in school. The impacts of motor educability on physical competence of male players were shown to be statistically significant, according to the findings. The main effect of tribal vs. non-tribal affiliation was also statistically significant. The interaction effects of motor educability and tribal-non-tribal belongingness on male players' physical skill have been demonstrated.

Ghosh Sandip Sankar (2015): The study's goal was to compare the motor abilities of Bharatnatyam dancers and West Bengal professional gymnasts. The statistics employed in this study for data interpretation were mean, standard deviation (SD), and independent t-test. The p0.05 cut-off for a significant difference between two groups was used. For statistical calculations, a Windows 7 Excel Spread Sheet was employed. The findings of this study demonstrated that there were substantial differences between Bharatnatyam dancers and professional gymnasts in practically all motor ability components except agility. According to the findings of the study, Bharatnatyam dancers outperform professional gymnasts in terms of cardiovascular endurance and speed. Professional gymnasts, on the other hand, outperform Bharatnatyam dancers in terms of explosive leg strength, muscular strength, and muscular endurance.

Dhara Kabita.et.al (2015): The goal of this study was to assess the power and kinesthetic perception of kabaddi players at the state and varsity levels. Twenty-five (25) University level kabaddi players and the remaining twenty-five (25) state level kabaddi players were chosen at random from the University of Kalyani and the South 24 Parganas of West Bengal out of fifty (50) male students. The subjects are between the ages of 19 and 23. Explosive hand strength was assessed using a six-pound medicine ball throw test in metres, explosive leg strength was assessed using a standing broad jump in metres, and kinaesthetic perception was assessed using a centimetre-based distance perception jump test. Different variables' mean and standard deviation were determined. The 't'-ratio was used to analyse the data collected on the selected variables. For this investigation, the criterion of significance was chosen at 0.05 percent. Statistical significance was determined at a confidence

level of 0.05. SPSS software was used for all statistical computations.

Puri.et.al (2014): The study's goal was to compare elite Gujarat volleyball players to standard human performance metrics based on their chosen co-coordinative talents. The study's goal was to compare sub-junior, junior, and senior volleyball players based on their chosen co-coordinative talents. The individuals were assessed on a variety of co-coordinative abilities, including reaction time, orientation, differentiation, balance, and rhythm. Mean and standard deviation were utilised to compare elite state volleyball players to their standard human performance measures by selected coordinative abilities. One way analysis of variance (ANOVA) and post hoc (Least significant difference) tests were used to assess chosen co-coordinative abilities across athletes from three levels (Sub-Juniors, Juniors, and Seniors), with significance levels set at 0.05. The analysis of variance revealed that there was a significant difference in Reaction ability, Orientation ability, Balance ability, and Rhythmic ability between sub juniors, juniors, and seniors, as "F" Values were found to be significant (99.65, 9.60, 9.39, and 176.44), where these were required to be 3.92 at 0.05 level of confidence. Explosive Strength, Agility, Flexibility, Reaction Ability, and Kinaesthetic Perception are all factors to consider. As "F value was not found to be significant (0.021), when this was necessary to be 3.92 at 0.05 level of confidence, there was no significant difference between sub juniors, juniors, and seniors in terms of differentiation capacity. After using the post-hoc (least significant difference) test, it was discovered that mean differences between sub juniors and juniors; sub juniors and seniors; juniors and seniors were significant at the 0.05 level of significance in connection to reaction ability. At the 0.05 level of significance, mean differences between sub juniors and juniors; juniors and seniors; juniors and seniors were shown to be significant in regard to orientation ability. At the 0.05 level of significance, mean differences between sub juniors and juniors; juniors and seniors; juniors and seniors were shown to be significant in connection to Balance ability. The mean differences between sub juniors and juniors; sub juniors and seniors; were determined to be significant at the 0.05 level of significance in regard to rhythmic ability. The difference in mean between juniors and seniors was discovered to be minor..

Soren Chanchal (2014): For the study, 20 male Santal dancers and 20 non-dancers were chosen at random. The subject was between the ages of 16 and 18. The study's variables included motor fitness (sit-ups, side steeping, standing broad jumps, and modified pull-up squat leg thrust) and coordination (eye-hand coordination test ball transfer) as well as an eye-foot coordination test. The collected data was computed using the "t" test at a significance level of 0.05. The findings indicate that there was a significant difference in coordinative ability. However, he discovered no statistically significant differences in motor fitness measures between Santal dancers and non-dancers.

H.I.Ceylan.et.al (2014): The purpose of this study is to look at body composition, sprint, and coordination metrics in children aged 7 to 12 years old based on gender and age. Nine hundred and forty-five children took part in the study. Body mass index was used to calculate the values of children's body composition. In addition, the 30 m sprint test, as well as the

eight-run test, were utilised to measure sprint performance. For statistical analysis, the independent t-test, one-way ANOVA, and Tukey HSD were utilised. Between boys and girls, there were significant disparities in performance in the 30 m sprint and the eight-run test, with boys outperforming girls. The body mass index did not show any significant changes. It was discovered that as girls and boys grew older, their speed and coordination improved. The BMI of children has risen as a result of their physical development, which has resulted in an increase in their body height and weight. The reason that boys perform better than girls at all ages is due to a distinct endocrine system that begins with puberty. The endocrine system's differentiation may have an impact on body composition. The growing process is regarded to play a significant effect in children's performance.

Chakraborty Samrat (2013): The goal of the study was to look into and evaluate the coordination abilities of attackers and central blockers in terms of chosen neuro-psychological components (hand-eye and leg-eye) (reaction ability, kinaesthetic sense, orientation ability). The subjects were male university level attackers and central blockers ranging in age from 22 to 28 years old. Nelson measured the hand reaction. The ball transfer test was used to examine hand-eye coordination, the one leg hop foot print leap was used to measure leg eye coordination, and the distance perception jump was used to measure kinaesthetic sense. He came to the conclusion that there were neuropsychological components and coordination capacity between attackers and central blockers in the case.

Mukhopadhyay M.et.al (2011): The purpose of this study was to examine the physical fitness, reaction ability, and kinesthetic perception of twenty-five national level gymnasts, twenty-five Kho-Kho players, and twenty-five professional Chow Dancers aged 15 to 20 years. Explosive Strength, Agility, and Flexibility, as well as Reaction Ability and Kinesthetic Perception, were the characteristics studied under physical fitness. Analysis of variance was employed as a statistical tool to explore the existence of significant differences in Physical Fitness Components, Reaction Ability, and Kinesthetic Perception among three groups. In terms of explosive strength, agility, flexibility, reaction ability, and kinaesthetic perception, statistical analysis of the collected data revealed no significant

differences between national level gymnasts, Kho-kho players, and professional Chow dancers.

SahaGopal Chandra.et.al (2011) The goal of the study was to examine reaction time, kinaesthetic perception, and body fat percentage in pre-adolescent students from three distinct educational boards in West Bengal: CBSE, WBBSE, and ICSE. Sixty male kids, aged 11 to 14, from 6th to 8th grade, were chosen as subjects for the study, with 20 pupils from Navodoya Vidyalaya (Banipur) each (Central Board of Secondary Education). Kamarhuba's Startford Day School (Indian Certificate of Secondary Education) South Habra High School (Habra) is a public high school in Habra, California (West Bengal Board of Secondary Education) Kinaesthetic perception was measured using the distance perception jump (Nelson & Johnson), reaction ability was measured using the Nelson hand reaction test (Nelson & Johnson), and body fat percentage was measured using the Body Fat Monitor, an electronic device manufactured by Omron model no. HBF306. Analysis of variance statistics were performed at the 0.05 level of significance to see if there was a significant difference in kinaesthetic perception, reaction ability, and percentage of body fat across students from three educational boards. The acquired data was statistically calculated to indicate that there was a substantial difference between the three Educational boards, with students from Navodaya Vidhyalaya, Banipur under the CBSE board performing better than students from other Educational boards.

3. Procedure:

The approach used in the current investigation is discussed in this chapter. The topic, criterion measure, instruments and techniques employed, data collection procedure, and statistical procedure for data analysis have all been described..

Selection of the Subject

The current study focused on thirty (30) residential school students and thirty (30) non-residential school students among school pupils. As a result, there were only sixty (60) subjects in all. Saptagram Adarsha Vidyapith, Bamihati, Jasur, N.24 Pgs., and Rastrya Kalyan Bhavon, Banipur, both in the district of North 24 Parganas, West Bengal, provided the topic..

Criterion Measures

The Following Criteria were measured:

No.	Variables	Measuring Test	Instrument
1.	Muscular Power	Standing broad jump	Field, measuring tap
2.	Cardio respiratory Endurance	Harvard step test	Stopwatch, bench(20"),Metronome
3.	Running sprit	50 yard dash	Stop watch, field
4.	Kinaesthetic Perception	Distance perception jump	Measuring tap,
5.	Reaction Ability	Nelson hand reaction time	Scale, table
6.	Front Roll	Metheny-Johnson motor educability test	Mat, field, chalk
7.	Back Roll	Metheny-Johnson motor educability test	Mat, field, chalk
8.	Jumping Half-Turns	Metheny-Johnson motor educability test	Mat, field, chalk
9.	Jumping Full-Turns	Metheny-Johnson motor educability test	Mat, field, chalk

Design of the Study

Random sampling technique was used for this study.

Reliability of Instruments

The scale, table, bench (20"), metronome, stop watch, and 34 inch marking tape were employed in this investigation. Measuring tape is commonly used for comparable measuring applications and is manufactured by reputable companies. As a result, the instruments utilised in this study for the same measuring purpose were regarded as dependable as the manufacturer stated.

Tester's Reliability

The assistance of a physical education specialist was enlisted for the aim of data collection. They were also given a brief introduction and practise session prior to the data collection. As a result, it's safe to believe that the testers were qualified and trustworthy for the job.

Reliability of Data

Subjective evaluation was used to verify data dependability, and testers who assisted in data collection were given technical training, and the subject's reliability was demonstrated through the test-retest procedure.

Procedure for Collecting Data

For the research, a total of 60 male school students were chosen based on their age range (10-12 years). Of these, 30 (thirty) male students were residential from Rastrya Kalyan Bhavon, Banipur N.24 Pgs, and the other 30 (thirty) male students were non-residential from Saptagram Adarsha Vidyapith, Bamihati, Jasur, N.24 Pgs. All subjects and testers were properly oriented by the investigator before to delivering the tests, and they were motivated to offer their best effort in executing all items prescribed for them. All of the patients underwent a standing wide jump test to determine their muscular power. The Harvard step test was used to assess cardio-respiratory endurance in all of the participants. All of the subjects were put through a 50 yard dash test to assess their running ability. All of the subjects underwent a distance

perception jump test to assess their kinaesthetic perception. All of the subjects were given the Nelson hand response time test to assess their reaction ability. On all of the subjects in this study, the Metheny-Johnson motor educability test was used to measure Front Roll, Back Roll, Jumping Half-Turns, and Jumping Full-Turns. The test was carried out one by one on the subjects. The test re-test technique had confirmed the data's trustworthiness. All of the subjects' data was collected over the course of two days. The information was discovered to be highly connected and was deemed to be trustworthy.

Administration of the Test

A. Gross Motor Proficiency

Under this test there was four test items selected

1. Standing Broad Jump: To measure the Muscular Strength.

Objectives: The amount of force you can exert with your muscles is referred to as muscular strength.

Equipment's: A measuring tape and jumping pit.

Procedure: In front of the pit, a take-off line is marked. The pupil stands with his feet slightly apart behind a take-off line. He jumps as far as he can from both feet at the same time, landing on both feet. He crouches slightly and swings his arm to aid the jump.

Three trials are allowed.

2. Harvard Step Test: To measure the Cardio respiratory endurance

Objectives: The ability of the circulatory and respiratory systems of the body to supply fuel and oxygen during prolonged physical exercise is known as cardio respiratory endurance..

Equipment: a stop watch, 14 inches high bench, metronome or tape recorder (optional)

Procedure: exercise time was reduced to 3 minutes for 11-12 years children.

Scoring: the pulse of all- 30 sec, rest or 30 sec count, 30sec rest 30 counts, 30sec rest 30sec count, and calculated by following formula:-

$$\text{Fitness index (F.I)} = \frac{\text{Duration of exercise period in second} \times 100}{2 \times \text{sum three puls counts after exercise}} = \frac{\text{Duration of exercise period in second} \times 100}{2 \times \text{sum three puls counts after exercise}}$$

Fitness index (F.I)

3. 50 yard run: To measure Running Speed

Objectives: It is defined as an individual's ability to perform several motions of the same pattern at a high rate..

Equipment: There are two stopwatches. An adequate running area is also necessary to enable for the 50 yard run plus an extension for halting.

Procedure: It is recommended that two subjects run concurrently. Both of these exercises begin with a standing stance. "Are you ready?" and "Go!" are the commands delivered. When the starter is told to go, he drops his arm so that the timer at the finish line may begin timing. The participants sprint across the finish line as quickly as they can.

Scoring: The time from the start of the race and the runner crossing the finish line is measured to the tenth of a second.

4. Kinesthetic perception jump test: To measure the Kinaesthetic perception of students.

Objectives: Kinesthesia, also known as kinaesthetic perception, is the ability to perceive the position and relationship of body parts in space.

Equipment:- Measuring tape, marking chalk, Blind fold handkerchief.

Procedure: - Without a practise trial, the performer was asked to sense the distance between the two lines. The participant was then blindfolded and instructed to jump from behind the starting line, landing as near to the target

line as feasible. He was given the opportunity to see where he would place on each trial. Ten trials were conducted.

Scoring - The distance from the target line to the farthest heel was measured and recorded for each jump to the closest 14 inch.

B. Co-ordinative Ability

1. Nelson Hand Reaction Time Test :- To measure the reaction ability

Objectives: Coordinative abilities are a performance requirement that is largely defined by mechanisms involved in movement control and regulation. This test is meant to determine how quickly a person's hand reacts to a visual stimulus. This test is appropriate for both boys and girls aged five and up.

Equipment:-Scale, chair, Table.

Test Administration: The tester asked a subject to sit in the chair with his or her forearm and hand resting on the table (or desk top) in such a way that the tips of the thumb and index finger are held in a ready to pinch position, about 3 or 4 inches beyond the edge of the table, after giving a practical demonstration to a group of 10 to 15 subjects. The tester double-checks that the thumb and index finger's upper edges are horizontal. Now the tester holds the stick of the timer from its top edge in such a way that the bottom edge of the stick timer hangs between the subject's thumb and index finger, such that the stick timer's marked base line (not the edge) is in the same horizontal position as the subject's thumb and forefinger. The subject must not touch the hanging stick timer, according to the tester. Now he or she directs the subject's attention to the concentration zone, which is the dark shaded area between the 0.120 and 0.130 second lines. The subject is told to catch the stick by pinching his thumb and index finger together as soon as the tester releases the stick timer. He or she is also told not to stare at the tester's hand or move his or her hand up or down while attempting to catch the falling stick timer. The tester provides a prior command of 'Ready' before leaving the stick. Twenty trials are provided to each subject.

Scoring: When the subject catches the falling stick timer, the time is read from the stick right above the upper border of the thumb. The results of the five quickest and five slowest trails are eliminated, and the average of the middle ten trails determines the test's score (nelson, 1965).

Precautions:-

a) Between the command "ready" and the release of the stick timer, the tester should use varied timings. It should, however, not be too little or too large, and it should fluctuate between 0.5 and 2.0 seconds.

b) The testing setting should be serene in order for the subject to focus adequately.

c) The distance between the index finger and thumb should not exceed one inch.

C. Motor Educability Test

1. Metheny Johnson Motor Educability Test

Objectives: It is characterised as one's ability to learn new motor abilities with ease.

Equipment:-Marking chalk, mat, measuring tape.

Procedure: - This test battery is an updated version of Johnson's 1932 educability exam, which was created to assess natural neuromuscular skill capability. There are four test items in all, which are listed below.

Test area :- A canvas with dimensions of 15 feet long and 2 feet broad is marked as indicated in figure 2 3.7. The 15-foot length is broken into ten 18-inch sections. The width of the transverse lines alternates between 34 and 3 inches, as indicated in fig 23.7, so that the lines remain 18 inches apart in the middle, and another 3/4-inch-wide line is drawn longitudinally in the middle of the canvas. This properly marked piece of canvas is laid over a gymnasium mat, with the sides and ends tucked into the mat to keep the canvas stretched properly. Alternatively, instead of using the canvas, the aforementioned area could be immediately painted or marked on the gymnasium mat.

Test items:-

a) Front roll:The subject is instructed to begin outside the specified area and complete two front rolls, one up to 7.5'x.e.3" wide centre line and the other in the second half of 7.5'. The goal is to complete the rolls without exceeding the boundaries of the above-mentioned zone.

Scoring: Each right roll is worth 5 points, for a total of 10 points. Two points are deducted for ever reaching the side line for a beach roll, whether right or left; one point is deleted for exceeding the end limit on each roll; and a complete five points are deducted when the subject fails to do a true front roll.

b) Back Roll: In terms of performance and scoring, the test is equivalent to front roll. The subject must begin outside of the specified chart area and complete two back rolls in the 2 foot lane area, one in the first half and the other in the second half.

Scoring: - Each right roll is worth 5 points, for a total of 10 points. Two points are deducted for ever reaching the side line for a beach roll, whether right or left; one point is deleted for exceeding the end limit on each roll; and a complete five points are deducted when the subject fails to do a true front roll.

c) Jumping Half Turns: Starting with both feet on the first 3 inch wide line, the subject is instructed to jump with both feet to the second 3 inch wide line, executing a half turn either right or left; jump to the third 3inch line, executing a half turn in the opposite direction to the first half-turn; and then to the fourth and fifth 3inch wide lines, executing half turns, right or left alternately..

Scoring: Ten points are awarded for flawless execution of four jumps. When the subject does not land with both feet on the 3 inch line or turns the wrong way or both, just two points are removed for each incorrect jump.

d) Jumping full turns: The individual is instructed to begin with his or her feet outside the indicated area, roughly in the middle of the lane. Continue jumping to alternate rectangular spaces across the marked mat, executing full turns, rotating body in the same direction, landing on both feet every time; continue jumping to alternate rectangular spaces across the marked mat, executing full turns, rotating body in the same direction, landing on both feet every time.

Scoring: Ten points are awarded for flawless execution of five leaps. If the subject loses balance when landing on both feet, turns too far, or oversteps the squares, two points are deducted.

Statistical Procedure:

For the comparing of the collecting data following statistical treatment were given.

☐ The "T" test was used to compare gross motor proficiency (muscle power, cardiopulmonary endurance, running spirit, and kinaesthetic perception) as well as coordinative ability (reaction ability) and motor educability (Front Roll, Back Roll, Jumping Half-Turns, and Jumping Full-Turns) between residential and non-residential school children.

Level of Significance

The level of significance for this study was chosen at 0.05 level of confidence, which was regarded reasonable for the study.

4. Results:

The results reveal that there is no significant difference in gross motor proficiency, coordination ability, or motor educability between residential and non-residential school

pupils. This could be due to the fact that the duration of practise, the surroundings, food habits, neuro-physiological state, mental age, and IQ level and memory capacity were all the same, all of which influenced the study's outcome.

5. Conclusions

On the basis of the acquired results, the following conclusions were drawn within the scope of the current investigation:

1. Data analysis demonstrated that there was no statistically significant difference between residential and non-residential school pupils in terms of gross motor performance.
2. Data analysis revealed that there was no significant difference between residential and non-residential school children in terms of coordination ability.
3. Data analysis demonstrated that there was no significant difference between residential and non-residential school pupils in terms of motor educability.

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