

Model Coordination and Activity Tracking (MCAT): Self-efficacy in elementary school children

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Abstract:

All students have different talents and interests; for educators, this is the potential that must be developed to improve the quality of student learning. To achieve this, an instructional model is essential—one that not only stimulates active student engagement but also encourages them to play a active role in the teaching and learning process. Considering the unique characteristics of each child, particularly in physical education where a psychological approach is paramount, there is a need for a tailored approach to developing physical activity. This research aimed to explore how the application of coordination and activity-tracking models can contribute to the improvement of self-efficacy in elementary school children. This study employed an experimental design with a one-group pre-test-post-test structure. The population comprised 125 sixth-grade students, averaging 10 years of age, drawn from 12 schools in the City of Tasikmalaya. The sampling technique used is non-probability sampling with a purposive sampling approach. This technique has specific considerations, including the limitations of researchers in managing research classes. It makes it easier for researchers to determine the sample, namely students who live not far from the research location. So from a population of 125 people, a piece of 87 students was selected consisting of 57 boys and 30 girls. The results of the One way ANOVA test between the coordination model and activity tracking with self-efficacy show the results of the Sig. Obtained a P value (P-value) of 0.002, thus less than 0.05. So this means there is a difference in the average initial test with the final examination on the results of the primary motor movement test and the SES questionnaire. Based on the research findings above, the coordination and activity tracking model significantly affects children's self-efficacy levels. This condition is because MCAT allows children to continue showing their best abilities in carrying out every movement so that the psychological factors become well-honed indirectly.

Key Words: - Coordination Model, Activity Tracking, Physical Education, Self-Efficacy, Elementary School

Introduction

Physical education (PE) in elementary schools is an educational program through movement activities as long as children receive education at school. PE is seen as providing full provision for children to grow and develop properly. Ideally, PE provides opportunities for children to be active in a sustainable manner through a variety of materials packaged into games and sports, developmental activities, gymnastic activities, rhythmic activities, water activities and out-of-school education (Ardha et al., 2018; Milićević et al., 2022). However, based on the results of the author's observation, the material for the scope of PE learning has not been fully conveyed properly because, in Indonesia, there are still several obstacles that can result in slightly hampered learning objectives due to the carrying capacity of the facilities and infrastructure available in each school. So that children experience several obstacles when carrying out physical activities, one of which is coordination disorders (CD).

Coordination disorder (CD) is a common thing in neurodevelopment. It is characterized by problems with fine or gross motor coordination which results in disturbances in daily work functions (Barnett & Hill, 2019). Children's difficulties at home and school are often mistakenly ascribed to resisting behavior, learning or attention difficulties, or laziness in learning (Barnett & Hill, 2019; Zimmer et al., 2020). However, this needs special attention because it will relate to their overall growth and development. The study results (Sit et al.,

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2019) prove that children with coordination disorders have a history of being less physically active than other children; besides having problems at school, they tend to be less able to adapt to playing in their surroundings. According to (Cairney, Dudley, et al., 2019) that children with coordination disorders grow less physically healthy than children who usually develop and are more likely to be overweight or obese as a result of a lack of physical activity.

Motor coordination is an important component of child development. Children with low motor coordination tend to be overweight and unfit as teenagers. When a child's impaired coordination is combined with a lack of interest in relationships and social involvement, this lack of motor experience can increase the risk of poor health in infancy and inactivity throughout life (Biotteau et al., 2019; Delgado-Lobete et al., 2019; Zimmer et al., 2020). Poor motor coordination affects physical, motor, and psycho-social indicators and is influenced by them; previous studies have shown this unhealthy relationship as negative feedback (Hidayat et al., 2022). In addition, this unfavorable cycle exposes children with CD to several psychological problems, such as stress, ongoing frustration, failure, and bullying, all of which can significantly affect how competent they feel and how confident they are. Feel within themselves (James et al., 2022; Rigoli et al., 2012). A person's assessment of his ability to carry out various daily activities effectively is known as self-efficacy (Cai et al., 2021). (Smits-Engelsman & Verbecque, 2022) revealed that children with CD often consider themselves less competent, demonstrating a lower sense of self-efficacy in various daily activities and involvement and satisfaction in physical activity through physical education. Self-efficacy is a person's belief in his abilities that he can do something or overcome a situation that he will be successful in doing so. Self-efficacy is people's beliefs about their ability to produce a level of performance and master situations that affect their lives. Self-efficacy determines how people feel, think, motivate themselves, and behave (Prifti, 2022). Furthermore, children feel that if self-efficacy is low, these children can show reduced social involvement and perceived poor levels of cognitive, social, or motor skills, which can cause stigmatization, isolation, and mental health problems (Lengkana et al., 2019; Subarna et al., 2021). Left unchecked, this can become a more serious matter for children, as they will have a higher chance of having poor heart health and, over time, developing chronic disease earlier. Elementary school age is a period with an age range between 6-12 years, or the intellectual period (Lengkana et al., 2020; Mulya et al., 2021). Children's knowledge will increase rapid as they get older, the skills mastered are even more diverse, and psychological factors will be easily honed and even falter. Children's interest in this period is mainly focused on everything that is dynamically moving (Braaksma et al., 2018). The implication is that children tend to do various activities that will be useful in their future development process. Physical activity has very important benefits for children's health, growth and development now and in the future. Therefore, researchers are trying to study more comprehensively the application of the coordination and activity tracking (MCAT) model to ensure that children avoid more acute coordination disorders and also to ensure children's daily involvement in sports. In sports, activity tracking assists individuals in increasing physical activity. Activity tracking and step goals are efficient in encouraging children's physical activity behavior. Many physical activity interventions aim to develop regular exercise habits and leisure-time exercise activities from an early age.

The findings of previous studies regarding Coordination and Activity Tracking (Cairney et al., 2015) showed that some children's activities could have an impact on children's fitness (Cairney, Veldhuizen, et al., 2019) that children have moderate coordination and fitness, then from (King-Dowling et al., 2019) that, activities carried out by children significantly affect fitness results. This condition proves that several previous studies have not been so specific towards applying the Coordination and Activity Tracking Model to psychological factors, namely self-efficacy in elementary school children aged 6-12 years. This research is expected that students can have good self-efficacy after they are given the Coordination and Activity Tracking Model so that children with coordination disorders can continue to learn movement through physical education on an ongoing basis with full confidence or confidence about their ability to organize, carry out a task, achieve a task. Goals, produce something and implement actions to achieve the desired skills.

Material & methods

Design

The quantitative approach is used in this study as the operational basis for research activities. The model proof is an effort that researchers make to overcome weaknesses in coordination and children's involvement in physical activity. The design used is an experiment with a one-group pre-test-post-test design. All samples will receive treatment for four months, considering that this period is sufficient to measure children's development during the training period at school. Researchers are accompanied by teachers, assistants and parents of students; this is done to introduce each stage of the research program and deepen the level of trust parents of students have in the school.

Participants

The population in this study amounted to 125 sixth-grade students with an average age of 10 years, who were elementary school students from 12 schools in the City of Tasikmalaya. The sampling technique used is non-probability sampling with a purposive sampling approach. This technique has certain considerations, including the limitations of researchers in managing research classes. It makes it easier for researchers to determine the

sample, namely students who live not far from the research location. So from a population of 125 people, a sample of 87 students was selected, consisting of 57 boys and 30 girls.

Research Procedure

For three months, the students received a research program using the coordination model, and one month later, the researchers tracked the students regarding their interests and talents in what types of physical activity they enjoyed every day. This step is a follow-up that must be carried out by students so that there is continuity of the coordination model program that has been given to avoid coordination disorders caused by low physical activity from students. The most accessible activities in physical education for coordination abilities are general exercises that simultaneously cover the main muscle groups. These are exercises without objects and with objects, including balls, gymnastic sticks, and jumping rope; relatively simple and quite complicated, carried out in modified conditions with different body positions or parts, agility components including somersaults, various floor exercises activities, and balance exercises. Special preparatory exercises for improving the coordination of movements are developed, taking into account the peculiarities of the chosen sport or profession. In Table 1. This activity is a coordination exercise similar to the technical-tactical actions in this sport;

Table 1. Coordination Model Program

Coordination Ability Type	Children's age								
	6	7	8	9	10	11	12	13	14
Ability to manage long-term muscle strain	G B	G B	G B						
Ability to distinguish spatial and temporal characteristics	G B	G B		G	G B	B			
Ability to control the timing of the implementation of both visual and auditory signals			G B	G B	G B	B			
The ability to keep a rhythm		G B	G B	G B	B				
Ability to navigate space						G B	G B	G B	B
Ability to maintain balance				G	G B	B			

The researcher integrates the balance program into the coordination model; this is done because one of the determining factors for body coordination is balance. The ability of a person to maintain a vertical position in the Earth's gravitational field is very important. Even relatively simple movements cannot be performed without a sufficiently high level of development of the balance organs. Maintaining balance in everyday life takes place automatically and reflexively. Maintaining balance is one of the most important conditions for active human interaction with the external environment. Highly determined by the level of development of the balance function. A low level of stato-kinetic stability is accompanied by decreased general well-being, dizziness, nausea, vomiting, and even fainting. When performing physical exercises, it inhibits the development of movement techniques and reduces the degree of other manifestations of physical abilities.

Several researchers (Dumuid et al., 2021; Filar-Mierzwa et al., 2021) researched to identify the most sensitive period in developing coordination abilities in school children. Studies have shown that coordination skills (including balance, as a type of coordination ability) are more sensitive, easier and more effective to train at certain age periods. The best sensitive period for developing school children's coordination abilities is approximately 7-12 years. Therefore, coordinating and improving children's motor skills is best completed in the first six years of schooling. In table 2 below, it is explained how the balance program synergies to produce good coordination;

Table 2. Techniques for Improving Balance

Ways to improve skills	Techniques Implementation
Extends retention time of unstable postures	Phase extension of the body in a horizontal position on the torso then returns to the original position.
Temporary exclusion or visual limitation of control cells	Static exercises and using gymnastic balance beams or acrobatic exercises in pairs and groups by closing both eyes
Reduction of the support area	Static and dynamic exercises on rails, bridge beams, balance beams, gymnastic benches, or on narrow logs; jumping and other movements using one leg
Increase the height of the supporting surface or the distance from the center of gravity.	Movement and fixation on stage, performing exercises on a balance beam or uneven bars of different heights
Unstable support recognition	Exercise on swinging logs, horizontally suspended ropes, and media shifted on rollers.
The inclusion of early and concurrent moves that make it difficult to sustain	Maintaining a static position of the body after rolling (front-back), juggling balls of various sizes
Dynamic balance	Maintain dynamic balance in pairs while standing and lifting one leg, then walking, running and even jumping while holding on.
Use of difficult natural environmental conditions	Running, cycling on rough terrain, with different track conditions, in difficult weather conditions

Data Collection

This research uses a pre-test and post-test, namely to determine the effect before and after treatment is given. The first test instrument used is the basic motor movement test (Szabo et al., 2020), which consists of agility tests, standing long jumps, wall pas using a tennis ball, sprints, flexibility, upright jumps, running and static coordination and static balance tests. Observation sheets and interviews used to track children's physical activity were used as a reference to be adjusted according to the researchers' recommendations, adjusted for the results of basic motor movement tests. Then the second instrument is a Self-Efficacy Scale (SES) questionnaire (Bayazit et al., 2022). The SES consists of 30 statement items that aim to examine generic expectations of self-efficacy unrelated to specific situations or actions. The basic assumptions of this tool are that individual differences in prior experience and success attributions result in variable degrees of generalizable self-efficacy expectations and that personal mastery expectations are a significant determinant of behavior change. SES successfully predicts that individuals with higher self-efficacy will be more successful than those with lower self-efficacy in achieving past financial, educational, and professional goals. More specifically, the following is the Self-Efficacy Scale questionnaire grid (Sánchez-Escobedo, 2022);

Table 3. Self-Efficacy Scale Questionnaire Grid

Dimensions	Indicator
Dimensions of self-efficacy levels	Confidence in the ability to take the necessary actions to achieve a result Confidence in the ability possessed to overcome obstacles in the level of difficulty of the task at hand Have a positive view of the task at hand
The breadth dimension of self-efficacy	Able to respond to various situations and conditions with a positive attitude. Using life experience as a step to achieve success. Displaying an attitude that shows self-confidence towards the entire learning process.
The power dimension of self-efficacy	Have strong self-confidence in self-potential in completing tasks. Have a fighting spirit and do not easily give up when experiencing obstacles in completing tasks. Commit to completing academic assignments well.

Data Analysis

The data was processed with the help of a statistical approach using SPSS series 20. The researcher's first step was to test the questionnaire, which would later be tested for validity and reliability. After the questionnaire was declared valid and reliable, the questionnaire was used in the initial and final tests of the study. The next step is to find the average and standard deviation for each test presented. Once the statistical description is known, the next test step is the data normality test, followed by testing the hypothesis using one-way ANOVA (Asmus & Radocy, 2017).

Results

Participants' Physical Activity Data

In this section, the researcher tries to present data on the results of tracking several forms of physical activity carried out by students outside of school hours for one month after the treatment period is carried out. The following is an explanation of the activity data in question;

Table 4. Forms of Physical Activity of Students

Factors/n	User
Regular sport	n=87
Yes, recreational level	25 (28.74 %)
Yes, competitive level	56 (64.37 %)
No	6 (6.90 %)
(minimum 30 minutes moderate physical activity) / week	Average: 4.57 day; Mode: 3.0; Median: 3.8 3.16 days/week

In the results of tracking the form of activity in the students above, it can be explained that the percentage of students who carry out activities at the recreational level is 28.74%, at the competitive level is 64.37% and do not carry out other physical activities by 6.90%. On average, the participants carried out physical activity three times a week with a minimum duration of 30 minutes in each session.

Table 5. Participants' Answers in Tracking Activity

Purposes	Users (n=87)
Monitor my daily physical activity	12 (13.79%)
I would like to live healthier	30 (34.48%)
I like the gadgets / I like to keep up with IT trends	23 (26.44%)
I would like to harden more	9 (10.34%)
I would like to look better	7 (8.05%)
Other	6 (6.90%)

Based on the results of the answers to the goals of tracking the activities of the students, there were several variations of the answers they gave, including, there were those who wanted to track their movements, as many as 12 people or 13.79%, as many as 30 people or 34.48% answered they wanted to live healthier; as many as 23 people or 26.44%, answered just going along with it because they like to follow IT trends; as many as nine people or 10.34% answered they wanted to look tough; as many as seven people or 8.05%, answered they wanted to look better and as many as six people or 6.90% responded to others.

Validity and Reliability Test Data

The first stage of this study was to conduct a questionnaire trial on the same population but not as a sample. Then the next step is to test the validity and reliability of the self-efficacy questionnaire. The following are the results of the validity and reliability tests of the SES questionnaire items;

Table 6. Test results of the validity and reliability of the Self-Efficacy Scale questionnaire

Variable	Test (n=105)		Validity Test		Reliability Test					
	Mean (SD)	Item-Total Correlation	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's α	ICC (95% CI)	p-Value $\uparrow$	SEM	% SEM	MDC
Dimensions of self-efficacy levels (score)	2.25 (0.33)	0.118 **	2.44 (0.61)	.163	0.806	0.831 (0.731–0.903)	0.270	0.19	6.30	0.22
The breadth dimension of self-efficacy (score)	2.48 (0.52)	0.147 **	2.50 (0.34)	.302	0.832	0.841 (0.769–0.956)	0.350	0.21	6.56	0.16
The power dimension of self-efficacy (score)	2.78 (0.55)	0.176	1.69 (0.60)	.211	0.815	0.854 (0.711–0.881)	0.257	0.27	6.70	1.37
Total domain score	2.65 (0.57)	0.117 **	2.38 (0.46)	.135	0.899	0.898 (0.750–0.912)	0.358	0.29	7.03	0.66

Based on the data from the validity and reliability test results on the self-efficacy questionnaire above, the data results are obtained with a good level of consistency; this is by the questions, variables, total score of the questionnaire, and the average in the range (Cronbach's 0.806-0.899). The validity test showed that all questions were declared valid, namely <table 0.215. It can be stated that the questionnaire is valid and reliable.

Data Descriptions

After testing the validity and reliability, the next step is to find each test's average value and standard deviation in the pre-test and post-test. Table 7 below presents a description of the intended data;

Table 7. Mean and SD ($\pm$) Test Instrument

Table 7: Mean and SD ($\pm$) Post Instrument			
Test			Mean $\pm$ SD
Basic Motor Movement Test (score)	AY (score)	Pre-test	4.50 $\pm$ 0.56
		Post-test	6.02 $\pm$ 0.43
	SD (score)	Pre-test	5.90 $\pm$ 0.47
		Post-test	8.54 $\pm$ 0.34
	SLJ (score)	Pre-test	25.17 $\pm$ 11.09
		Post-test	36.19 $\pm$ 9.40
	WP (score)	Pre-test	8.12 $\pm$ 6.19
		Post-test	10.47 $\pm$ 4.78
	ST (score)	Pre-test	4.29 $\pm$ 0.88
		Post-test	5.67 $\pm$ 0.32
	FY (score)	Pre-test	12.36 $\pm$ 2.77
		Post-test	13.52 $\pm$ 2.11
	VJ (score)	Pre-test	15.43 $\pm$ 2.91
		Post-test	16.03 $\pm$ 2.21
	RC (score)	Pre-test	4.53 $\pm$ 8.61
		Post-test	5.97 $\pm$ 6.15
	SB (score)	Pre-test	12.38 $\pm$ 9.32
		Post-test	13.16 $\pm$ 8.46
SES (score)	Pre-test	8.60 $\pm$ 10.62	
	Post-test	9.37 $\pm$ 8.64	

Notes: Notes: AY is Agility; SD is Speed; SLJ is Standing Long Jump; WP is Wall Pass; ST is sprints; FY is Flexibility; VJ is Vertical Jump; RC is Running Coordination; SB is Static Balance; SES is a self-efficacy scale

Based on the Basic Motor Movement Test test, the average agility test results in the pre-test and post-test are in the range 4.50-6.02 and the standard deviation is in the range 0.56-0.43, the speed test results are in the range 5.90-8.54 and the standard deviation is in the range 0.47 -0.34, the standing long jump test results are in the range 25.17-36.19 and the standard deviation is in the range 11.09-9.40, the wall pass test results are in the range 8.12-10.47 and the standard deviation is in the range 6.19-4.78, the sprint test results are in the range 4.29- 5.67 and the standard deviation in the range 0.88-0.32, the results of the flexibility test are in the range 12.36-13.52 and the standard deviation in the range 2.11-2.91, the results of the vertical jump test are in the range 15.43-15.03 and the standard deviation is in the range 2.91-2.21, the results of the running test coordination is in the range 4.53-5.97 and the standard deviation is in the range 8.61-6.15, the results of the static balance test are in the range 12.38-13.16 and the standard deviation is in the range 9.32-8.46, the results of the self-efficacy scale questionnaire test are in the range 8.60-9.37 and the standard deviation in the range 10.62-8.64.

Data Normality Test

Table 8 below shows the results of the data normality test for each test carried out in this study. The following is a presentation of the data in question;

Table 8. Normality Test

Variables	Kolmogorov-Smirnov		
	Statistic	df	Asymp. Sig. (2-Tailed)
Basic Motor Movement Test (score)	0.168	87	0.131
SES (score)	0.320	87	0.106

Notes: SES is a self-efficacy scale

Based on the results of the normality test on the Kolmogorov-Smirnov test, an Asymp.Sig (2-Tailed) score of 0.131 was obtained for the basic motor movement test and 0.106 for the SES questionnaire. The prerequisite for the normality test is that the Sig value must be > 0.05 so that the calculation results can be stated to be normally distributed. Based on these data, it can be noted that it meets the requirements for further statistical analysis using parametric tests.

Hypothesis Test Results

After the data is known to be normally distributed, the next step is to test the parametric hypothesis using the one-way ANOVA test. The results of the data calculation can be seen in Table 9 below;

Table 9. Hypothesis Test Results- One-Way ANOVA

Variabel	Sum of squares	df	Mean squares	F	Sig.
Between groups	8.623	7	3.861	3.440	0.002
Whitin groups	11.370	80	0.986	0.871	
Total	19.993	87			

Table 9 above shows the results of the One way ANOVA test between coordination and activity tracking models with self-efficacy showing the results of the Sig. Obtained a P value (P-value) of 0.002, thus less than 0.05. So this means there is a difference in the average initial test with the final test on the results of the basic motor movement test and the SES questionnaire. So, the coordination and activity tracking models significantly influence the self-efficacy of elementary school children.

Dicussion

Based on the results of previous data analysis, the coordination and activity tracking model in physical education (PE) learning is very supportive in increasing children's self-efficacy. In this case, they find it helpful to remind some of the daily activities that must be done. Not only do they learn how to understand and be able to do several coordination models, but they can be helped with their future sports talent interests. (Shahgholi et al., 2022) explains that talent in sports is important because it estimates how much a person ability has the opportunity to undergo a training program in the sport he likes so that he can achieve high achievements. Therefore, regular exercise in childhood and adolescence will increase the potential for a physically active and healthy body in adulthood (Kliethermes et al., 2020). The only indicator that can provide the most accurate prediction of a person's well-being in the future is the habit of exercising from school age to adulthood (Lengkana et al., 2019, 2020). (Hidayat et al., 2022; Subarna et al., 2021) explains that those who have been or have remained active in sports since they were at school report rarely getting sick in their lifetime. (Ginting et al., 2021; Muhtar et al., 2019) Shows that if children exercise regularly for years at school, it has greater potential to become a habit into adulthood. Therefore this program is very supportive to be implemented early on in physical education for children at school age.

Bandura's Social Cognitive Theory suggests that a person's behavior will increase if self-efficacy increases (Govindaraju, 2021; Kursan Milaković, 2021). This issue is to the statement (Reisi et al., 2021) that physical activity is beneficial for child psychology, such as making it more self-confident, increasing the quality of children's sleep, children can concentrate better and socialize easily. In addition, the activities carried out by

children can relax (Shahgholi et al., 2022). Therefore, the coordination model is taught how children have confidence in overcoming doubts, being unable to do it, and not believing in their potential.

Sports can be a good opportunity for insecure and shy children to open up more (Mulya et al., 2023). Exercising by a well-order will increase a child's self-confidence, especially if he is gifted (Razali et al., 2023). Opportunities to learn, develop skills, and grow positive thoughts within, are just a few of the many benefits children can have thanks to regular exercise. The main impact is that a healthy self-image develops stably within them (Subasman, 2015; Xiao et al., 2021). With this positive attitude, self-efficacy will also develop along with how often children socialize and interact, and, of course, there are opportunities to carry out physical activities to maintain their potential so that they are well maintained.

Conclusions

Based on the research findings above, the coordination and activity tracking model significantly affects children's levels of self-efficacy. This condition is because the coordination model can provide children with opportunities to continue learning movement and develop individual and group movement patterns so that children feel confident in managing their potential. Therefore, physical education needs to be developed with several other scientific approaches so that students can continue to enjoy physical activity according to their growth and development needs. So physical education is no longer only psychomotor oriented, but psychological factors become the direction of educational goals because child psychology is the basis of a child's true abilities. The fitter the child is, the more intensively they participate in learning activities, the more intensively and committed they are to physical activity, the more the child's needs for growth and development will be met naturally.

Conflicts of interest

The authors declared no conflict of interest

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