

The Development of Body Movement Activity Program for Upper Elementary School Students

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Abstract

This study developed and evaluated a physical movement activity program for upper elementary students, focusing on three objectives: (1) program development, (2) improving learning capabilities, and (3) assessing its impact on knowledge, skills, and desirable characteristics. Conducted over eight weeks with three 50-minute sessions per week, the study involved 40 randomly selected students from 185 at Kasetsart University Laboratory School. Data analysis included validity and reliability testing, pre- and post-intervention comparisons, dependent t-tests, and descriptive statistics. Research instruments included a program manual (reliability = 0.82), knowledge and characteristics tests (difficulty index = 0.71, discrimination index = 0.41), and a skill test (reliability = 0.87, validity = 0.81). Results showed statistically significant improvements ($p < 0.05$) in knowledge and movement skills, along with enhanced self-confidence and teamwork. Quantitative analysis revealed increased average scores for both knowledge and physical movement skills post-intervention. This research highlights an engaging and challenging program that fosters physical movement and provides valuable insights for further refinement, ensuring continuous opportunities for students to develop their movement potential.

Keywords: Development program, Activity body movement, Elementary school students

Introduction

The study should aim to cultivate knowledge and abilities to ensure that Thai people develop good qualities, in line with the royal education policy of His Majesty King Rama X. Education should focus on building a strong foundation for students, fostering positive and correct attitudes, and equipping them with a stable and resilient foundation for life. This includes discipline, employment, and vocational skills, ensuring that no one remains idle or allows wrongdoing to spread in society. The objective is to create good citizens who will contribute to the nation's progress. A key aspect of this is teaching people to differentiate between right and wrong and to make choices that align with good moral conduct. Thai children should develop critical thinking and avoid following societal trends without discernment. Another important aspect is the royal policy that encourages taking action for the nation.

When Thais see something beneficial for the country, they should act upon it (King Vajiralongkorn, 2018).

The development of a learning process for basic movement activities seeks to foster human development, improving the quality of life comprehensively and in balance—physically, intellectually, emotionally, socially, and culturally. This approach focuses on learner-centered pedagogy within physical education, in alignment with the National Education Act of 2019 (Amendment No. 4), specifically Article 24, which calls for the integration of physical education across various dimensions to ensure a balanced and proportionate learning experience. Moreover, moral values and desirable attributes should be instilled across all subjects, aligning with the curriculum's goal to develop students into good and happy individuals. This relates to the objective of

physical education in promoting physical and mental health, good hygiene, and regular exercise (Ministry of Education, 2016). According to the Basic Education Core Curriculum, the aim is to develop students with desirable characteristics, focusing on physical development, knowledge acquisition, and personal attributes (Peachob, 2005).

In modern times, human movement plays a crucial role in daily activities, exercise, and sports. The human body is a complex system, and children whose movement skills lag behind their peers require more effort to control their bodies. This affects their posture, balance, and muscle control during movement, which is critical for both short-term and long-term development, especially in preparing children for the challenges of the 21st century. This era demands students to be critical thinkers, lifelong learners, morally courageous, and adept at problem-solving and adaptation (Office of the National Economic and Social Development Council, 2016). These attributes align with the objectives of physical education in schools. Studying physical movement in upper elementary school students is essential due to the critical developmental changes that occur during this stage of childhood. These students, generally between the ages of 9 and 12, are at a pivotal point in their physical, cognitive, and social development. Their bodies are maturing, and they are gaining control over more complex motor skills, such as coordination, agility, and balance, which are fundamental to both academic and personal success.

The goal of physical education aligns with 21st-century educational goals, emphasizing appropriate developmental training that corresponds with growth stages. Khuna- apisit (1998) notes that physical education involves activities that enhance and improve human physical condition. Physical education seeks to promote the physical, mental, emotional, and social development of learners through exercise and sports activities.

Given that physical education focuses on holistic development, it must be prioritized to ensure students' growth in multiple dimensions. As Peachob (2018) explains, physical education, when combined with sports, fosters learning, and supports the development of physical, mental, emotional, moral, and attitudinal aspects simultaneously. This process involves active participation and hands-on practice, enabling students to

realize their full potential. Physical education should emphasize the learning of body mechanics, promoting physical capacity development and related knowledge.

As individuals mature, the ability to move effectively, especially in sports and recreational activities, becomes fundamental. Movement skills are categorized into three types: locomotor movement (moving from place to place), non-locomotor movement (stationary movement), and manipulative movement (using objects in movement). Manipulative movement typically involves controlling objects with hands and feet, such as throwing, hitting, kicking, and catching (Office of the Basic Education Commission, Ministry of Education, 2008).

Research on the effects of movement activities has shown that children aged 6- 12 years, experience significant improvements in muscle, bone, and nervous system development, leading to more efficient movement. Children in this age group should be encouraged to participate in movement and sports activities to support their holistic development. However, movement abilities vary among children depending on their opportunities for practice and participation (Jeong, 2017). Foundational movement skills, which allow individuals to perform activities efficiently, are essential for children's development and form the basis for various physical activities.

As discussed, human development must begin in childhood, as this stage is critical for laying a proper foundation in movement skills. Basic movements are integral to daily life and survival, and upper elementary students, in particular, need to develop correct and challenging movements, such as walking, running, jumping, climbing, and coordinated movement using equipment. These complex movements integrate basic skills and contribute to physical, mental, emotional, social, and intellectual development. Physical education programs that encourage appropriate movement activities support this growth, fostering overall development.

Children should engage regularly in complex movement activities, especially those involving equipment, as consistent practice strengthens the connection between the brain and the body. Such activities are vital for students, particularly in primary education, as they are support in daily life, exercise, and sports, as well as survival in their environments.

From the research reviewed, it is clear that upper elementary students must develop their movement skills. Complex movement activities with equipment represent advanced skills that are particularly important for this age group. These activities enhance brain function, nervous system coordination, and body control. If students engage in these activities regularly, they will experience comprehensive physical, mental, emotional, social, and intellectual development. Based on observations during physical education classes, many students struggle with movement skills. Thus, this research focuses on developing a physical activity program for upper elementary students and provides a framework for physical education teachers and others interested in improving students' movement skills.

The outcomes of physical education instruction, as explained by Sangthong (2009) indicated that children in the school-age group (6-12 years) will develop holistically. Based on observations during physical education classes, it was evident that most students were unable to effectively perform the activities. This prompted the researcher to develop a physical movement activity program specifically for upper elementary school students. The aim of this research was to provide a framework for physical education teachers or other interested parties to use as a guide for enhancing students' physical movement capabilities. This program can serve as a conceptual model for promoting physical activity among students in the future.

Research methodology

This study employed a research and development (R&D) methodology, primarily relying on quantitative research methods. The research objectives were defined as follows: (1) to investigate a physical movement activity program for upper elementary students, (2) to create a physical movement activity program that enhances learning capabilities for upper elementary students, and (3) to evaluate the physical movement activity program in terms of knowledge, skills, and desirable characteristics before and after the intervention. The program consists of five activities, conducted over eight weeks, with three sessions each week, each lasting 50 minutes.

Population and sample

The population for this research consists of fourth-grade students at the Kasetsart University Laboratory School, Kamphaeng Saen Campus, in Nakhon Pathom Province for the 2023 academic year, comprising four classrooms. The researcher established criteria for selecting volunteers for the research project as follows

Inclusion criteria

1. Fourth-grade students from the Kasetsart University Laboratory School, Kamphaeng Saen Campus, for the 2023 academic year, selected through simple random sampling, with one classroom comprising 40 students.
2. Participants must be able to read, listen, and write in Thai.
3. Participants must not have serious illnesses that would hinder their participation in the physical movement activity program for upper elementary students.
4. Participants must consent to participate in the research.

Exclusion criteria

1. Participants who do not wish to provide information.
2. Participants not present during the data collection period.
3. Participants who fail to complete the questionnaires as required by the physical movement activity program for upper elementary students.

Withdrawal criteria for individual participant

1. Participants who decide to withdraw from the research project.
2. Participants who experience serious illness during the course of the research project.

Termination criteria for the whole research project

1. Authority figures can terminate the research.
2. The principle of respect for persons requires that the dignity of individuals be upheld, ensuring that informed consent is obtained comprehensively.
3. The principle of beneficence/non-maleficence mandates that measures are taken to prevent risks to participants' physical or mental well-being.
4. The principle of justice requires clear criteria for inclusion and exclusion.

Sample used in the research

The sample used in the research consisted of fourth-grade students from the Kasetsart University Laboratory School, Kamphaeng Saen Campus, for the 2023 academic year, the students were selected through simple random sampling from four classrooms, resulting in a total of 40 students.

Research instruments

The researcher used various tools for the experiment and data collection, which included:

1. A manual for the physical movement activity program for fourth-grade students.
2. An assessment of knowledge and desirable characteristics related to physical movement activities.
3. A skill assessment for physical movement abilities.

Steps in instrument development

Step 1: Study and analyze theories, documents, journals, and related research to create a suitable

physical movement activity program, with guidance from five experts.

Item Objective Congruence (IOC): Items with an IOC of 1.00 demonstrated a perfect alignment between the objectives and the content. Most skills, such as bending (5.1, 5.2), one-foot hop (8.2), and others, achieved high IOC scores, indicating strong consensus among experts regarding their relevance. **Content Validity:** The overall results indicated robust content validity of the physical movement activity program. Skills and activities receiving IOC values of 0.80 and above were deemed strong relevance to the intended objectives. **Expert Consensus:** High averages and IOC scores for many skills (such as jumping, dodging, and striking underscore the importance of these activities in the context of physical movement education for upper primary students. **Areas for Improvement:** Skills with lower IOC scores, particularly those around pushing and pulling, may require further development to enhance their educational impact.

Table 1 Expert consensus and IOC calculation

Skills/Activities	Average Score	IOC
1. Stretching		
1.1. Flexion & Extension	0.6	0.6
1.2. Sit-to-Stand	0.6	0.6
2. Twisting		
2.1. Twisting Motion	0.8	0.8
2.2. Forward & Backward Twists	0.8	0.8
3. Pushing Skills		
3.1. Push Motion	0.8	0.8
3.2. Push-up	0.8	0.8
4. Pulling Skills		
4.1. Pulling	0.6	0.6
4.2. Pulling Force	0.8	0.8
5. Bending		
5.1. Bending Forward	1.0	1.0
5.2. Bending & Lifting	1.0	1.0
6. Running		
6.1. Shuttle Running	0.6	0.6
6.2. High-Knees Running	0.6	0.6
7. Two-foot Jump		
7.1. Jumping	0.8	0.8
7.2. Spring Jump	0.8	0.8
8. One-foot Hop		

Skills/Activities	Average Score	IOC
8.1. One-foot Jumping	0.8	0.8
8.2. Bunny Hop	1.0	1.0
9. Leap		
9.1. Jump Over Barriers	0.8	0.8
9.2. Low Barrier Jump	1.0	1.0
10. Galloping		
10.1. Forward Gallop	0.8	0.8
10.2. Gallop Over Barriers	0.8	0.8
11. Sliding		
11.1. Side Slide	1.0	1.0
11.2. Slide & Kick	0.8	0.8
12. Dodging		
12.1. Dodging Running	1.0	1.0
12.2. Dodging Obstacles	1.0	1.0
13. Throwing		
13.1. Wall Ball Throw	0.8	0.8
13.2. Throwing Ball Return	0.8	0.8
14. Kicking		
14.1. Wall Kick	0.8	0.8
14.2. Target Kick	1.0	1.0
15. Bouncing		
15.1. Dribbling Forward	0.8	0.8
15.2. Dribbling Around Cones	1.0	1.0
16. Striking		
16.1. Balloon Strike	0.8	0.8
16.2. Partner Strike	1.0	1.0
17. Rolling		
17.1. Forward Rolling	0.8	0.8
17.2. Directed Rolling	1.0	1.0
18. Running over Obstacles		
18.1. Forward Over Barriers	1.0	1.0
18.2. Two-foot Jump Over Barriers	1.0	1.0
19. Circular Running		
19.1. Circular Barrier Jump	0.8	0.8
19.2. Circular Run Over Barriers	1.0	1.0
20. Square Running		
20.1. Circular Forward Run	1.0	1.0
20.2. Backward Square Run	1.0	1.0
21. Triangular Running		
21.1. Triangular Forward Run	0.8	0.8
21.2. Triangular Backward Run	1.0	1.0

Table 2 Analysis of reliability and validity of physical activity skill assessment tests

Test Item	Reliability (Cronbach's Alpha)	Validity (Content Validity)
Body Movement Test (turning, weaving, jumping over obstacles)	0.87	0.81
Standing Long Jump	0.85	0.78
Run to Collect Items	0.88	0.80
50-Meter Sprint	0.90	0.82

Step 2: Develop the physical movement activity program by creating assessments for knowledge, skills, and desirable characteristics.

The analysis of the reliability and validity of the four physical activity skill assessment tests shows a high level of reliability, with Cronbach's alpha values ranging from 0.85 to 0.90. Similarly, the validity scores range from 0.78 to 0.82.

These findings demonstrate that the assessment tools are reliable and valid for evaluating students'

movement competencies. Therefore, these assessments can be effectively utilized in research and the development of physical activity programs for students, providing a valuable and efficient means to enhance learning and promote physical fitness among elementary school children.

Step 3: Test the physical movement activity program by collecting data from fourth-grade student samples.

Table 3 Basic statistics of knowledge assessment scores on physical activity programs

Item	Mean	Standard Deviation	Minimum
Pre-test Score	13.05	1.78	16
Post-test Score	16.40	2.18	20
Score Difference	3.35	0.97	5

The basic statistics indicated that the average pre-test score was 13.05, while the average post-test score increased to 16.40. The average difference between the pre-test and post-test scores was 3.35. The standard deviation for the pre-test scores was 1.78, whereas it

increased to 2.18 for the post-test scores. The standard deviation of the score differences was calculated as 0.97, indicating a positive change in the distribution of scores following the intervention.

Table 4 Results of the dependent t-test comparing pre-test and post-test scores

Item	Mean Difference	Standard Deviation	t-value
Score Difference	3.35	0.97	24.15

The results from the dependent t-Test indicate a t-value of 24.15, signifying a statistically significant difference between the pre-test and post-test scores. The p-value was less than 0.05 ($p < 0.05$), demonstrating that the difference in scores before and after the intervention was statistically significant at the 0.05 level. This indicates that the intervention was effective in enhancing

students' knowledge and understanding of physical activity programs and activities among fourth-grade students.

Step 4: Evaluate the physical movement activity program, using a total score of 100 for assessing knowledge and movement skills.

Data collection

The researcher collected data following to the predetermined steps, obtaining permission from relevant authorities and student guardians to ensure ethical compliance in the research.

The researcher followed the steps below to collect data:

1. Submitted an official request from the Department of Physical Education and Sports, Faculty of Education and Development Sciences, Kasetsart University, Kamphaeng Saen Campus, to the Director of the Kasetsart University Laboratory School, Kamphaeng Saen Campus, Educational Research and Development Center, Kamphaeng Saen District, Nakhon Pathom Province, to request permission to collect data.

2. Sent a letter to parents requesting permission for students to participate in the activities and obtained ethical approval for human research.

3. Used the physical movement activity program manual for fourth- grade students, developed by the researcher, to collect data from the sample population.

4. Administered pre- tests to assess students' physical movement abilities and knowledge of the physical movement activity program before the experiment.

5. Implemented 44 skill development activities, each lasting 50 minutes, three times a week, over a period of eight weeks.

6. Administered post- tests to assess students' physical movement abilities and knowledge of the physical movement activity program after the eight-week experiment.

7. Evaluated the physical movement activity program for upper elementary school students in terms of knowledge, physical movement skills, and desirable characteristics, and made necessary revisions to improve the program.

8. Analyzed the collected data using statistical software and presented the results in tables and narrative form.

Table 6 Norms for physical movement tests for grade 4 students at Kasetsart university laboratory school

Test Item	Skill Score	Norms for Males	Norms for Females
Physical Movement Assessment	1	35 and above	40 and above
	2	34.9-30	39.9-35
	3	29.9-25	34.9-30
	4	24.9-20	29.9-25
	5	19.9 or below	24.9 or below
Long Jump	1	Below 1.0	Below 0.8
	2	1.0-1.3	0.8-1.1
	3	1.4-1.7	1.2-1.5
	4	1.8-2.2	1.6-2.0
	5	Above 2.2	Above 2.0
Run to Collect Items	1	19 and above	20 and above
	2	17-18	18-19
	3	15-16	16-17
	4	13-14	14-15
	5	12 or below	13 or below
50-Meter Run	1	11.1 and above	12.1 and above
	2	10.1-11.0	11.1-12.0
	3	9.1-10.0	10.1-11.0
	4	8.1-9.0	9.1-10.0
	5	8.0 or below	9.0 or below

Table 7 Assessment criteria for male students' movement skills

Test Item	Score Criteria 1	Score Criteria 2	Score Criteria 3	Score Criteria 4	Score Criteria 5
Physical Movement Assessment	35 and above	34.9-30	29.9-25	24.9-20	19.9 or below
Long Jump	Below 1.0	1.0- 1.3	1.4-1.7	1.8-2.2	Above 2.2
Run to Collect Items	19 seconds and above	17-18	15-16	13-14	12 seconds or below
50-Meter Run	11.1 seconds and above	10.1-11.0	9.1-10.0	8.1-9.0	8.0 seconds or below

Table 8 Assessment criteria for female students' movement skills

Test Item	Score Criteria 1	Score Criteria 2	Score Criteria 3	Score Criteria 4	Score Criteria 5
Physical Movement Assessment	40 and above	39.9-35	34.9-30	29.9-25	24.9 or below
Long Jump	Below 0.8	0.8-1.1	1.2-1.5	1.6-2.0	Above 2.0
Run to Collect Items	20 seconds and above	18-19	16-17	14-15	13 seconds or below
50-Meter Run	12.1 seconds and above	11.1-12.0	10.1-11.0	9.1-10.0	9.0 seconds or below

Table 9 Desirable characteristics assessment results for grade 4 students

Desirable Characteristics	Min. Score	Max. Score	Mean	SD
Ethics and Morality	10	15	12.5	1.82
Love for Nation, Religion, and King	8	16	12.2	2.04
Honesty	7	15	11.8	1.92
Discipline	9	16	12.7	1.78
Commitment to Work	10	17	13.0	1.66
Eagerness to Learn	11	18	13.5	1.56
Public Spirit	9	15	12.1	1.83

The assessment of desirable characteristics among Grade 4 students (n=185) revealed moderate to high averages in areas such as ethics and morality

Summary of research findings

This research was classified as research and development (R&D) with three main objectives: (1) to study the physical movement activity program for fourth- grade students, (2) to create a program that enhances learning capabilities, and (3) to evaluate knowledge, skills, and desirable characteristics before and after the intervention. The program included five activities, implemented over eight weeks, with three sessions per week, each lasting 50 minutes.

(Mean = 12.5, SD = 1.82) and discipline (Mean = 12.7, SD = 1.78).

The research sample comprised fourth- grade students from the Kasetsart University Laboratory School, Kamphaeng Saen Campus, with 40 students were selected through simple random sampling from four classrooms to form the experimental group.

The research instruments consisted of a manual for the activity program, assessments for knowledge and desirable characteristics, and skill assessments for physical movement.

The data analysis was conducted as follows: (1) The content validity of the knowledge and understanding test on the physical movement activity program, the

physical movement ability test, and the confidence in implementing the physical movement activity program was evaluated using the Index of Item Objective Congruence (IOC). The average scores were calculated, and the face validity of the physical movement activity program for fourth-grade students was assessed. (2) The reliability of the knowledge and understanding test on the physical movement activity program was measured by calculating the Cronbach's Alpha Coefficient, following Cronbach's method. (3) The reliability of the physical movement activity test for fourth-grade students was assessed through the test-retest method, using Cronbach's Alpha Coefficient. (4) The mean and standard deviation were computed for both the knowledge and understanding test of the physical movement activity program and the physical movement ability test for fourth-grade students. (5) A comparison of pre-test and post-test data was conducted using the Dependent T-Test. And (6) The data were statistically analyzed using computer software and were presented in tables and narrative form.

Research Results (1) The manual for the physical movement activity program for fourth-grade students had a reliability of 0.82. (2) The knowledge and desirable characteristics test on students' understanding of physical movement activities for fourth-grade students demonstrated a difficulty index of 0.71 and a discrimination index of 0.41, both deemed acceptable. (3) The physical movement ability test for fourth-grade students, which assessed movements such as shuttle runs, cone dribbling, and obstacle courses, yielded a reliability of 0.87 and a validity of 0.81. The standing broad jump test had a reliability of 0.85 and a validity of 0.78. The run-to-collect-things test achieved a reliability of 0.88 and a validity of 0.80. The 50-meter run test demonstrated a reliability of 0.90 and a validity of 0.82, with a Cronbach's Alpha of 0.805. And (4) The sample consisted of current fourth-grade students from Kasetsart University Laboratory School, Kamphaeng Saen Campus, Educational Research and Development Center, Nakhon Pathom Province. The training sessions lasted 50 minutes each, conducted three times a week over eight weeks. The results were statistically significant at the 0.05 level.

Suggestions

1. The developed program should be tailored to suit the context and environment of each school.

2. Promoting learning through group activities is essential for developing social skills and the ability to collaborate effectively.

3. The program should be extended to other schools to evaluate its sustainability and appropriateness in across different contexts.

4. Specific assessment tools should be created to evaluate students' movement skills at the elementary level.

5. Teachers and parents should be encouraged to actively participate in supporting continuous learning through physical movement activities.

Suggestions for future research on physical movement activity programs for upper elementary school students

1. Expanding the Sample Size: The sample size should be increased to enhance the reliability of the research findings and improve applicability across various contexts and schools.

2. In-Depth Analysis: A more detailed analysis should be conducted in each area, such as by grade level, gender, or other factors that may influence the evaluation results, to obtain more precise data.

3. Long-Term Follow-Up: Researchers should conduct long-term monitoring of students' development to assess the program's impact on their knowledge, skills, and desirable attributes in the future.

4. Satisfaction Survey: A survey should be administered to gather feedback from students and teachers who participated in the program, to understand their experiences and opinions. This feedback will inform improvements to the program's effectiveness.

5. Integration of Technology in Teaching: The use of technology, such as movement applications or videos, is recommended to motivate students and enhance the learning experience.

6. Development of Best Practices: Standards or guidelines should be established for organizing physical movement activity programs that can be applied in educational institutions to promote effective and appropriate movement among students.

7. Teacher and Staff Development: Ongoing training or skill development should be provided to teachers and staff responsible for instruction to ensure they possess the knowledge and skills to manage the program effectively.

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