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Development of Physical Activity Breaks During Changes in Learning Hours for Elementary School Students

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Abstract

This research aims to: (1) Produce a physical activity break movement product at the change of learning hours for elementary school students, packaged in the form of a guidebook. (2) Assess the feasibility of a physical activity break product at the change of learning hours for elementary school students. (3) Assess the practicality of a physical activity break product at the change of learning hours for elementary school students. This type of research is Research and Development, using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. The research subjects were teachers and students of elementary schools in Yogyakarta City. The trial included two stages: a small-scale trial subject (Ungaran 1 State Elementary School, Yogyakarta City), consisting of 1 teacher and 25 students, and a large-scale trial subject (Muhammadiyah Sagan Elementary School and Muhammadiyah Suronatan Elementary School, Yogyakarta City), composed of 2 teachers and 50 students. Before the trial, an expert validation process was conducted by two material experts, one media expert, and two practitioners. The instruments used in this study were interviews and questionnaires. Data analysis used descriptive statistics expressed in percentages. The data collection technique used was the Delphi method. The results of the study show that: (1) This study produced a physical activity break product at the change of learning hours for elementary school students, consisting of 10 forms of physical activity break movements that are "feasible" and "practical". (2) The physical activity break product at the change of learning hours for elementary school students is categorized as "feasible". Based on the assessment of material experts of 90.83% (feasible), the assessment of media experts of 86.67% (feasible), and the assessment of practitioners of 97.50% (feasible). (3) The physical activity break product at the change of learning hours for elementary school students is categorized as "practical". Based on a small-scale trial, according to the practicality questionnaire by the teacher of 88.33% (practical) and the practicality questionnaire by the students of 82.80% (practical), as well as a large-scale trial, according to the practicality questionnaire by the teacher of 96.67% (practical) and the practicality questionnaire by the students of 84.67% (practical). Thus, it can be concluded that this research produced 10 forms of physical activity break movement activities that were "feasible" and "practical".

Keywords: *Physical Activity Break; The Change of Learning Hours; Elementary School Students*

Introduction

At this Time, stressful and demanding activities can easily lead to adverse effects, such as high stress, anxiety, and even mental health issues like depression (Deliviana et al., 2020). Therefore, psychological and physical health are inseparable aspects that must be taken seriously, especially during the school learning process, as this can disrupt students' sense of wellbeing during learning activities.

Research findings suggest that a dense learning system often leads to feelings of boredom and fatigue among students, necessitating thorough preparation, both physical, psychological, and intellectual (Setyawan et al., 2021, p. 375). The relationship between learning duration and boredom, which is a problem, can be explained by research findings from (Trisnawati & Fauziya, 2024), which clarify that dense and long learning hours are factors contributing to the boredom and fatigue often experienced by students, as students usually sit in one position for extended periods. Boredom is closely related to its opposite, enjoyment.

Boredom and learning fatigue will tend to focus on threats and will limit students' cognitive abilities needed for learning activities in school. Boredom here is closely related to motivation, so that material or tasks that lack value (positive or negative) may be experienced as more monotonous and boring by students with higher control due to a lack of challenge (Putwain et al., 2018).

In addition to increasing boredom to learning fatigue and a lack of enjoyment or enthusiasm for students in class, sitting for long periods is also an example of real sedentary behavior in schools, this is supported by the opinion of (Park et al., 2020) some examples of sedentary behavior are activities carried out for a long Time and continuously such as watching television, playing video games, using computers, sitting at school or work, and sitting while traveling. In the school environment, boredom is closely related to learning fatigue; activities and mental engagement in the learning process can lead to both (Hastuti & Kurnia, 2017). Strengthened by research that says these two aspects can be caused by the Time used in the learning process being too long, which can also lead to habits of sedentary behavior, and also caused by monotonous learning methods (Pulsford et al., 2015).

Furthermore, students often do not get much movement during most of their school hours and fail to meet daily activity recommendations (Campbell & Lassiter, 2020). Therefore, if this issue is not adequately addressed, it will have adverse effects on students and raise fundamental concerns, such as sedentary behavior.

The research statement by Melo et al. (2025) found that the increase in studies on sedentary behavior over the past few years reflects its recognition as a public health problem. There is also growing evidence regarding the adverse effects of prolonged sitting on children. This sedentary behavior also poses serious challenges and needs to be addressed, because, according to Park et al. (2020, p. 266), approximately 31% of the global population aged ≥15 years does not engage in adequate physical activity, which is known to contribute to the deaths of approximately 3.2 million people each year.

Ironically, the daily reality of sedentary behavior has become a current trend that continues to increase among today's youth with the term "*rebahan*" or "*mager*" (Syafa & Misrah, 2024, p. 174). This is a real challenge regarding sedentary behavior trends among children. Data from WHO (2024) indicate that 81% of adolescents aged 10-17 years are not physically active, and this trend is compounded by technological advances that decrease physical activity, especially among children. Children today tend to be addicted to gadgets and are busier playing gadget games than engaging in physical activity.

These issues are feared to exacerbate the learning process, which is characterized by high demands and pressures, and monotonous learning methods that can lead to boredom, fatigue, and a lack of enjoyment or enthusiasm for learning in class. They also exacerbate existing problems stemming from

sedentary behavior, thereby reducing students' daily physical activity. Therefore, serious attention and action are needed to address these various issues.

Physical activity breaks are said to have positive effects, with benefits for students including feelings of joy and enjoyment, as well as helping overcome boredom and fatigue from studying. Research findings indicate that physical activity breaks can effectively mitigate the detrimental effects of prolonged sitting on physical performance. Benefits include improved mood, improved blood vessel function, and improved metabolic health (Wanders et al., 2021, p. 2259).

Other research findings suggest that physical activity breaks can foster positive behavior and health, including emotional and physical health, and improve math and reading achievement among students. This indicates that they can address sedentary behavior and improve academic achievement (Peiris et al., 2024). Activity breaks are a promising strategy for improving attention and cognitive performance in elementary school children while addressing the challenges posed by prolonged sedentary behavior and mental fatigue (Ferrara et al., 2025, p. 5). Furthermore, research findings suggest that physical activity breaks are similar to the theory of stretching exercise interventions in the workplace and school. Furthermore, research findings suggest that stretching exercises reduce boredom and learning fatigue at Muhammadiyah Kedungbanteng Junior High School (Salsabila & Amelia, 2020).

Based on the existing literature, launching a physical activity break and stretching exercise intervention program has broad positive effects on students. The basis for implementing physical activity breaks is expected to be established in the educational environment. Moreover, students also sit in class for hours every day, especially when the learning is monotonous. Given the above problems and the research findings through the existing literature review, here schools can be used as interventions to reduce the effects of boredom, learning fatigue and negative losses in sedentary behavior habits, in accordance with the opinion of Sales et al. (2023, p. 5) "policies for change in schools must be adopted and implemented, for example increasing the variety of activities during school hours and increasing time for physical activity breaks to address existing problems, as well as structural changes to school facilities".

The results of the needs analysis study based on limited observations and interviews conducted in several elementary and junior high schools in the province of Yogyakarta Special Region and Lampung Province, researchers conducted informal interviews with eight subject teachers including PJOK teachers and 15 elementary school students to find needs analysis so that information was obtained from the teachers saying that the conditions in the field sometimes really need a form of activity that aims to increase the enthusiasm for learning, a feeling of enjoyment and readiness to learn for students in overcoming boredom to learning fatigue with the hope that students will be happy and not stressed when learning takes place. Because the learning researchers observed was often carried out over a long period, especially for elementary school children, and because the learning environment was such that students sat in one position.

During the learning process, responses from subject teachers were also obtained. On average, many said they rarely or never conducted intervention activities such as physical activity breaks or similar activities (e.g., stretching in class). However, it was also found that teachers sometimes included light body-movement activities in games, namely "icebreakers," but many focused only on cognitive icebreaker games with little physical value.

Based on the perspectives of several teachers, the author concludes that the conditions in the field have not yet implemented a planned, programmed development of physical activity break activities at the change of learning hours. Strengthened by the field statement of facts, other research findings revealed that, especially in the educational environment, it is very rare to find a habit of engaging in physical stretching activities outside PJOK subjects. Physical activities are sometimes only done once a week on Friday mornings (Priyoto & Wahyuning, 2019, p. 54). According to the literature on intervention

programs related to physical activity, for example, physical activity breaks have positive benefits for students.

The author also obtained information from the students' perspective through interviews, stating that many students often feel bored when learning involves only sitting in class listening to the teacher lecture on the material, especially when they are given subjects that are difficult for them. It was also found that after-school learning activities, children spend more Time at home using gadgets than engaging in regular physical activity three times a week.

Based on the literature and needs analysis above, solutions are required to address these problems. Therefore, it is necessary to develop physical activity break activities at every change of class period at school. This is because several studies have found numerous benefits from implementing physical activity breaks in the learning process. This is also supported by research by Gani et al. (2023), which states that "feelings of pleasure and comfort (enjoyment) experienced by students and the positive impact of implementing physical activity breaks are the keys to successful learning in schools".

Based on the description above, with many studies stating that physical activity break interventions have been proven to be effective and have quite extensive positive benefits in supporting the learning process of students and the agreement to incorporate this program into classroom learning, researchers want to study and conduct research with the theme "Development Of Physical Activity Breaks During Changes In Learning Hours For Elementary School Students ".

Research Methods

This study uses the Research and Development (R&D) model of the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model to develop product forms of physical activity break activities. The research subjects were teachers and elementary school students in Yogyakarta City. The trial included two stages: a small-scale trial subject (Ungaran 1 Elementary School, Yogyakarta City) comprising one teacher and 25 students, and a large-scale trial subject (Muhammadiyah Sagan Elementary School and Muhammadiyah Suronatan Elementary School, Yogyakarta City) comprising two teachers and 50 students. Before the trial, an expert validation process was conducted by two material experts, one media expert, and two practitioners. The instruments used in this study were interviews and questionnaires. Data analysis used descriptive statistics expressed in percentages. The data collection technique used was the Delphi method.

The data obtained will be analyzed using Aiken's Validity test formula and Cronbach's Alpha for Reliability. In this data analysis technique, qualitative and quantitative data will be obtained. The collected data are then calculated using the feasibility and practicality assessment formula and the rating scale formula, and analyzed descriptively. Qualitative data is obtained from input, suggestions, and comments from validators (experts) in descriptive form. Quantitative data processing results are used as criteria for product assessment.

In contrast, quantitative data is obtained from the results of distributing questionnaires using a four-point rating scale in checklist form. The data are then analyzed using descriptive statistics. To determine whether the resulting product is feasible or not, and practical or not, use the rating scale formula to find the assessment interval (Sugiyono, 2020).

Research Result

A. Analysis

At the analysis stage, the aim is to review previous literature and identify sources that address the development aspects to be carried out, and to determine the need for field studies to obtain the information needed. At the analysis stage, the aim is to review the literature, identify sources that address the development aspects to be carried out, and determine the need for field studies to obtain the required information.

1. Literature Study

The literature review stage is intended to gather data from supporting theoretical studies to develop physical activity break movement activities at the transition between learning hours for elementary school students.

2. Field Study

A preliminary study was conducted to analyze the research needs. Based on the results of the preliminary study, the researcher obtained the following data: (1) a preliminary study of field conditions showed that learning was still mainly carried out with very long learning durations, especially for elementary school children, especially if the students only sat in one position, (2) the application of ice breaking only focused on cognitive games without any physical value, (3) the need for development and intervention of similar activities such as physical activity breaks, and (4) the need for activities to overcome learning saturation, learning fatigue and sedentary behavior.

The results of the preliminary research were analyzed to compile the initial design for developing physical activity break movement activities.

B. Design

The second stage of the ADDIE model is the design stage. This stage involves designing various forms of movement-related physical activity breaks by preparing references for these activities. Physical activity break activity products are compiled based on the materials needed for product development, and create specific preparation references in the product design that will always integrate the values of fun, fitness, and the harmony of movements. This stage is still in the form of frameworks before product development, with an initial draft of 10 physical activity break movement forms that are still raw.

C. Development

During the development stage, researchers collected supporting materials that still contained raw procedures, serving as a product draft to be realized into a finished product for assessment and testing. At this stage, researchers also did not forget to re-correct the product before conducting validation tests by experts and product trials. Furthermore, a feasibility assessment was also carried out by material experts, media, and practitioners to obtain values and input on the product, so that the product design that had been designed and developed included 10 forms of physical activity break movements that had been improved based on suggestions, input, and assessments by experts.

The following are the names of the physical activity break movements that have been developed, namely (1). Let's Move Our Body, (2). Clap Enthusiastically, (3). My Body is Strong and Healthy, (4). Swimming, Cycling, and Flying (5). Ready to Move? Go! (6). Climbing to the Top of the Mountain, (7). Rotating Body Parts, (8). Walking, Jumping, and Regulating Breath (9). I am a Healthy Child (10). Tiki-Tiki, Bam-Bam, Bum.

The validator assessment was conducted by five people, including 2 Material Experts, 1 Media Expert, and 2 Practitioners.

Table 1. Expert Assessment Results Data

Validator	Score (*n*)	Percentage	Category
Material Experts (2)	109	90,83%	Feasible
Media Expert (1)	52	86,67%	Feasible
Practitioners (2)	117	97,50%	Feasible

The results of each expert's assessment are as follows: based on the evaluation of material experts, 90.83% are categorized as "feasible"; based on the evaluation of media experts, 86.67% are classified as "feasible"; and based on the evaluation of practitioners, 97.50% are categorized as "feasible". The validity test results range from 0.80 to 1.00 and indicate a high level of validity, and the reliability test results are 0.67, indicating reliable information. After the product revision is based on input and product assessment from experts and practitioners, it can thus be tested on a small or large scale.

D. Implementation

In the implementation stage, what is done is to conduct product trials on a small and large scale and use practicality questionnaires by teachers and students to determine the suitability of the product and the practicality of the product by obtaining assessments and input from practicality questionnaires from teachers and students, interviews, and evaluations, which are used as a reference for the final product.

1. Small-Scale Trial

A small-scale trial was conducted at Ungaran 1 State Elementary School in Yogyakarta City, in class IV C, with one teacher and 25 students.

Table 2. Small-Scale Product Trial Results Data

Respondents	Score (*n*)	Percentage	Category
Teacher (1)	53	88,33%	Practical
Students (25)	1.242	82,80%	Practical

The results of the small-scale trial were evaluated by teacher and students as follows: based on the teacher practicality questionnaire, 88.33% were categorized as "practical"; based on the students' practicality questionnaire, 82.80% were classified as "practical".

2. Large-Scale Trial

Large-scale trials were conducted in 2 schools: Muhammadiyah Sagan Elementary School, Yogyakarta City, class II Ibnu Hazmi, and Muhammadiyah Suronatan Elementary School, Yogyakarta City, class III C, with a total of 2 teachers and 50 students.

Table 3. Large-Scale Product Trial Result Data

Respondents	Score (*n*)	Percentage	Category
Teachers (2)	116	96,67%	Practical
Students (50)	2.540	84,67%	Practical

The results of the large-scale trial were evaluated by teachers and students as follows: based on the teachers' practicality questionnaire, 96.67% were categorized as "practical"; based on the students' practicality questionnaire, 84.67% were classified as "practical".

E. Evaluation

This evaluation stage aims to identify deficiencies, errors, and product feasibility issues at each stage of the development process, enabling the product to be improved as a whole. The evaluation stages in this study will be conducted at each stage of the product development process, from product creation to implementation. This aims to measure the achievement of development goals through various methods, so they can be corrected immediately and become a perfect final product with minimal weaknesses.

Discussion

Based on the results of data analysis of the results of assessments and small and large scale trials of physical activity break products at the change of learning hours for elementary school students, the categories were "feasible" and "practical", this shows that the activity intervention program at the shift of learning hours is sufficient to help students overcome problems in the learning process and support teachers in having forms of physical activity break activity movements that are used in the break between learning hours as a substitute for "ice breaking" which does not emphasize the physical activity aspect to prepare students to feel ready to face the following subject through practical and fun activities and prevent the adverse effects of sitting in one position from the beginning of learning to the end of learning that is too long.

The results of this study also align with the theory that physical activity break interventions have a positive impact on student learning in school. The results of the study are reinforced by the findings of research conducted by (Yu Fiona et al., 2025) who said that stopping sitting activities and increasing light-moderate intensity physical activity can help offset the adverse effects of sitting too long in one position, furthermore, physical activity is significant for maintaining overall health and wellbeing, reducing stress, and increasing energy levels, thereby increasing productivity, cognitive function, and satisfaction in carrying out activities at school.

Another research finding (Ferrara et al., 2025) reported on physical activity interventions during every learning break lasting 11 weeks, demonstrating that activity breaks are a promising strategy to improve attention and cognitive performance in elementary school children while addressing the challenges posed by prolonged sedentary behavior and mental fatigue. In addition, physical activity breaks are active learning that is carried out physically and can be designed to include moderate-to-vigorous physical activity (MVPA), which is integrated into classroom learning. The 5-minute intervention has a positive effect, increasing students' daily activity and classroom behavior (Masini et al., 2019).

The results of this study are also based on and strengthened by research by Gani et al. (2023), which states that "feelings of joy, comfort (enjoyment) experienced by students and the positive impact of implementing physical activity breaks are the key to successful learning in schools." Therefore, the activity intervention program, which replaces learning with physical activity breaks and has been developed and implemented under the categories "feasible" and "practical," aligns with existing research findings, is a positive activity, and can help overcome learning problems directly experienced by students at school.

The final product of this development research is a physical activity break at the change of learning hours for elementary school students. There are 10 forms of activity movements at the change of

learning hours that can be used during the break between learning hours and are "feasible" and "practical".

The products created and developed are packaged into a practical and innovative user guidebook for teachers to prepare their students for the change of learning hours, which is equipped with an explanation of physical activity break activities, implementation procedures, movement lyrics, images and videos in QR barcodes to be used to help prepare students' enthusiasm in class so that they feel ready to face the following subject by intervening in various forms of physical activity break movements that are summarized into activities at the change of learning hours, and will also be disseminated as reference material for elementary school teachers.

Conclusion

Based on the research results, data analysis, and discussion presented in the previous section, the following conclusions can be drawn:

1. This research produces a form of physical activity break movement activity at the change of learning hours for elementary school students through the ADDIE approach and development model, consisting of 10 forms of "feasible" and "practical" physical activity break movement activities packaged in a guidebook.
2. The physical activity break product during the change of learning hours for elementary school students was categorized as "feasible." Based on the assessment of material experts, it was 90.83% (feasible), the evaluation of media experts was 86.67% (feasible), and the assessment of practitioners was 97.50% (feasible).
3. The product of physical activity breaks during learning hours for elementary school students is categorized as "practical". Based on a small-scale trial of the practicality questionnaire by teachers of 88.33% (practical) and the practicality questionnaire by students of 82.80% (practical), as well as a large-scale trial of the practicality questionnaire by teachers of 96.67% (practical) and the practicality questionnaire by students of 84.67% (practical).

Suggestion

Based on the findings of this study, which have novelty and contribution in education, there are suggestions from this study, namely:

1. Teachers are expected to use physical activity breaks during the change of learning hours for elementary school students.
2. Teachers are expected to be able to develop physical activity break activities at the change of learning hours for elementary school students, in the form of other activities and developments tailored to field conditions.
3. Teachers can work together to facilitate and coach other teachers so they can implement this activity in their respective schools.
4. For further research, this study will contribute to in-depth research and the further development of the product to improve the form of physical activity breaks during changes in learning hours for elementary school students.

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