

Can Model-Based Approach in Physical Education Improve Physical Fitness, Academic Performance, and Enjoyment among Pupils? A Systematic Literature Review

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Abstract The aim of this study is to determine existing teaching and learning process information published over the past five years (2016 – 2020) on how the different approaches in Physical Education (PE) improve physical fitness, academic performance, and enjoyment among pupils. A mixed systematic review was conducted, and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were referred to. The articles included were selected based on the requirements: studies published in the international journal; studies published from 2016 to 2020; studies conducted within primary (7 to 12 years old) and secondary (13 to 18 years old) school context; studies that involved qualitative or quantitative methods; an article that focused on the effectiveness of multiple approaches in PE towards physical fitness, academic performance and enjoyment among pupils. A total of 14 articles were identified. Results showed that model-based approaches in PE such as Teaching Games for Understanding (TGfU), Project-based Learning (PBL), and Collaborative Learning (CL) gradually improve physical fitness, academic performance,

and enjoyment among pupils compared to traditional approaches. Finally, alternative teaching approaches abundantly differ from the traditional method in PE, which potentially improves overall performance among pupils. Therefore, this review can help teachers and researchers to deliver their teaching and learning activities using different approaches in primary Physical Education lessons.

Keywords Physical Fitness, Academic Performance, Enjoyment, Model-Based Approaches

1. Introduction

Physical Education enhances pupils' performance physically and is filled with sports content of knowledge, thus, applicable in daily lives [1]. In the Malaysian context, Physical Education is a compulsory subject needed to be taken by both primary and secondary school students, which correlates with the National Philosophy of

Education that focuses on developing holistic individuals. PE teachers frequently use several teaching methods, but unfortunately, the implementation of multiple approaches in Physical Education for primary and secondary school pupils is significantly less. Also, according to Watson et al. (2017), Physical Education class allows pupils to be physically active and enjoy attending the course. The pupils' involvement depends on conducting the excitement and different activities during the teaching and learning sessions. Hence, this systematic review and meta-analyses mainly determine several studies focusing on the teaching approach and effectiveness during the PE lesson.

Systematic reviews and meta-analyses have a high level of indication as signified by the evidence-based pyramid [3]. On the other hand, a systematic review is defined as an overall review using a methodical technique to summarize evidence on a specific topic and a comprehensive study plan [4]. Therefore, a well-conducted systematic review and meta-analyses were carried out as the process of creating evidence on effective teaching approaches in Physical Education. Besides, this research helps educators enhance their knowledge and performance in teaching approaches, specifically in Physical Education.

Based on the meta-analyses, there are several student-centered approaches implemented in PE classes, such as Teaching Games for Understanding (TGfU), Cooperative Learning (CL), and Project-Based Learning (PBL). During the last few years, some methods and techniques in teaching and learning sessions were expanded due to their environmental factors and the implementation in various educational settings [5]. Casey and MacPhail [6] stated that Teaching Games for Understanding (TGfU) is among the practical approaches frequently used in physical Education by PE teachers. Also, Cooperative Learning (CL) is the beginning of the 21st-century learning model that allows pupils to collaborate and perform based on the given task [7]. Additionally, Project-Based Learning (PBL) is a general form of cooperative and inquiry-based learning that enables active pupils' engagement and comparative Education [8].

Furthermore, the systematic review was also conducted on the effectiveness of teaching approaches towards physical fitness, academic performance, and enjoyment among pupils from different states and countries. Thus, it is an opportunity for the researcher to adopt it in Malaysian educational content, specifically in Physical Education. Based on those mentioned above, the main aim of this study was to review the literature or articles published in the last five years on model-based approaches implementation in Physical Education among primary school students aged 7 to 12 years old and secondary school students aged 13 to 18 years old. The review also updates and explores previews studies to help the teachers and researchers to apply in their teaching and learning sessions.

2. Methods

2.1. Search Sources

A systematic analysis or review of the articles published over the last five years on the model-based approach in Physical Education was conducted. Six electronic databases were initiated to find existing publications between January 2016 and December 2020, such as SCOPUS, Google Scholar, EBSCO host, ERIC, SPORTDiscus, and Web of Science. The descriptors "Teaching Games for Understanding", "Cooperative Learning", "Project-Based Learning", "model-based learning", and "Physical Education" were used with the search operator.

2.2. Study Selection

The studies were selected based on the following inclusion criteria: (a) articles that published in journals, (b) intervention program based on Teaching Games for Understanding, Cooperative Learning, and Project-based Learning, (c) physical fitness, academic performance, enjoyment was measured, (d) the article written in English, (e) five years of publication of the articles starting from 2016 to 2020.

2.3. Assessment of Risk of Bias

To assess the risk of bias, PEDro scale was applied [9]. This scale was used to evaluate the quality of intervention program studies. The GRADE guidelines that involve a four-point scale: very low, low, moderate, and high were used to identify the quality of studies [10]. The risk of bias results of included articles was shown in Table 1 below. In the Table 1 below, the character Y means criterion was fulfilled while N means criterion was not fulfilled. The number 1 showed eligibility criteria were defined, number 2 showed the participants were randomly distributed to groups, number 3 showed the assigned was concealed, number 4 showed the groups were similar before the intervention (at baseline), number 5 showed all participants were blinded; number 6 showed therapists (teachers) who conducted the intervention were blinded, number 7 showed there was blinding of all evaluators, number 8 showed the measures of at least one of the actual outcomes were attained from more than 85% of the participants initially, number 9 showed "intention to treat" analysis was conducted on all participants who received the control condition or treatment as assigned, number 10 showed the findings of statistical comparisons between groups were reported for at least one actual outcome, and number 11 showed the study gives variability and punctual measures for at least one actual result; total score: each satisfied item (except the first) adds 1 point to the total score.

2.4. Data Collection

Based on the PRISMA guidelines, the data was collected and the information was transformed into several terms: participants, intervention, comparisons, outcome, and

study design (Moher et al., 2009). Table 2 shows the main terms of different protocols of intervention and participants' details: age, sex, level of Education, and sample size.

Table 1. Risk of bias according to the PEDro Scale

| Study | Response to Each Item Level of Evidence | | | | | | | | | | | Total score |
|------------------------------|---|---|---|---|---|---|---|---|---|----|----|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| Alcala, D.H, Garijo, 2017 | Y | N | N | Y | Y | N | N | Y | Y | Y | N | 6 |
| Badicu, 2018 | Y | N | N | Y | Y | N | N | Y | Y | Y | N | 6 |
| Bjorke,L & Moen, 2020 | Y | N | N | Y | Y | N | N | Y | Y | N | N | 6 |
| Cocca et al., 2020 | Y | N | Y | Y | Y | N | N | Y | Y | Y | Y | 8 |
| Dania et al., 2017 | Y | N | N | Y | Y | N | N | Y | Y | N | N | 5 |
| Engels & Freund, 2020 | Y | N | Y | Y | Y | N | N | Y | Y | N | Y | 7 |
| Ginanjar & Tarigan, 2018 | Y | Y | N | Y | Y | N | N | Y | Y | Y | N | 7 |
| Hidayat, 2020 | Y | N | N | Y | Y | N | N | N | Y | Y | N | 6 |
| Jani et al., 2017 | Y | N | Y | Y | Y | N | N | Y | Y | Y | Y | 7 |
| Marheni et al., 2020 | Y | Y | Y | Y | Y | N | N | Y | Y | Y | N | 8 |
| Morales-Belando et al., 2018 | Y | N | Y | Y | Y | N | N | Y | Y | Y | N | 7 |
| Rahman et al., 2020 | Y | N | Y | Y | Y | N | N | Y | Y | Y | Y | 8 |
| Ramirez et al., 2017 | Y | N | N | Y | Y | N | N | Y | N | N | Y | 5 |
| Syamsuar et al., 2020 | Y | N | N | Y | Y | N | N | Y | N | Y | Y | 6 |

Table 2. Characteristics of the participants and protocol

| Study | Characteristics of the Sample | | Protocol | |
|------------------------------|---|---|--|--|
| | Sample Size of Groups and Sex | Age (SD) and Education Level | Treatment Group | Control Group |
| Alcala, D.H, Garijo, 2017 | EG: 128 CG: 109 | 1st, 2nd, 3rd, and 4th grade (NR) High School | Teaching Games for Understanding (TGfU) | Technical-traditional approach |
| Badicu, 2018 | 52 pupils (28 males and 24 females) EG: 27 CG: 25 | 9 – 10 years (NR) Primary School | Games method | Traditional method |
| Bjorke, L & Moen, 2020 | EG: 64 student (41 5th-grade students and 23 6th-grade students) (NR) | 10–11 years and 11–12 years (NR) Primary School | 24 lessons of Cooperative Learning | NR |
| Cocca et al., 2020 | EG: 105 (47 females and 58 males) CG: 83 (30 females and 53 males) | 10.22 ± 0.76 years (7.96) Primary School | TGfU-based intervention | Traditional PE sports activities |
| Dania et al., 2017 | 91 third and fourth-grade students | 9.2 years, SD 0.7 Primary School | TGfU method | Traditional method |
| Engels & Freund, 2020 | EG: 155 (NR) CG: 130 (NR) | 10 to 16 years (Mage = 12.67 years, SD= 1.10; 48.4% female). Primary and High School | Cooperative-games | Noncooperative-games |
| Ginanjari & Tarigan, 2018 | EG: 40 CG: 40 NR | NR High School | Project-Based Learning | Conventional approach |
| Hidayat, 2020 | EG: 29 (18 females and 11 males) | 14 (NR) High School | Project-based Learning | NR |
| Jani et al., 2017 | 14 students EG: 7 CG: 7 (NR) | 18 years (NR) High School | Coaching module based on TGfU | Regular teaching |
| Marheni et al., 2020 | EG: 30 (NR) CG: 30 (NR) | NR High School | Project-based learning | Conventional learning or lecture method |
| Morales-Belando et al., 2018 | 41 pupils (23 boys and 18 girls) | Mage ± SD 11.73 ± .66 years Primary School | TGfU method | NR |
| Rahman et al., 2020 | EG: 42 (NR) CG: 38 (NR) | 16 years (NR) High School | The passing and receiving skills in field hockey skills with the TGfU method | The passing and receiving skills in field hockey skills using the traditional approach |
| Ramirez et al., 2017 | 38 girls and 37 boys | 11–12-years (SD= 11.44) Primary School | Project-based Learning | - |
| Syamsuar et al., 2020 | 30 students (NR) | 11 years (NR) Primary School | TGfU method | Conventional with lecture and discussion method |

Note: CLG = Cooperative Learning Group; CG = Control Group; SD = Standard Deviation; NR = Not Reported. Table

Table 3. Characteristics of the interventions (period and activities)

| Study | Duration of Study | Number of Sessions | Intervention Programme |
|------------------------------|-------------------|--|--|
| Alcala, D.H, Garijo, 2017 | NR | 24 lessons | TGfU Model (Transference, Representation, Exaggeration, Increasing tactical complexity, Authentic assessment. All TGfU learning units followed the same structure (Play, Tactical Awareness, Ability Execution) |
| Badicu, 2018 | 6 months | NR | Dynamic games applicative pathways within the instructive and educational process |
| Bjorke, L & Moen, 2020 | 6 weeks | 24 lessons | Cooperative Learning structures and tasks, CL theoretically, collaboratively think and plan units following CL (Workshops 2, 4, 6, and 8), as well as evaluating and reflecting on the completed units (Workshops 3, 5, 7, and 9) |
| Cocca et al., 2020 | 6 months | Twice per week and 45 min per session | The teaching Games for Understanding (TGfU) model in football, basketball, and handball is divided into 5 phases: TGfU phases a, b, c, d, and e. |
| Dania et al., 2017 | 8th- week | four times per week (35-45 minutes) | 14 invasion game-units, which were implemented by utilizing the TGfU Approach |
| Engels & Freund, 2020 | 16 weeks | 15-minute-cooperative games once per week | Cooperative learning approaches (components of existing cooperative games and led by SDT) |
| Ginanjari & Tarigan, 2018 | NR | NR | Model of learning based on the teaching of Project-Based Learning creativity, student concentration, and test |
| Hidayat, 2020 | 12 weeks | NR | Project Based-Learning with six steps (Project Determination Planning, Project Completion Steps, Project Implementation Schedule Arrangement, Project Completion with Teacher Monitoring, Learning Result Report Preparation, Process and Result Evaluation) |
| Jani et al., 2017 | 4 weeks | NR | Training using the coaching module (decision-making in determining the attack or defense strategies and tactics and the application of skills in the modified game) |
| Marheni et al., 2020 | NR | 2 x 45 minutes | Project-based learning (PBL) (application, starting from planning/planning students working together in the division of tasks, reporting strategies, finding resources, and creativity in making athletic sports support tools) |
| Morales-Belando et al., 2018 | NR | 4 Weeks = Each week, there were two 55-minutes lessons | An eight lessons unit: TGfU (Floorball, indoor invasion game) principle of play TGfU core features: (a) the learners played an active role, (b) struggled with problems, and (c) explored and proposed solutions. |
| Rahman et al., 2020 | 6 weeks | NR | Teaching Games for Understanding (TGfU) approach (understanding tactical aspects, the game itself, reflection on errors, and acquired learning) |
| Ramirez et al., 2017 | 2 Years | NR | Project-Based Learning three groups, 6 ^A (12 female and 13 male students), 6 ^B (13 female and 13 male students) and 6 ^C (13 female and 11 male students) Interdisciplinary activities, Evaluation, Other PBL activities given |
| Syamsuar et al., 2020 | NR | NR | TGfU (teaching activities with the inductive concept, observe and solve problems during the learning process by stimulating them with many activities) |

Note: NR = Not Reported.

Based on the intervention, Table 3 summarizes the following details: a period of the study, number of sessions, and type of intervention program.

2.5. Statistical Analysis

A random-effects model was applied for this meta-analysis to measure the effect of TGfU, Cooperative Learning, and Project-Based Learning interventions on physical fitness, academic performance, and enjoyment among pupils. Table 3 represents the result of each study on this variable. The changes between the experimental and control group calculate the effectiveness of the

intervention programs. Overall, the effect size in each study was analyzed using mean and standard deviation as a pre and post test.

3. Results

A total of 14 studies were conducted systematically from the first [11] to the last [24]. In this study, the related information was evaluated following the structure used in the systematic review as authors with publication year, aim, sample analysis, data resources, and analysis and outcomes. A summary table regarding the information above was

shown in Table 2 and 3.

3.1. Aim of the Study

Physical Education has gradually become prominent, and it is more of a modern approach that focuses on creating a student-centered learning environment. It also encourages pupils to participate in sports regularly while facilitating the development and maintenance of fitness [26]. Thus, this research identifies the multiple teaching approaches and their efficiency in PE classes in a 21st-century learning environment. Rahman et al. [22] determine the effectiveness of Teaching Game for Understanding (TGfU) to promote enjoyment in PE classes. Similarly, Cocca et al. [14] assess pupils' physical fitness changes after a six-month TGfU-based program. Following that, Alcalá & Garijo, Badicu [11,12]; Jani et al. [19]; Morales-Belando et al. [21]; Syamsuar et al. [24], examined the effectiveness of the Teaching Games for Understanding (TGfU) method towards physical fitness among pupils. On the other hand, Engels and Freund [16] investigated whether cooperative learning in physical education classes can increase students' enjoyment. Also, Bjorke and Moen [13] examine the effectiveness of cooperative learning in physical education among pupils. However, Hidayat, Marheni, et al., Ramirez et al. [18,20,23] examine the efficiency of the Project-Based Learning methods on Physical Education among primary and secondary school pupils.

3.2. Sample Description

Twelve studies are descriptive regarding each study's context, while only two studies are reviewed and proposed. Additionally, research was carried out in the subject's grade level on the primary and secondary education levels. However, the majority focused on primary school [12-15,21,23,24], followed by secondary school [11,16-19,22]. Lastly, the biggest sample (285 participants) was assessed by Engels and Freund [16], and the lowest (14 participants) was by Jani et al. [19].

3.3. Data Resources and Analysis

In this study, several data collection and analyses methods were used: quantitative (8) [11,12,14-17,22,24], qualitative (5) [13,18-20,23], and mixed methods (1) [21]. Physical fitness tests and questionnaires were used in the quantitative studies, while observations, reports, and interviews were used in qualitative studies.

3.4. Outcomes

The multiples approach: Teaching Games for Understanding (TGfU), Project-Based Learning (PBL), and Cooperative Learning (CL) had positive feedback or improvement in physical fitness, academic performance,

and enjoyment among pupils.

4. Discussion

This systematic review aimed to determine scientific literature on multiple approaches using in Physical Education and their efficiency towards physical fitness, academic performance, and enjoyment among primary and secondary school pupils. In the technology world, Physical Education in primary and secondary schools has been under inspection. The teachers use various teaching methods to deliver skills and knowledge to the pupils, especially in primary schools. Mainly; traditional methods used and a priority for physical education classes have been eradicated from the school schedule happens in many schools. Furthermore, most schools primarily focused on enhancing academic performance compared to physical fitness, which caused limited time spent in physical education learning sessions [27].

Therefore, this systematic review and meta-analyses of fourteen studies gradually proved that three main approaches (Teaching Games for Understanding, Cooperative Learning & Project-based Learning) give positive feedback in Physical Education learning sessions. The TGfU is categorized as a transformation strategy in the physical education curriculum. Alcalá & Garijo, Badicu [11,12]; Jani et al. [19]; Morales-Belando et al. [21]; Syamsuar et al. [24]; Rahman et al. [22]; Cocca et al. [14] proved that the TGfU approach had increased students' physical fitness and enjoyment in the Physical Education class.

Besides, the cooperative learning approach enables pupils to work together while observing each other and learning new skills from their members. Engels and Freund [16] and, Bjorke and Moen [13] cooperative learning can help foster enjoyment in physical education classes. It developed pupils with positive attitudes and enabled working with their peers in small groups. Finally, Project-Based Learning consisted of shorter projects evaluating a current situation and collaboratively forming a specific problem. Hidayat, Marheni, et al., Ramirez et al. [18,20,23] proved that Project-based learning in physical education increased creativity better than a conventional approach and increased academic performance while pupils enjoyed it.

In Malaysian context teaching physical education using model based approach gradually implemented by ministry of education through developing new curriculum replacing traditional method. In house training provided to the physical education teachers to improve their teaching skills. Physical education text books written focused on students' centered learning process by introducing model based learning approach. Teachers who are called old timers can easily adopt and adapt the new methods by reading and reviewing the outcomes from varies researches and case studies conducted around the world. Literature reviews on

new teaching methods and approaches widely discussed among academicians to enhanced teaching profession globally.

5. Conclusion

Overall, a systematic review of the literature provided detailed knowledge and allowed the researchers and teachers to design a suitable approach in Physical Education teaching process. As detailed above, several studies stated that pupils' physical fitness and enjoyment improved via a proper implementation of student-centered strategies. Students- centered learning approach is proven as an alternative and effective method in teaching Physical Education. Also, various methods and instruments were used in studies to transform the traditional approach into a student-centered approach. The findings of above studies should be a guidance to the local physical education teachers to improve and enhance their teaching methods towards the current requirements of new generation in this ever-changing world of technology. In conclusion, a learning material offers inclusive, learner-centered, relevant opportunities that promote outcome achievement in multiple domains among pupils [28]. This study determines that the usage of model based on teaching method becomes preference among teachers in schools and lectures in higher institutions. It's a good sign of progress development in teaching Physical Education towards enhancing pupils higher order thinking and problem solving skills.

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