Practice-Based Learning Method to Improve Physical Education Teacher Understanding of TGMD-2 Usage

Baskoro Nugroho Putro[1], Hanik Liskustyawati[2], Djoko Nugroho[3], Sri Santoso Sabarini[4], Sunardi Sunardi[5], Budhi Satyawan[6]

{baskoro.np@staff.uns.ac.id[1], hanik_l@staff.uns.ac.id[2], djokonugroho@staff.uns.ac.id[3], srisantoso@staff.uns.ac.id[4], sunardi58@staff.uns.ac.id[5], budhisatyawan@staff.uns.ac.id[6]}

Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[1] ,Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[2] ,Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[3] ,Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[4] ,Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[5] ,Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia[6]

Abstract. Elementary school physical education teachers must understand gross motor development. Elementary school students must have good gross motor skills to learn motion at the next level. The development of gross motor skills should be evaluated periodically. TGMD-2 is a gross motor skill test instrument that has been widely used. Implementing TGMD-2, which tends to be easy, can help teachers identify the development of gross motor skills. Elementary school physical education as the samples need to learn how to use TGMD-2. Samples study TGMD-2 using practice-based learning to learn TGMD-2 deeper. The research design used a one-group pretest and posttest design. Pretest and posttest instrument tested to a group of samples that have the same characteristics as research samples. The samples' understanding of the use of TGMD-2 increased after undergoing treatment. Paired t-test with a probability value of significantly smaller than 0.05 declared that practice-based learning impacted samples. The achievement of N gain with the lowest category "average" and a decrease in the posttest percentage of Error compared to the pretest strengthens the hypothesis. Samples had the opportunity to see TGMD-2 from the learner, location setter, test taker, and testers side. This perspective provides complete knowledge for samples in using TGDM-2 as an evaluation tool.

Keywords: physical education; teacher; TGMD-2; pratice; learning

1 Introduction

Physical education teachers must understand the needs of students for their lives. Competencies achieved through education show learning outcomes and emphasize using knowledge gained in activities [1]. High-quality education and the needs of all students can be met with a teacher-appropriate response [2]. Poor physical education quality is one factor in the decline in the quality of movement development in children [3]. Physical education teachers are responsible for how to move using the correct technique, the ability to detect motion errors, and how to correct them [4]. Teachers must understand and have technology that can be used to increase effectiveness and efficiency in teaching physical education [5]. Technology in physical education can facilitate an authentic assessment [6].

ACPES 2022, October 28-30, Medan, Indonesia

DOI 10.4108/eai.28-10-2022.2327478

Gross motor skills are one of the student competencies and need. Locomotor and object control are skills that included gross motor skills [7]. The development of gross motor skills is one of well-being and general development indicator [8]. Human ability to learn and develop gross motor skills can be varied [9]. Space, opportunity, and trust in the school environment will develop optimally gross motor skills [10]. Physical activity also has a massive impact on gross motor skills development [11]. Physical activity is produced by skeletal muscles and requires energy expenditure [12]. Gross motor skills give a chance to developed physical fitness since associated with physical activity that requires energy expenditure. A student with high gross motor competence tends to be more physically fit than low gross motor competence students [13]. As crucial for advanced movement learning, gross motor skills should be monitored and screened periodically [14].

TGMD-2 is an assessment instrument that builds for identified three until 10 years of children's gross motor skills. TGMD-2 is one of the most frequently used test instruments to measure children's gross motor skills [15]. TGMD-2 is one of most TGMD-2 is a standard gross motor skill assessment approach [16]. TGMD-2 is not only used as a test instrument in clinical and research fields but can also be used in education [17]. TGMD-2 measured the development of gross motor skills through two sub-tests [18]. The two sub-tests used in TGMD-2 are divided into a sub-test of six locomotor skills and six object control [19]. The test is used to identify the development of gross motor skills, plan gross motor skill development learning programs and evaluate gross motor skill development programs' success [20].

Practice-based learning gives the teacher a more significant opportunity to understand TGMD-2. Practice is a learning situation that gives the learner a clear goal, immediate feedback on performance, and enough repetition to level up the performance [21]. Practice-based learning can be considered an excellent approach to develop learner competency [22]. The focus of practice-based learning is firmly juxtaposed ground knowledge and how to use in actual condition [23]. When undergoing practice-based learning, learners are put in genuine professional environments [24].

2 Method

The research design used was one group pretest and posttest design. Samples got treatment after pretest until approaching posttest. Treatment that was given to respondents was a practice-based learning method. Samples had the opportunity to become examiners and test objects during treatment. Research instrument for pretest and posttest adapted from TGMD-2 skill indicator. The test instrument uses a true-false model. The validity test instrument uses biserial point since the instrument was a true-false questionnaire. The reliability test uses KR 20 for the same reason as using biserial point. The pretest and posttest instruments were tested on 20 elementary school physical education teachers other than the Samples. Categorization of pretest and posttest results using the ideal score as basic formula (Table 1).

Table 1. Categorization of Result

Norm	Result
$X \geq \overline{X}_{ideal} + 1{,}5\ S_{ideal}$	Very High
$\overline{X}_{ideal} + 0{,}5\ S_{ideal} \leq X < \overline{X}_{ideal} + 1{,}5\ S_{ideal}$	High
$\overline{X}_{ideal} - 0{,}5\ S_{ideal} \leq X < \overline{X}_{ideal} + 0{,}5\ S_{ideal}$	Average

$\bar{X}_{ideal} - 1{,}5\ S_{ideal} \leq X < \bar{X}_{ideal} - 0{,}5\ S_{ideal}$	Low
$X \leq \bar{X}_{ideal} - 1{,}5\ S_{ideal}$	Very Low

Note: X = Ideal Score, $\bar{X}_{ideal} = \frac{1}{2}$ Ideal Score, $S_{ideal} = \frac{1}{3}\bar{X}_{ideal}$

Interpretation of improvement in test results using the normalized gain score (Table 2). interpretation was used to strengthen the research hypothesis. Data normality was tested with Kolmogorov-Smirnov (KS) test. A normality test was carried out on the difference between the two groups of data. The homogeneity test uses the F test to determined variance similarity. The research hypothesis was tested using paired t-test. The null hypothesis is rejected, and the alternative hypothesis is accepted if the paired t-test result is less than 0,05. The Samples involved in this study were 20 elementary school teachers. Samples are members of the physical education elementary school teachers association in Mojolaban District, Sukoharjo Regency.

Table 2. Norm of Normalize Gain Score

Formula	Norm	Interpretation
$\frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$	g < 0,00	Degradation
	g = 0,00	No Improvement
	0,00 < g ≤ 0,30	Low Improvement
	0,30 < g ≤ 0,70	Average Improvement
	0,70 < g ≤ 1,00	High Improvement

3 Result

The preliminary design of the research instrument consists of 48 questions. The instrument validity and reliability still need to be analyzed, although the instrument was adapted from the TGMD-2 indicator. The result of the instrument reliability calculation was r_{11}=0.98. The result of r_{11} was substituted into t_{count}=3.81. The instrument was declared reliable since the result of t_{count} was greater than t_{table}=1.75. The validity test showed seven items were invalid and had to be removed. Detail of instrument validity can be seen in table 3.

Table 3. Instrumen Validity (t_{table} 1,73)

Item	r_{11}	t_{count}	Validity	Item	r_{11}	t_{count}	Validity	Item	r_{11}	t_{count}	Validity
1	0,66	4,89	Valid	17	0,42	2,13	Valid	33	0,37	1,85	Valid
2	0,72	6,25	Valid	18	0,60	4,02	Valid	34	0,49	2,77	Valid
3	0,43	2,21	Valid	19	0,20	0,87	Invalid	35	0,40	2,05	Valid
4	0,49	2,75	Valid	20	0,45	2,43	Valid	36	0,56	3,46	Valid
5	0,60	3,91	Valid	21	0,55	3,34	Valid	37	0,62	4,23	Valid
6	0,68	5,27	Valid	22	0,45	2,41	Invalid	38	0,39	1,94	Valid
7	0,38	1,87	Valid	23	0,36	1,77	Valid	39	0,50	2,79	Valid
8	0,38	1,87	Valid	24	0,56	3,49	Valid	40	0,45	2,36	Valid
9	0,50	2,86	Valid	25	0,38	1,86	Valid	41	0,75	7,25	Valid
10	0,41	2,09	Valid	26	0,36	1,77	Valid	42	0,42	2,13	Valid
11	0,02	0,10	Invalid	27	0,19	0,84	Invalid	43	0,44	2,34	Valid
12	0,05	0,19	Invalid	28	0,37	1,84	Valid	44	0,38	1,86	Valid

Item	r_{11}	t_{count}	Validity	Item	r_{11}	t_{count}	Validity	Item	r_{11}	t_{count}	Validity
13	0,56	3,50	Valid	29	0,29	1,34	Invalid	45	0,46	2,48	Valid
14	0,39	1,94	Valid	30	0,44	2,29	Valid	46	0,40	2,00	Valid
15	0,46	2,50	Valid	31	0,14	0,59	Invalid	47	0,48	2,65	Valid
16	0,46	2,50	Valid	32	0,63	4,36	Valid	48	0,44	2,34	Valid

Samples performed pretest and posttest during the research. The pretest was used to identify the teacher's initial understanding of TGMD-2 usage. Samples learn how to run TGMD-2 after the pretest. Samples implemented the TGMD-2 instrument as the examiner and test object. Respondents performed the posttest after finished the treatment. The results of the posttest showed that all Samples experienced an increase in understanding TGDM-2 (Table 4). 9 Samples had average improvement, and the rest had significant improvement of understanding. Improvement range is affected by the difference between pretest and posttest results. Samples with the highest posttest score do not necessarily get the most significant improvement.

Table 4. Pre and Post Test

Respondent	Pretest	Result	Posttest	Result	N Gain	Improvement
R1	10	Very Low	26	High	0,5	Average
R2	14	Low	35	Very High	0,8	High
R3	20	Average	34	Very High	0,7	Average
R4	13	Low	33	Very High	0,7	High
R5	12	Low	32	Very High	0,7	High
R6	24	High	35	Very High	0,7	Average
R7	10	Very Low	32	Very High	0,7	High
R8	19	Average	34	Very High	0,7	High
R9	18	Average	32	Very High	0,6	Average
R10	18	Average	36	Very High	0,8	High
R11	23	Average	37	Very High	0,8	High
R12	11	Low	35	Very High	0,8	High
R13	22	Average	29	High	0,4	Average
R14	21	Average	37	Very High	0,8	High
R15	17	Low	29	High	0,5	Average
R16	27	High	32	Very High	0,4	Average
R17	26	High	38	Very High	0,9	High
R18	21	Average	35	Very High	0,7	High
R19	19	Average	30	High	0,5	Average
R20	16	Low	28	High	0,5	Average

The normality test showed that the pretest and posttest data had a normal distribution with KS_{count} 0,12 was smaller than KS_{table} 0,30. The homogeneity test shows that the data was homogeneous with the value of F_{count} 2,49 was greater than F_{table} 2,17. Pretest and posttest must be carried out by Samples to identify prior knowledge and knowledge after experiencing treatment. Pretest result showed that most of the Samples seem not familiar with TGMD-2. Samples with high category scores were only 3 out of 20 Samples. The practice-based learning treatment succeeded in improving Samples' understanding. All Samples made score increasement in the posttest. Pretest and posttest results showed significant differences in the results (Figure 1).

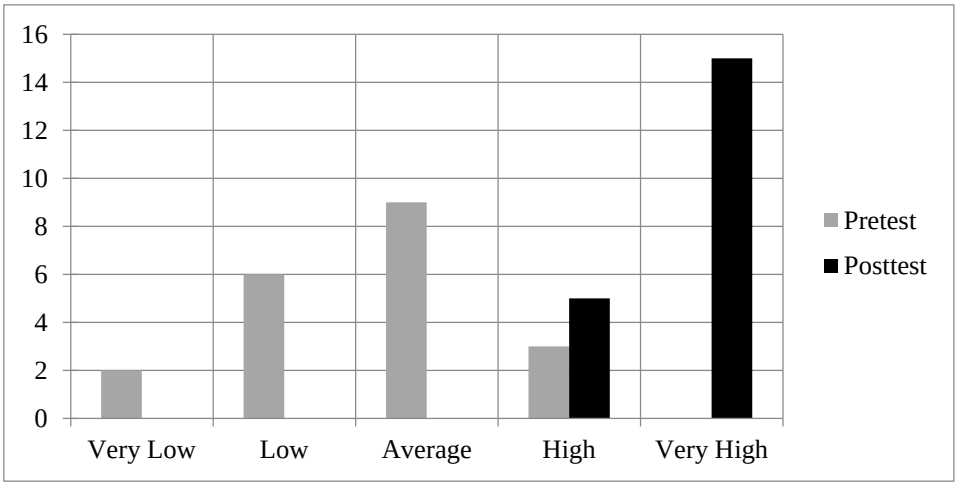

Figure 1. The Difference of Respondens Achievement in Pretest and Posttest

The pretest results can be used as a mapping of skills that the participants did not understand. A skill needs special attention in the treatment process if it had an error percentage of 50%. The error percentage is taken from the proportion of incorrect answers multiplied by 100. During treatment, locomotor skills that need special attention were gallop, hop, leap, and slide (Figure 2). In the locomotor skills indicator, the Gallop, leap, and slide skills were the most difficult skills for Samples to understand. All indicators of gallop, leap, and slide skills have an error percentage above 50%. Hop skills only need to inform the respondent about how many hops the test taker must do.

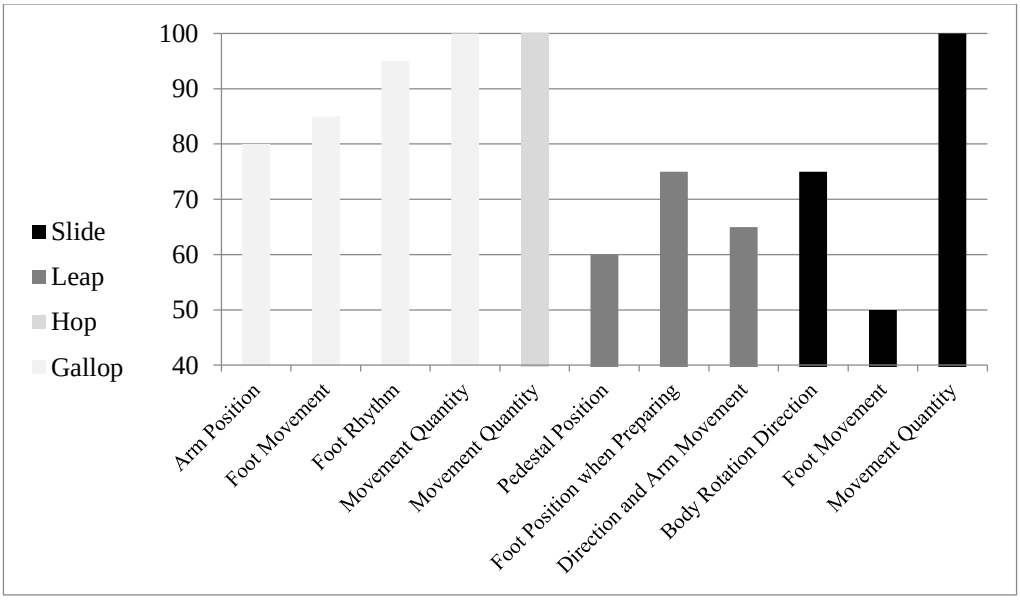

Figure 2. Error Percentage above 50% on Locomotor Skills Indicator

Skill indicators on object control require more special attention than locomotor skills (Figure 3). 6 object control skills require special attention. Striking a stationary ball, underhand roll, and overhand throw skills were the most difficult skills for participants in object control skills. The Samples do not sufficiently understand the skill indicators. Stationary dribble, kick and catch skills only need to match the perception of the number of moves, catch and kick conditions standardized by TGMD-2.

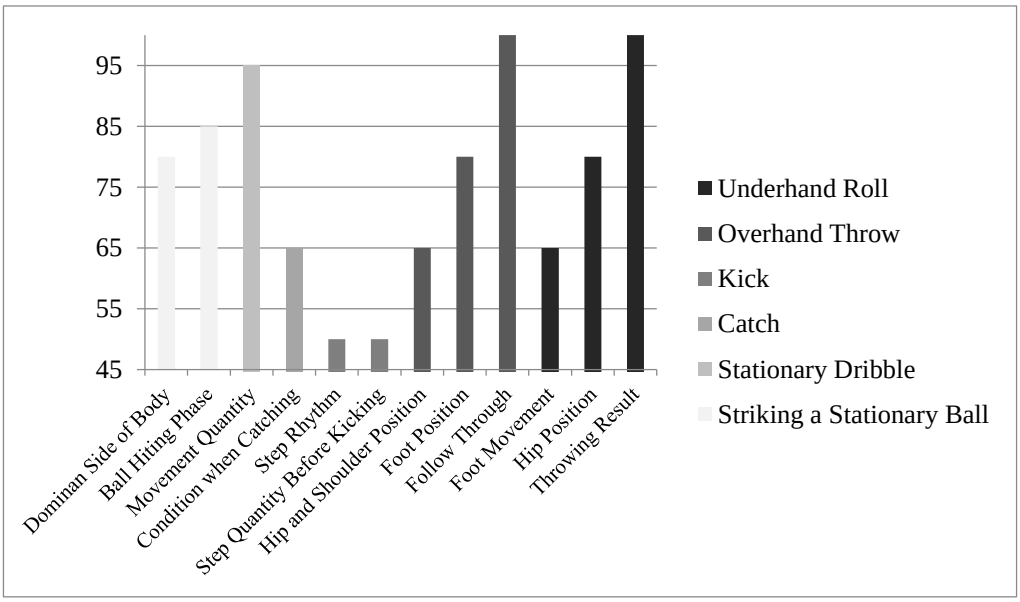

Figure 3. Error Percentage above 50% on Object Control Skills Indicator

Paired t-test shows that the probability value of significantly smaller than 0.05. Paired t-test results declared that the null hypothesis was rejected. Samples have different understandings after learning TGDM-2 with the practice-based learning method. The different understandings mean that Samples improve their understanding after experienced the treatment. The decrease in the percentage of errors during the posttest emphasized the participants' improvement after undergoing the posttest. The decrease in the percentage of errors also shows participants' progress in understanding the indicators of the subtest (Table 5). It strengthens the hypothesis that practice-based learning improves the understanding of Samples.

Table 5. Difference of Error Percentage

Skills	Item	Questions	Percentage (%) of Error		Status
			Before Treatment	After Treatment	
Run	1	Foot Position	5	5	No Changes
	2	Arm Movement	5	5	No Changes
	3	Landing Phase	25	15	Decreased
	4	Non-pedestal Position	35	20	Decreased
Gallop	5	Arm Position	80	30	Decreased
	6	Foot Movement	85	25	Decreased
	7	Foot Rhythm	95	30	Decreased
	8	Movement Quantity	100	30	Decreased
Hop	9	Pedestal Position	20	15	Decreased
	10	Arm Position	30	15	Decreased
	11	Movement Quantity	100	35	Decreased
Leap	12	Pedestal Position	60	30	Decreased
	13	Foot Position when Preparing	75	30	Decreased
	14	Direction and Arm Movement	65	30	Decreased
Horizontal Jump	15	Preparation Phase	35	15	Decreased
	16	Movement when Jump	40	30	Decreased
	17	Movement when Land	35	15	Decreased
Slide	18	Body Rotation Direction	75	35	Decreased
	19	Foot Movement	50	35	Decreased
	20	Movement Quantity	100	25	Decreased
Striking a Stationary Ball	21	Dominant Hand Position	45	20	Decreased
	22	Dominant Body Side	75	30	Decreased
	23	Ball Hitting Phase	55	15	Decreased
Stationary Dribble	24	Hand Position	35	25	Decreased
	25	Location of the Bouncing Ball	45	30	Decreased
	26	Movement Quantity	95	25	Decreased
Catch	27	Arm Position when Preparing	40	25	Decreased
	28	Arm Position when The Ball Comes	20	5	Decreased
	29	Condition when Catching	65	25	Decreased
Kick	30	Step Rhythm	50	25	Decreased
	31	Step Quantity before Kicking	50	20	Decreased
	32	Pedestal Position	10	5	Decreased
	33	Foot Impact on the Ball	40	20	Decreased
Overhand Throw	34	Arm Position	25	10	Decreased
	35	Hip and Shoulder Position	65	30	Decreased
	36	Foor Position when Throwing	80	25	Decreased
	37	Follow Trough	100	15	Decreased
Underhand	38	Dominant Hand Movement	40	15	Decreased

Skills	Item	Questions	Percentage (%) of Error		
			Before Treatment	After Treatment	Status
Roll	39	Foot Movement	65	25	Decreased
	40	Hip Position	80	25	Decreased
	41	Throwing Result	100	25	Decreased

4 Discussion

Samples studied TGMD-2 in theory and practice (Figure 4). Samples try to understand skill indicators by learning skill by skill. The learning process was carried out on each skill so that Samples can focus on understanding each skill indicator. Learning by completing tasks one by one provides many advantages in learning conditions that get more targets [25]. Users of test instruments are expected to be familiar with the assessment process and have a high level of understanding about the development of children's movements [26]. The practice of setting the test location was carried out by Samples after studying the test indicators. The setting of the test location must be understood by the respondent to have the ability to organize an efficient and effective test site. The specially designated location for instruments must be standard and safe [27]. Samples were also simulated as test-takers to practice the assessed skills. Errors while practicing moves provide an opportunity to explore and identify the correct moves [28]. Samples carry out their duties as testers after understanding theoretically and practically. Simulation facilitates learning participants to get special situations according to learning needs [29]. The learning process returns to the initial stage to learn other skills when the respondent has understood the indicators of one skill well.

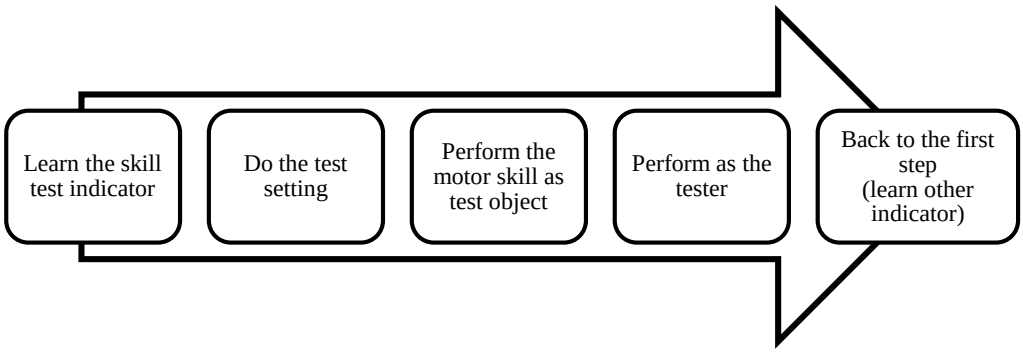

Figure 4. Treatment Cycle

Practice-based learning demands Samples high involvement. The Samples' ability to implement the material following the guidelines affects the treatment results [30]. Prior knowledge has no significant role in learning results and conditions [31]. The seriousness of the Samples in undergoing treatment plays an essential role in increasing understanding. The Samples' learning outcomes about TGMD-2 should be implemented periodically when evaluating their students' motor skill development. The periodic implementation will sharpen Samples' understanding of the use of TGMD-2 as an evaluation tool.

5 Conclusion

Practice-based learning with a focus on learning skills one by one helps Samples to understand TGMD-2 better. Samples get a complete learning experience during treatment. Samples build an understanding of TGMD-2 through various points of view. Samples had the opportunity to see TGMD-2 from the learner, location setter, test taker, and testers side. This perspective provides complete knowledge for Samples in using TGDM-2 as an evaluation tool.

Acknowledgments. The research group would like to thank LPPM UNS for providing research funding.

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