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## Physical education teacher skills in preparing HOTS lesson plans and their contribution to teaching performance

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### ABSTRACT

**Background:** Higher-order thinking skills (HOTS) are 21st-century thinking skills needed by students to survive the demands of the current era. However, the problem is that teachers often do not optimally include HOTS in the lesson plan and <sup>1</sup>the implementation of learning. **Research Objective:** This study aimed to investigate the relationship between <sup>1</sup>the teacher's skill in preparing HOTS lesson plans and <sup>1</sup>the teacher's performance in <sup>1</sup>applying them to physical education. **Methods:** This type of research is correlational using two research variables: <sup>1</sup>the teacher's skills in preparing HOTS lesson plans and teaching performance. The participants were 28 physical education teachers (men = 21, women = 7) who participated in the Teacher Professional Education Programme at Universitas Negeri Padang in 2022. The HOTS lesson plan data and teacher teaching videos were taken from the documented performance test results (PDF files and teaching videos). Data analysis used regression with the help of SPSS version <sup>1</sup>25. **Findings/Results:** The results showed that  $\alpha < 0.05$  (0.007) with a regression value of 2.923 means that <sup>1</sup>the teacher's skills in preparing HOTS lesson plans are positively determined by their performance in teaching HOTS to students. The contribution made by the teacher's ability to prepare HOTS lesson plans to teacher teaching performance is 24.70%. **Conclusion:** Teachers who can prepare a good HOTS lesson plan can provide a guarantee for their HOTS teaching performance. Thus, the more detailed the teacher formulates the goals, objectives, activities, media, and HOTS assessments, the more it helps them determine their teaching performance that encourages their students' HOTS.

**Keywords:** HOTS lesson plan; physical education; teacher performance

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## INTRODUCTION

Higher <sup>1</sup>order Thinking Skill (HOTS) is a cognitive ability that involves various tasks, including analysing, evaluating, and creating (Anderson et al., 2001; Blegur, Rajagukguk, et al., 2023; Krathwohl, 2002). According to Laird et al. (2014), this ability is sometimes called integrated learning. With HOTS, students can better understand what they learn, relate it to previously learned knowledge, and retain new long-term knowledge (Wijnen et al., 2021). Students who use HOTS can develop better scientific and critical thinking

skills (Shanti et al., 2022; Williyanto et al., 2022) while actively creating knowledge (Anderson et al., 2001). In addition, HOTS dimensions have also been widely used as dimensions to support students' life skills (e.g., problem-solving) (Cronin et al., 2018, 2020; Cronin & Allen, 2017) as well as critical and creative thinking (Hoskins & Liu, 2019).

The development of HOTS is seen as an important educational goal for students (Kwangmuang et al., 2021), because it is highlighted in producing quality human resources (Misrom et al., 2020). Heron and Palfreyman (2021) revealed that HOTS is needed to increase conceptual and scientific knowledge. Education does not only talk about mastery of material or skills during one meeting or one semester, but education must also be able to prepare students to be able to use their knowledge, attitudes, and skills as a result of education and learning to be able to adapt to the various needs of the times. Therefore, in order to prepare students for the next life, teachers need to prepare students with HOTS to solve problems and encourage critical thinking and creativity (Voogt & Roblin, 2012). Learning to think critically and creatively and with the ability to solve complex problems are skills that many researchers, educators, and policymakers agree that students need to develop (Voogt et al., 2013).

The low HOTS of students in Indonesia means that the government must improve educational institutions by recruiting educational staff, educational units, educators, and prospective educators so that Indonesia can compete with other countries (Suwarma & Apriyani, 2022). This condition can worsen because students tend to have difficulty when asked HOTS questions and have a strong desire to persist in low-level thinking (Afandi et al., 2018). Researchers claim that students exhibit more low-order thinking skills than higher-order thinking skills that require procedural and conceptual knowledge, raising questions about the extent to which these abilities are taught and assessed by teachers to their students (Rittle-Johnson et al., 2015). Educators must encourage their students to have and improve HOTS (Wijnen et al., 2021), which starts with integrating HOTS learning activities into lesson plans (Suwarma & Apriyani, 2022).

Each teacher must make a lesson plan and implement it in the classroom. The implementation of learning should ideally follow the lesson plan that has been made because it contains a list of all activities that will be carried out in the implementation of learning (Setiyasih, 2016). However, in general, teachers carry out their learning without using a lesson plan (Haris & Ghazali, 2016). Lesson plans are often made by school teachers only as administrative documents that must be submitted to the school principal, not as instructional resources for the teaching and learning process (Setiyasih, 2016). Lesson plans are the main key to learning (Suhadi et al., 2023), so if teachers can formulate and apply HOTS optimally to students, it will impact students' life skills. Therefore, it is necessary to ensure that the teacher's design for the HOTS-based learning process is implemented into the learning process.

Several previous HOTS studies in physical education include HOTS learning in football material (Rianto et al., 2020), the effect of TGFU learning to improve HOTS in basketball material (Nopembri et al., 2022; Waffak et al., 2022), teacher perceptions of teaching students' thinking skills and their skills in constructing a HOTS lesson plan (Anaktototy et al., 2024), and physical education teachers' attitudes in stimulating elementary school students' HOTS (Hardiansyah et al., 2024). Unfortunately, no research has investigated the relationship between teachers' ability to compile HOTS lesson plans and their skills in implementing HOTS. Therefore, the urgency of this study is to provide additional insight to readers about whether teachers skilled in compiling HOTS lesson plans can contribute to their skills in teaching students HOTS. This finding will confirm whether, when compiling HOTS lesson plans, teachers understand the learning behaviours that

contribute to the formation of students' HOTS so that teachers are able to entity them in a series of teaching skills that help students develop HOTS-based learning behaviours. Finally, this study examines the relationship between physical education teachers' skills in preparing HOTS lesson plans and their skills in implementing HOTS lesson plans.

## **METHOD**

### ***Research Design***

This study used a correlational design to test the relationship between teachers' skills in constructing HOTS lesson plans and their performance when teaching HOTS in physical education. Participants first completed preparing HOTS lesson plans, followed by practicing teaching physical education at their schools according to the material listed in their respective lesson plans. Participant lesson plan data was obtained in Portable Document Format (PDF). On the other hand, the teacher recorded learning videos during the physical education learning process, which lasted approximately 80 minutes. We then analysed the two groups of data (lesson plan HOTS and teaching performance) using Microsoft Excel and SPSS applications.

### ***Participant***

The participants were 28 physical education teachers (men = 21, women = 7) who attended in-service training at the Teacher Professional Education Programme at Universitas Negeri Padang, Padang, West Sumatera, Indonesia. We determined them using a simple random sampling technique.

### ***Instrument***

The participants' HOTS lesson plan assessments used the assessment instruments and rubrics offered by (Suwarma & Apriyati, 2022). There are five HOTS lesson plan assessment indicators, namely: (i) Goals (the verb that writes in goals consists of HOTS keywords such as analysing, evaluating, and creating); (ii) Objectives (all "Audience, Behaviour, Condition, and Degree: aspects written in Objectives and "Behaviour" aspects show HOTS keywords); (iii) Activities (the teacher stimulates many questions to encourage students' original thoughts, such as questions to identify, analyse, clarify, create ideas and solutions, and develop argumentation); (iv) Media (media represents concept); and (v) Assessment (the problems consider HOTS keywords such as analysing, evaluating, and creating). For each participant's HOTS lesson plan, the researcher analysed the content and gave an assessment on three scales, namely advanced (i), intermediate (ii), and emerging (iii).

The assessment of the participants' teaching performance used the teaching performance instrument developed by (Maksum, 2012), which met the validity test ( $r = 0.456-0.897$ ) and high-reliability test ( $\alpha = 0.971$ ) based on tests conducted by (Lumba et al., 2021). The participants' teaching performance was grouped into three sections, which were assessed using the Guttman scale, Yes (1) and No (0), such as the introduction (items 1-3), including "The teacher clearly communicates learning objectives to students", core instruction (item 4-15), including "The teacher breaks down the teaching assignments according to the students' abilities," "Teachers implement strategies to optimize student practice," "The teacher reinforces nonverbal symbols," and "The teacher asks questions to stimulate student reasoning," and closing (item 16-19), including "The teacher provides feedback to students," as well as "The teacher carries out cooling activities."

As mentioned in the "activities" indicator in the HOTS lesson plan formulation, researchers evaluate performance that can represent students' HOTS experiences in the teaching performance variable. Teachers' teaching performance must stimulate many

questions to encourage students' original thinking in their physical activities. For example, the teacher "provokes" to identify their negligence in using the basic techniques that impact inaccurate kick results in soccer games. Alternatively, the teacher provokes students to modify and create other movements to ensure their baseball throws reach the target. The two examples of the word "provocation" above (identify and create) are part of the HOTS verb, and this has been included in numerous teaching performance instrument indicators, such as "Teachers implement strategies to optimize student practice," "The teacher asks questions to stimulate student reasoning," and "The teacher asks questions to stimulate students' thinking."

**1**  
**Data Analysis**

The research data collected from the HOTS lesson plan observation guidelines and the participants' teaching performance observation guidelines were analysed descriptively using the regression test. The descriptive analysis aims to profile the frequency (f), percentage (%), mean (M), and standard deviation (SD) of the two research variables based on the lesson plan HOTS rating scale (emerging, intermediate, and advanced) and teaching performance (yes and no). Classical assumption testing was done before the regression analysis was run. The classic regression assumption is accepted if the research data meet the normality and linearity tests ( $\alpha > 0.05$ ). If the value is 0.05, it can be concluded that there is an influence on the teacher's skills in constructing HOTS lesson plans and their teaching performance in the field. The entire testing process uses the Microsoft Excel application and SPSS version 25.

**RESULTS AND DISCUSSION**

**Teacher Skill in Preparing HOTS Lesson Plan**

The results of the assessment of skills in preparing lesson plans for 28 participants are shown in Table 1. The skills of teachers in preparing HOTS lesson plans include goals, objectives, activities, media, and assessments. The maximum score for the HOTS lesson plan assessment is 420, while the achievement score for the HOTS lesson plan assessment is 351; thus, the percentage of teacher achievement in making HOTS lesson plans is 83.6%, with a very good classification. However, the data also explains that teachers still need to pay attention to the formulation of HOTS lesson plans in terms of goals and objectives and assessment. These three things still get a high percentage in the emerging class; moreover, it occupies up to 50% in the assessment aspect.

**1**  
**Table 1. Description of Teacher Skills in Preparing HOTS Lesson Plans**

No	Aspect lesson plan HOTS	Emerging		Intermediate		Advance		M+SD
		f	%	f	%	f	%	
1	Goal	3	10.71	3	10.71	22	78.57	2.68+0.67
2	Objectives	2	7.14	12	42.86	14	50.00	2.43+0.63
3	Activities	1	3.57	6	21.43	21	75.00	2.71+0.53
4	Media	1	3.57	0	0.00	27	96.43	2.96+0.19
5	Assessment	14	50.00	7	25.00	7	25.00	1.75+0.84

**Teacher Teaching Performance**

Teacher HOTS teaching performance in physical education is assessed through teaching video assessments, as shown in Table 2. The maximum score for HOTS implementation is 532, while the achievement score for HOTS implementation is 389, so the percentage of teacher achievement in HOTS implementation is 73.12%, with a good classification. Several notes on the teacher's HOTS teaching performance are in the aspect

of the teacher preparing students for the next lesson (71.43%), the teacher likes to convey appreciation for student performance (46.43%), as well as the teacher reinforcing nonverbal symbols, and the teacher delivering direct corrections (42.86%). At the same time, some of the teacher's HOTS teaching strengths were noted in the aspects of teachers implementing strategies to optimise student practice (71.43%), the teacher asking questions to stimulate student reasoning (64.29%), and the teacher asking questions to stimulate students' thinking (64.29%).

**Table 2. Description of Teacher Teaching Performance**

No	Aspects of teaching performance	Yes		No		M+SD
		f	%	f	%	
1	The teacher clearly communicates learning objectives to students	18	64.29	10	35.71	0.64+0.49
2	The teacher arouses students' attention and motivation	18	64.29	10	35.71	0.64+0.49
3	The teacher warmed up in a guided manner	28	100.0	0	0.00	1.00+0.00
4	The teacher teaches the task of the movement in sequence	28	100.0	0	0.00	1.00+0.00
5	The teacher applies a modified approach	23	82.14	5	17.86	0.82+0.39
6	The teacher breaks down the teaching assignments according to the students' abilities	25	89.29	3	10.71	0.89+0.31
7	Teachers implement strategies to optimize student practice	20	71.43	8	28.57	0.71+0.46
8	The teacher conveys phrases that inspire students to participate	18	64.29	10	35.71	0.64+0.49
9	The teacher reinforces nonverbal symbols	16	57.14	12	42.86	0.57+0.50
10	The teacher delivers direct corrections	16	57.14	12	42.86	0.57+0.50
11	The teacher asks questions to stimulate student reasoning	18	64.29	10	35.71	0.64+0.49
12	The teacher asks questions to stimulate students' thinking	18	64.29	10	35.71	0.64+0.49
13	The attention of the teacher is thorough, not just skilled students	28	100.0	0	0.00	1.00+0.00
14	The teacher likes to convey appreciation to student performance	15	53.57	13	46.43	0.54+0.51
15	The teacher clearly communicates learning objectives to students	27	96.43	1	3.57	0.96+0.19
16	The teacher arouses students' attention and motivation	24	85.71	4	14.29	0.86+0.36
17	The teacher warmed up in a guided manner	21	75.00	7	25.00	0.75+0.44
18	The teacher teaches the task of the movement in sequence	20	71.43	8	28.57	0.71+0.46
19	The teacher applies a modified approach	8	28.57	20	71.43	0.29+0.46

### Regression Analysis

Before the regression analysis of the data on the teacher's skill in preparing the HOTS plan and the teacher's skill in teaching the HOTS lesson plan, a data normality test was carried out to ensure that the data in this study were normally distributed. The results of the normality test are shown in Table 3. The normality test was carried out with two tests, namely the Kolmogorov-Smirnov test and the Shapiro-Wilk test. Based on the two normality tests, the results show that the value of Sig. for each variable is greater than 0.05 ( $\alpha > 0.05$ ). Thus, the research data is normally distributed.

Table 3. Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Lesson plan	0.152	28	0.098	.944	28	0.120
Teaching performance	0.152	28	0.098	.941	28	0.120

a. Lilliefors significance correction

<sup>3</sup> Furthermore, a linearity test was carried out to determine whether the dependent and independent variables studied had a linear relationship. Linear regression cannot be used if it does not meet the linearity requirements. Based on the ANOVA table (see Table 4) below, it is known that the value of deviation from linearity = 0.085 > 0.05 means that there is a linear relationship between the teacher's skills in preparing HOTS lesson plans and the teacher's performance in teaching HOTS to students.

Table 4. Linearity Test (ANOVA table)

			Sum of squares	df	Mean square	F	Sig.
Teaching performance * HOTS lesson plan	Between groups	(Combined)	72.962	6	12.160	3.663	0.012
		Linearity	35.282	1	35.282	10.628	0.004
		Deviation from linearity	37.680	5	7.536	2.270	0.085
Within groups			69.717	21	3.320		
Total			142.679	27			

<sup>1</sup> Furthermore, regression analysis was used to examine the influence between teachers' skills in preparing HOTS lesson plans and teachers' skills in teaching HOTS lesson plans. The results of the regression analysis can be seen in Table 5. The analysis results provide a significant influence between the teacher's ability to prepare HOTS lesson plans and the teacher's skills in teaching HOTS lesson plans (Sig. = .007 < 0.05).

Table 5. Coefficients<sup>a</sup>

	Unstandardised coefficients		<sup>3</sup> Stand. coefficients	t	Sig.
	B	Std. Error	Beta		
<sup>1</sup> (Constant)	4.794	3.137		1.528	0.137
HOTS lesson plan	.726	.248	.497	2.923	0.007

a. Dependent variable: Teaching performance

The study's results prove a significant relationship between the teacher's ability to prepare HOTS lesson plans and the teacher's skills in teaching students HOTS. There is strong scientific evidence that there is great potential for success if the teacher actively, consistently, and deliberately instructs to foster HOTS among students (Miri et al., 2007), because in the teaching and learning process, the teacher has a significant role (Boiliu et al., 2021). Unfortunately, the traditional paradigm, which still emphasises the components of information and material mastery (disciplinary mastery), often hinders awareness of the importance of developing learning that emphasises HOTS in the 21st century (Afandi et al., 2018). The cognitive component of 21st-century skills, HOTS, refers to critical thinking and problem-solving abilities. Therefore, students who do not have HOTS may be less competitive in the job market in the future (Mitani, 2021).

The study of Rianto et al. (2020) and Blegur, Yustiana et al. (2023) once provided evidence of the positive results of implementing HOTS in physical education. However, unfortunately, in recent studies, Indonesia has partially reported the results of

investigations on HOTS, which are categorised as sufficient and even bracketed, both in the lesson plan analysis and the application of HOTS in physical education. For example, [Festiawan and Khurrohman \(2021\)](#) found that during HOTS learning, physical education during the COVID-19 period was classified as lacking (51.72%), and the study by [Suhadi et al. \(2023\)](#) reported the results of the HOTS analysis on teacher lesson plans in the sufficient category. Meanwhile, for the application of HOTS-based physical education, [Solissa et al. \(2023\)](#) recently reported in their study that the implementation of HOTS-based physical education learning was in the adequate category (71.43%), or only 15 teachers implemented HOTS-based learning with all its limitations. This condition also made other researchers start promoting various learning model interventions to increase students' HOTS in physical education, as was done by [Nopembri et al. \(2022\)](#) and [Waffak et al. \(2022\)](#) with the TGfU model.

Our current study again shows that participants or teachers involved in in-service training programmes can develop very good HOTS-based lesson plans (83.6%). This success was motivated by various materials and training programmes devoted to helping participants develop HOTS-based lesson plans that were certain to be different from the samples or respondents used in the previous studies above. This result also correlates positively with the teacher's performance in physical education, which is also in a good category (73.12%). Thus, these results differ from previous studies reported by [Festiawan & Khurrohman, 2021](#); [Solissa et al., 2023](#); [Suhadi et al., 2023](#). Differences in the results of this study include the use of respondents in the research (participants in in-service teacher training programmes and regular teachers), the use of instruments in assessing HOTS lesson plans and teaching performance, as well as learning contexts (Covid-19 and normal).

[Hwang et al. \(2018\)](#) argue that HOTS defines problem-solving, critical thinking, and creativity as the three elements. First, the ability to recognise problems, collect and evaluate relevant information, and select and implement relevant solutions is referred to as problem-solving. Second, critical thinking is the ability to evaluate information objectively, reason clearly and rationally, and make decisions. Finally, creativity refers to the ability to create and develop new ideas through innovative methods by conducting descriptions, reflections, analyses, and evaluations. How to teach reflective practice is a concern because HOTS is needed by graduates of educational institutions ([Jarvis & Baloyi, 2020](#)). HOTS can help students think critically and creatively, solve problems, and find solutions ([Hardiansyah et al., 2024](#)), so that it can help students survive in the 21st century ([Anaktototy et al., 2024](#); [Hamzah & Wan Yusoff, 2021](#); [Nofrion & Wijayanto, 2018](#)). Thus, educators need to recognise and take advantage of learning situations that encourage and enhance students' HOTS ([Lu et al., 2021](#)) through critical and evaluative formulation of lesson plans about HOTS as well as integrating them into learning models that encourage students' HOTS experiences ([Gürsan et al., 2022](#)).

Lesson plans are face-to-face learning plans for one basic competency in one or more meetings and are key to learning ([Haryani et al., 2019](#); [Suhadi et al., 2023](#)). All learning agendas, from introduction to closing, must be written in the lesson plan ([Murtafiah et al., 2022](#); [Ndiokubwayo et al., 2022](#)). In preparing lesson plans, teachers must consider some factors in detail because this involves several things, including student abilities, teaching styles, and availability of facilities, so lesson plans must be well prepared ([Anam, 2021](#)) so that the lesson plan produced is more comprehensive in accommodating various backgrounds of students' basic potential for a more operational, participatory, and holistic HOTS learning experience ([Anaktototy et al., 2024](#)). Developing a lesson plan has its own challenges, including requiring time, effort, and energy. It is also an opportunity for the teacher to determine the methods, materials, and activities needed so that the

learning process is not boring for students (Baştürk et al., 2022), so that the lesson plan that the teacher has formulated must be implemented in the learning process (Murtafiah et al., 2022).

The literature often indicates that the main obstacle to creating and implementing lesson plans in the classroom is the teacher's lack of experience in this regard (Cullen et al., 2013). Suppose a teacher does not thoroughly understand how to make lesson plans using the basic ideas and concepts of curriculum, learning, and assessment. In that case, the teacher will lose focus and cannot communicate his learning objectives properly (Iqbal et al., 2021). Therefore, it is very important for all teachers, including physical education teachers, to be skilled at preparing HOTS-based lesson plans and integrating HOTS lesson plans during the learning process. Changing teachers' ideas and practices should be a major component (Jensen et al., 2014). In addition, teachers who use innovative strategies in teaching can help their students achieve better (Saoke et al., 2022). Thus, the consistency and continuity of teachers teaching HOTS students in the lesson plan formulation and its implementation process in the learning process can make students human beings who think critically and creatively, can solve problems, and are ready to compete in the future.

This study reveals a determination between the teacher's ability to prepare HOTS lesson plans and their implementation in physical education learning for teachers participating in teacher professional education activities. Thus, it is suggested that future researchers be able to conduct to reveal the preparation of HOTS lesson plans and their implementation in physical education for teachers who have not participated in in-service training or have participated in in-service training activities and teachers who have passed certification or have not passed professional certification. In addition, the instruments used to capture the performance of physical education teachers in teaching HOTS are still limited because they are only detected in several performance items, which can affect the generalisation of our research results. Therefore, future researchers can fill this gap by investigating and using other potential instruments that can guarantee teacher performance or skills in teaching HOTS-based physical education. Another possible opportunity is to develop a new HOTS-based teacher-teaching skills instrument.

## CONCLUSION

The results of the study prove that the physical education teacher's skills in preparing HOTS lesson plans are determined by their performance in teaching HOTS to students. Thus, to teach and implement HOTS into physical education, the teacher must first be able to prepare a lesson plan that contains the HOTS elements in formulating goals, objectives, activities, media, and assessments. Preparing a HOTS lesson plan must be an important concern for teachers to maximise HOTS-based physical education learning. Other findings also confirm that there is a high percentage (advance) in the aspects of goals, activities, and media, and these results are also relevant to the high percentage of teachers in performance in the aspect of the teacher asking questions to stimulate student reasoning (64.29%).

The teacher asks questions to stimulate students' thinking (64.29%). At least these two aspects of teaching performance can provide a simple portrait of the teacher's relevance in preparing HOTS lesson plans and their performance in teaching. In the future, studies on the HOTS assessment aspect must receive close attention because the HOTS assessment aspect still has a high percentage in emerging classes (50%). The reason is that the success of teachers' HOTS learning will be easily evaluated by the instruments used to evaluate students' HOTS implementation in physical education.

Finally, the results of this study provide a new landscape for the HOTS teaching performance of physical education teachers. Teachers who can prepare a good HOTS lesson plan can provide a guarantee for their HOTS teaching performance. Thus, the more detailed the teacher formulates the goals, objectives, activities, media, and HOTS assessments, the more it helps them determine their teaching performance, which encourages their students' HOTS.

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### **CONFLICT OF INTEREST**

All authors declare that there is no conflict of interest in this article.

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