

Physical Education Teachers' Attitudes Towards Stimulating Higher Order Thinking Skills in Elementary School Students: Differences in Certified and Non-Certified Teachers

Actitudes de los profesores de educación física hacia la estimulación de las habilidades de pensamiento de orden superior en los alumnos de primaria: diferencias entre profesores titulados y no titulados

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Abstract. Elementary school-age children have started thinking logically and rationally; therefore, they need to be stimulated to think in a higher order. Higher-order thinking skills (HOTS) can help students think critically and creatively, solve problems and find solutions. Therefore, physical education teachers must participate in stimulating students' HOTS. This research aims to determine differences in physical education teachers' attitudes (certified and non-certified) based on gender, age and length of service toward HOTS stimulation in students. The method used in this research is comparative. The research sample consisted of certified and non-certified physical education teachers who taught in elementary schools in West Sumatra province, Indonesia, with 105 people (male = 77 and female = 28) aged 23-59 years. They were selected using accidental sampling. The instrument to measure stimulating higher-order thinking skills uses a Likert scale questionnaire consisting of 16 items. Data analysis was carried out using the Mann-Whitney U Test and Kruskal-Wallis H. The results of the study showed that differences in the attitudes of certified and non-certified teachers obtained a p-value < .05, while comparisons based on gender, age and work experience had a p-value > .05. So it can be concluded that the attitudes of certified and non-certified teachers towards HOTS stimulation are significantly different, while based on gender, age and length of service their attitudes towards HOTS stimulation are not significantly different.

Keywords: Stimulating higher-order thinking Skills, HOTS, 21st-century learning, physical education

Resumen. Los niños en edad escolar primaria han empezado a pensar de forma lógica y racional; por tanto, hay que estimularles para que piensen en un orden superior. Las habilidades de pensamiento de orden superior (HOTS) pueden ayudar a los alumnos a pensar de forma crítica y creativa, a resolver problemas y a encontrar soluciones. Por lo tanto, los profesores de educación física deben participar en la estimulación de las HOTS de los alumnos. Esta investigación tiene como objetivo determinar las diferencias en las actitudes de los profesores de educación física (certificados y no certificados) en función del género, la edad y la antigüedad hacia la estimulación de las HOTS en los estudiantes. El método utilizado en esta investigación es comparativo. La muestra de la investigación consistió en profesores de educación física certificados y no certificados que enseñaban en escuelas primarias de la provincia de Sumatra Occidental, Indonesia, con 105 personas (hombres = 77 y mujeres = 28) de edades comprendidas entre los 23 y los 59 años. Se seleccionaron mediante muestreo accidental. El instrumento para medir la estimulación de las habilidades de pensamiento de orden superior utiliza un cuestionario de escala Likert que consta de 16 ítems. El análisis de datos se llevó a cabo mediante la prueba U de Mann-Whitney y H de Kruskal-Wallis. Los resultados del estudio mostraron que las diferencias en las actitudes de los profesores certificados y no certificados obtuvieron un valor $p < .05$, mientras que las comparaciones basadas en el género, la edad y la experiencia laboral tuvieron un valor $p > .05$. Por lo tanto, se puede concluir que las actitudes de los profesores certificados y no certificados hacia la estimulación HOTS son significativamente diferentes, mientras que en función del género, la edad y la antigüedad laboral sus actitudes hacia la estimulación HOTS no son significativamente diferentes.

Palabras clave: Estimular las Capacidades de Pensamiento de Orden Superior, HOTS, Aprendizaje del siglo XXI, Educación Física, Certificación del Profesorado

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Introduction

Researchers, policymakers, and teachers agree that students must develop the ability to think critically and creatively, be able to solve problems and develop what are called higher-order thinking Skills (HOTS) (Voogt, et al., 2013; Conklin, 2011). HOTS results from a learning process in the form of cognitive abilities that involve thinking activities at the highest level of Bloom's taxonomy: analyzing, evaluating and creating (Virranmäki, et al., 2021; Widyaningsih, et al., 2021; Krathwohl, 2002). More broadly, HOTS also includes critical thinking, problem-solving, literacy, decision-making, responsibility, collaboration, creative thinking, and learning independently (Phuseengoen & Singhchainara, 2022; Griffin & Care, 2014; Klegeris, et al., 2013). Many countries today have made HOTS a top priority in their education (Ghanizadeh, 2017; Assaly & Jabarin, 2021) because by mastering HOTS,

students will more easily learn new things and connect them with the knowledge they have learned and apply this knowledge to achieve the goals they want (Kim How, et al. 2022). Therefore, it is imperative to familiarize students with HOTS since elementary school to be ready to face future challenges (Voogt & Roblin, 2012; OECD, 2018; Handayani, et al., 2019).

In physical education (PE), the teacher's task is to develop students' movement abilities and improve their thinking abilities (Perlman & Webster, 2011), including student HOTS. PE strategically prepares students to face society's challenges (Ockta, et al., 2023, p.3352). Therefore, "PE teachers must implement effective learning" (Ihsan et al., 2023, p.2458) and integrate it with 21st-century skills (HOTS) (Leao & Lorente-catalán, 2024) because one of the goals of PE is to improve students' HOTS abilities (Sutapa, et al., 2020). Umar et al., (2023, p.560) recently stated that "thinking skills are closely related to affective and

psychomotor abilities". Therefore, PE teachers must make HOTS something that must be present in their learning process. There are several elements of HOTS that teachers need to develop, including the ability to analyze and evaluate (Prahani, et al., 2020); this ability can help students understand PE concepts, such as the concept of movement, the concept of physical fitness, and the concept of safety in sports. The next HOTS element is problem-solving and critical thinking (Ismail, et al., 2017); with the help of these skills, students will be able to critically analyze information regarding various forms of exercise and physical activity and decide what is appropriate for their level of ability. Therefore, HOTS is something important in PE learning.

The Indonesian government is aware of the critical role of teachers in instilling HOTS in students; therefore, the government has made efforts to increase teachers' understanding and knowledge about HOTS, including holding workshops for teachers about HOTS. Workshops present resource persons who are experts in education, such as teachers or senior practitioners, to design learning activities (Yang & Liu, 2004). Workshops can provide practical steps in implementing programs for teachers (Talvio, et al., 2016), including HOTS implementation. In addition, workshops can improve participants' attitudes towards teaching (Hill, et al., 2012). According to research, teachers who take part in workshops are better prepared to accept change compared to teachers who do not take part in workshops (Talvio, et al., 2016). Workshop activities provided by the government are usually given more priority to teachers who have not participated in the certification program (non-certified) so that they also know and understand HOTS and can plan and implement HOTS-based learning.

The government's subsequent effort to improve HOTS is through a teacher certification program. Certification means the legality of a person's competence to occupy a professional position (Amalia & Saraswati, 2018). Since 2006, the Indonesian government has launched a teacher certification program, one of the aims of which is to produce teachers who can implement HOTS-based learning (Kusumawardhani, 2017; Ministry of Education, Culture, 2020); this certification activity became known as the Teacher Professional Education (PPG) program. The PPG program aims to produce quality teaching staff who can prepare students to meet the demands of the times (Kustati, 2020). Teachers who have passed the PPG program are given certification and are entitled to professional teacher status. Furthermore, they will receive compensation in the form of additional salary/income equivalent to one month's salary (Jackson, et al., 2014; Sinulingga & Simatupang, 2018). Teacher certification is an effective means of improving teacher quality because only those with the quality can complete the certification process (Andersson, et al., 2011). Through the certification program, teachers are given comprehensive insight into HOTS.

The government hopes that with these workshops and teacher certification activities, students in Indonesia will have high HOTS. However, this hope does not seem ready

to be realized (Pratiwi, et al., 2021); this is based on several studies which reveal that the HOTS scores of students in Indonesia are still low (Suwarma & Apriyani, 2022; Suhirman, et al., 2020), so that many students have difficulty analyzing and evaluating problems, automatically they will also have difficulty producing solutions (Misrom, et al., 2020). One factor that can influence the low level of HOTS among students in Indonesia is the teacher's attitude towards HOTS stimulation in students. According to Widana et al., (2018), teachers must provide relevant and exciting stimulation for students to realize HOTS in learning. Teachers are expected to carry out this stimulation since elementary school (Wijnen, et al., 2023); this needs to be done by the teacher because students cannot yet become high-level thinkers on their own (Wijnen, et al. 2021). Activities that stimulate higher-order thinking can be done by giving assignments, thinking deeply about difficult situations and asking questions and problems that require students to involve HOTS in solving these problems and in making decisions (Wijnen, et al., 2023; Wijnen, et al., 2021).

HOTS-stimulating activities are strongly influenced by the teacher's attitude towards the importance of providing stimulation itself. Attitude is critical and is related to the teacher's teaching behaviour (Kennedy & Kennedy, 1996). In addition, a person's behaviour towards an object can be influenced by their attitude towards it (Vögel & Wänke, 2016). Attitudes influence initial acceptance and future behaviour (Islahi & Nasrin, 2019). Research has proven that teacher attitudes directly influence the learning process and student development (Forlin, et al., 2010; McLeskey & Waldron, 2021). Although many opinions stimulating higher-order thinking in students is something important, research related to teachers' attitudes towards stimulating higher-order thinking is still very rare (Schulz & Fitzpatrick, 2016), especially about the attitudes of certified and non-certified PE teachers in elementary schools, so it is never known for sure their attitude towards this matter. Therefore, it is necessary to conduct a study to investigate the attitudes of certified and non-certified PE teachers towards stimulating HOTS in students, especially in elementary schools.

Several previous studies related to PE teachers (certified and non-certified) or the implementation of HOTS in PE have been conducted, including research on the impact of teacher certification for PE. This research shows that certified teachers are better at improving student competence than non-certified teachers (Phillips, 2008). Another study proves that the teacher certification program has improved the quality of PE teachers (Rhoades & Woods, 2012). Furthermore, studies on increasing HOTS in high school students in Yogyakarta, Indonesia, have proven that applying the Teaching Game for Understanding (TGfU) learning model can increase HOTS in students (Nopembri, et al., 2022). A study by (Waffak, et al., 2022) also proves that the TGfU model can increase HOTS in elementary school students in Yogyakarta, Indonesia.

Based on our search for previous research, we see minimal publications that discuss PE teachers and their relationship with HOTS, and no research has been found that examines the attitudes of PE teachers (certified and non-certified) towards HOTS stimulation in elementary schools. Therefore, we conducted this research to uncover differences in PE teachers' attitudes (certified and non-certified) based on gender, age and years of service toward HOTS stimulation in elementary school students. This research is vital to determine whether the teacher certification program organized by the government at a very high cost and providing professional allowances to certified teachers has formed a positive attitude towards HOTS or whether their attitude is the same as non-certified teachers who do not take part in PPG and do not receive professional allowances from the government.

Materials and Methods

Study Design

Following the research objectives, we used a quantitative research design with comparative methods to determine the differences in attitudes of certified and non-certified PE teachers and review differences based on gender, age and work experience towards stimulating higher-order thinking skills in students in elementary schools.

Samples

The sample was determined using an accidental sampling technique. Accidental sampling is a sampling technique because the sample happens to be at the data collection location (Etikan et al., 2016, p.2). In this study, the samples were PE teachers who received our online questionnaire link (Google Form), which was distributed via the WhatsApp Group (WAG) of the National Sports Teachers Association (IGORNAS) and Physical Education Subject Teachers' Conference (MGMP) WAG or distributed personally. Based on the accidental sampling procedure, our online questionnaire reached 11 districts and six cities in West Sumatra province, Indonesia. We closed the questionnaire after \pm 4 weeks because no one else completed the online questionnaire. Next, we verified by taking samples according to the research sample criteria. The characteristics of the sample in this study are those who work as PE teachers who teach in elementary schools, totalling 105 people in the certified and non-certified categories. In detail, the number of certified teachers = 52 people (49.52%) and non-certified teachers = 53 people (50.48%). Based on gender, there are 77 (73.33%) male teachers and 28 (26.67%) female teachers aged 23-59 years.

Instruments

PE teachers' attitudes towards stimulating higher-order thinking skills were measured by adopting an instrument from (Wijnen, et al., 2021) in the form of a Likert scale

questionnaire consisting of 18 items with four indicators (1) Perceived relevance (PR): This concept is related to teachers' perceptions regarding the importance of encouraging higher order thinking for students' growth as individuals. (2) Perceived student ability (PSA): This concept refers to the teacher's perception of whether higher-order thinking is appropriate for high or low-achieving students. (3) Self-efficacy (SE): the teacher's perception of his ability to encourage students to think in a higher order. (4) Context-dependency (CD): This concept describes teachers' perceptions that they need external conditions, such as support and time, to encourage students to think in a higher order.

According to Argimon & Jiménez, (2019, p.442), a questionnaire can be considered content valid if it covers all aspects of the concept under study, usually assessed through expert opinion. In the content validity test, we involved six experts as validators consisting of linguists (one person), lecturers who have experience in teaching HOTS or researching HOTS (three people), and professional teachers who have obtained certification from the government (two people). Our validators have educational qualifications: two bachelor's degrees, two master's degrees, one doctorate, and one professor. Content validity using AIKEN V (Aiken, 1985) on a scale of 1-4. The average value given by validators is 3.79. Based on the AIKEN V analysis, the validity coefficient is obtained between 0.83-1.00, while the threshold based on the AIKEN table is 0.78, so it can be said that all items meet the content validity requirements. Next, a construct validity test was carried out on 39 PE teachers (who were not the research sample). Based on the construct validity test, 16 questionnaire items obtained a Pearson Correlation of 0.348-0.758 and a Sig value (2-tailed) $<$.05 with a valid decision, and two items obtained a Pearson Correlation -0.112-0.110 and a Sig value (2-tailed) $>$.05 with invalid decision (items 15 and 17), so these two items were eliminated. Furthermore, the items declared valid were subjected to a reliability test, which produced a Cronbach's Alpha of 0.846, so they were declared reliable. The instruments used to collect data in this research were only items declared to meet the requirements for validity and reliability, so the number of items used was 16.

Data Collection and Data Analysis

Data on teachers' attitudes towards higher-order thinking stimulation was obtained from an online questionnaire using Google Forms, distributed to PE teachers in elementary schools in West Sumatra, Indonesia. Before the online questionnaire is sent, the Google Form setting in "Collect email addresses" is selected "Don't collect" so that emails from respondents will not be collected. In the questionnaire, we do not ask respondents to fill in personal data (such as name, identification number, or certificate number) to ensure that the questionnaire is filled out anonymously. The completed Likert scale (five-point) questionnaire is then downloaded in Microsoft

Excel. According to Heeren & D'Agostino, (1987), five-point scale data is a form of ordinal data. Therefore, non-parametric statistical rules apply. Many experts have demonstrated the superiority of non-parametric statistics for data that is not normally distributed or does not follow a normal distribution (Vickers, 2005) so that only a homogeneity test is carried out as a test of the analysis requirements with Levene's Test (Gastwirth, et al., 2009), this test aims to test whether the samples have the same variance or not. Next, analysis was carried out using the Mann-Whitney U Test to test the differences between two independent data groups, which are an ordinal scale (Karadimitriou, et al., 2018), as well as the Kruskal-Wallis test for more than two groups of data, analysis was carried out with the help of the IBM SPSS 25.0 for Windows application.

Ethics

This research protocol has been declared ethical following 7 (seven) WHO 2011 standards, namely 1) social value, 2) scientific value, 3) distribution of burdens and benefits, 4) risk, 5) inducement/exploitation, 6) confidentiality and privacy, and 7) Informed consent, which refers to the 2016 CIOMS guidelines. This is indicated by the indication of each standard that has been met. The Research Ethics

Committee of Universitas Negeri Padang authorized the ethical declaration, and it has been registered with number 04.02/KEPK-UNP/V/2024.

Results

Data Description

105 PE teachers who teach in elementary schools have filled out our online questionnaire. The results are then analyzed following the research objectives set at the beginning. In this section, a description of the data based on demographics (gender, teacher age, and length of service) will be presented, and a comparison of certified and non-certified teachers regarding HOTS stimulation will then be continued with homogeneity tests and Hypothesis tests. The data description is then plotted in tables.

Attitudes of certified and non-certified physical education teachers toward HOTS Stimulation

To assess the attitudes of PE teachers (certified and non-certified) towards stimulating thinking skills in elementary school students, we administered a questionnaire consisting of 16 statement items using a Likert scale. The measurement results can be seen in Table 1.

Table 1.
Teachers' Attitudes Towards Stimulating Higher Order Thinking Skills

No	Items	Certified Teachers				Non-Certified Teachers			
		F	%	M	SD	F	%	M	SD
1	I think it is essential for students' education to encourage higher-order thinking in them.	233	89.62	4.48	0.61	224	84.53	4.23	0.80
2	In my opinion, to stimulate students, you cannot start from an early age by giving assignments that involve high-order elements	216	83.08	4.15	0.78	223	84.15	4.21	0.63
3	I firmly believe that stimulating higher-order thinking in students is critical to their development.	233	89.62	4.48	0.64	228	86.04	4.30	0.64
4	I believe that all educators should incorporate higher-order thinking stimulation into their classrooms regularly because it is so important	229	88.08	4.40	0.63	225	84.91	4.25	0.76
5	In my opinion, "weak" students are less adept at higher-order thinking than "smart" students	127	48.85	2.44	1.02	113	42.64	2.13	0.96
6	I think 'weak' students cannot complete tasks requiring high-order thinking.	157	60.38	3.02	0.98	149	56.23	2.81	1.11
7	In my opinion, it is too difficult for 'weak' students to complete assignments that require higher-order thinking	154	59.23	2.96	0.95	131	49.43	2.47	1.05
8	I think 'weak' students will be frustrated with most higher-order thinking assignments.	161	61.92	3.10	1.03	145	54.72	2.74	1.11
9	I think assignments requiring higher-order thinking are more relevant to "smart" students than "weak" ones.	161	61.92	3.10	1.03	143	53.96	2.70	1.14
10	In my opinion, we cannot expect 'weak' children to think in a high order	169	65.00	3.25	1.01	155	58.49	2.92	1.07
11	I can ask my students questions that encourage higher-order thinking.	214	82.31	4.12	0.55	215	81.13	4.06	0.57
12	I have the skills to incorporate higher-order thinking exercises into my lessons.	215	82.69	4.13	0.40	217	81.89	4.09	0.56
13	I can assist students in completing assignments that stimulate their high-order thinking processes all	217	83.46	4.17	0.38	220	83.02	4.15	0.46
14	I can design assignments encouraging my students to use higher-order thinking skills.	218	83.85	4.19	0.44	221	83.40	4.17	0.67
15	I can only produce higher-order thinking activities if I have a system that shows me how to achieve them.	193	74.23	3.71	0.75	193	72.83	3.64	0.90
16	Group size affects my ability to stimulate my students' higher-order thinking.	182	70.00	3.50	0.98	185	69.81	3.49	1.03
Total		3428				3345			

F= absolute frequency obtained from the sum of all teacher answers (certified teachers = 52, non-certified teachers = 53)

% = percentage of F. M= Mean. SD= Standard Deviation

Table 2.
Comparison of the Percentage of Certified and Non-Certified Teacher Achievements

Teachers	N	Achievement Score	Maximum Score	Percentage of Achievement
Certified	52	3,079	4,160	74.01%
Not Certified	53	2,987	4,240	70.45%

The instrument used is a Likert scale questionnaire with 16 items, so the highest score that each teacher can achieve is 80. Based on measuring the attitudes of certified teachers

towards HOTS, the average score achieved by teachers is 59.21, with a standard deviation of 5.45. The highest score was 70. The lowest score was 48, while non-certified teachers obtained an average teacher achievement score of 56.36, with a standard deviation of 6.01; the highest score was 70, and the lowest was 45. Comparative data on the attitudes of PE teachers (certified and non-certified) towards HOTS stimulation in elementary school can be seen in Table 2.

Homogeneity Test

Before testing the hypothesis, we conducted a homogeneity test first to ensure whether the data in this study came from a population with the same variance. The homogeneity test used Levene's Test (see Table 3).

Table 3.
Test of Homogeneity of Variance

Score	Levene Statistic	df1	df2	Sig.
Based on Mean	0.567	1	103	0.453
Based on Median	0.514	1	103	0.475
Based on Median and with adjusted df	0.514	1	102.324	0.475
Based on trimmed mean	0.522	1	103	0.471

The Levene's Test testing criteria are as follows:

H₀ is accepted if the p-value is > .05

H₀ is rejected if the p-value is ≤ .05

Based on the homogeneity test with Levene's Test, p-value = 0.453. So, the p-value is 0.453 > .05, so H₀ is accepted, and it can be concluded that the data variance for the two groups is homogeneous.

Differences in attitudes of certified and non-certified teachers toward HOTS stimulation

The Mann-Whitney U Test was used to test for differences in the attitudes of certified and non-certified teachers, and the results can be seen in Table 4.

Table 4.
Mann-Whitney U Test of Certified and Non-Certified Teachers

Teacher	Mean	SD	p-value	Sig 5%
Certified	59.21	5.45	0.012	.05
Non-Certified	56.36	6.01		

Hypothesis testing criteria with the Mann-Whitney U Test are as follows:

H₀ is accepted if the p-value is > .05

H_a is accepted if the p-value is < .05

Based on Table 4, the p-value = 0.012, so the p-value is 0.012 < .05, so H₀ rejected and H_a accepted, meaning that the hypothesis which states that there is a significant difference between the attitudes of certified and non-certified PE teachers towards stimulating higher order thinking skills in elementary school students is accepted. Based on the difference in means, certified teachers have a greater mean than non-certified teachers.

Differences in PE Teachers' Attitudes Towards HOTS Stimulation Based on Gender

The teachers involved in this research were 77 male teachers and 28 female teachers. The results of the assessment of HOTS stimulation for male teachers obtained an average score of 57.64, with a standard deviation of 6.12. In contrast, female teachers obtained an average score of 58.14, with a standard deviation of 5.28. The Mann-Whitney U test was carried out to determine differences in teachers' attitudes towards HOTS stimulation (see Table 5).

Table 5.
Mann-Whitney U Test Based on Gender

Gender	Mean	SD	p-value	Sig 5%
Male	57.64	6.12	0.744	.05
Female	58.14	5.28		

Based on Table 5, the p-value = 0.744 is obtained, so the p-value is 0.744 > .05, so H₀ is accepted, and H_a is rejected,

meaning there is no significant difference between the attitudes of male teachers and female teachers towards HOTS stimulation.

Differences in PE teachers' Attitudes Towards HOTS Stimulation Based on Age

The teachers involved in this research ranged in age from 23-59 years. In this section, we divide it into four age levels, namely ≤ 30 years, 31-40 years, 41-50 years, 51-60 years. Teachers aged ≤ 30 obtained an average score of 56.07, with a standard division of 5.95. The group of teachers aged 31-40 obtained an average of 58.42 and a standard deviation 5.90. Teachers aged 41-50 obtained a mean of 58.33 and a standard deviation of 5.80. Teachers aged 51-60 got a mean of 59.00, standard deviation of 5.06. To determine the differences in teachers' attitudes based on age towards HOTS stimulation, the Kruskal-Wallis test was conducted (see Table 6).

Table 6.
Kruskal-Wallis Test H Based on Age

Age (year)	Mean	SD	p-value	Sig 5%
≤ 30	56.07	5.95		
31-40	58.42	5.90	0.275	.05
41-50	58.33	5.80		
51-60	59.00	5.06		

Based on Table 6, the p-value = 0.275 is obtained, so the p-value is 0.275 > .05, so H₀ is accepted, and H_a is rejected, meaning that teachers' attitudes towards HOTS stimulation based on age are not significantly different.

Differences in PE Teachers' Attitudes Towards HOTS Stimulation Based on Work Experience

Participants in this study had work experience from one year to 39 years. This section divides the work period into four levels, namely 1-10 years, 11-20 years, 21-30 years, and 31-40 years. Teachers with 1-10 years of work experience got an average score of 57.56 and a standard deviation of 6.38; teachers with 11-20 years of work experience got an average of 57.74, with a standard deviation of 5.34; teachers with 21-30 years of work experience got an average of 60.00 and a standard deviation of 2.83 and teachers with years of service 31-40 obtained an average of 62.50 and a standard deviation of 3.54. To determine the differences in teacher attitudes based on tenure towards HOTS stimulation, the Kruskal-Wallis test was conducted (see Table 7).

Table 7.
Kruskal-Wallis Test H Based on Work Experience

Work Experience (year)	Mean	SD	p-value	Sig 5%
1-10	57.56	6.38		
11-20	57.74	5.34	0.535	.05
21-30	60.00	2.83		
31-40	62.50	3.54		

Based on Table 7, the p-value = 0.535 is obtained, so the p-value is 0.535 > .05, so H₀ is accepted, and H_a is rejected, meaning that teachers' attitudes towards HOTS stimulation based on length of service are not significantly different.

Discussion

Our research results show that overall, the attitudes of certified and non-certified PE teachers towards HOTS stimulation in elementary school students are significantly different, and certified teachers have better attitudes based on mean comparisons. Certified PE teachers are worthy of the title of professional teachers. Those declared professionals have gone through a series of activities in the PPG program that can help them grow their knowledge, understanding, and awareness of the importance of HOTS. They have been given comprehensive material about HOTS, such as preparing HOTS-based lesson plans, implementing HOTS into the learning process, and evaluating student HOTS. Therefore, they are more concerned about the importance of HOTS stimulation for elementary school students than non-certified teachers. This is crucial because the teacher's perspective and attitude determine every educational effort (Zohar, et al. 2001). If teachers have a positive attitude, then they will make learning more effective and valuable, whereas if they have a negative attitude, then learning will be unpleasant. (Jebungei, 2017). Previous research shows that teachers' attitudes can influence their intentions and learning practices (van Aalderen-Smeets & van der Molen, 2013; Haney, et al., 2002). Therefore, in efforts to increase HOTS in students, the teacher's attitude towards HOTS stimulation is essential because this attitude can determine whether they will encourage students to think in a higher order.

The findings in this study also show that based on gender, the attitudes of male and female teachers towards HOTS stimulation do not differ significantly. "Although men tend to be considered more vital and physically capable" (Castillo et al., 2021, p.330) and conversely, "women are considered the weak party" (López et al., 2022, p.788) and "the participation of female teachers is classified as very low" (Castillo et al., 2023, p.969) However, in stimulating HOTS, the attitudes of male and female teachers are not significantly different. Research results from Abdullah et al., (2016) support this finding, which found that teacher gender did not influence HOTS implementation practices among students. Although research results from Fernández Baños, et al. (2018, p.255) prove that female teachers are better at increasing students' interest in PE learning and research Nikolopoulou & Kousloglou (2022), Which proves that compared to male teachers, female teachers are more active in improving students' cognitive abilities; however, this research has proven that in the realm of HOTS stimulation teachers' attitudes based on gender are not significantly different. This can be influenced by many factors, one of which is the motivation possessed by each teacher. According to Rafiola et al., (2020), motivation is essential to a person's actions. This includes the attitude of teachers in stimulating HOTS in their students.

The results of the following study prove that HOTS stimulation based on teacher age is also not significantly

different. This result contradicts the findings of Ismail et al., (2018) research, which proved that teachers above 50 years old had significantly higher HOTS effectiveness than the younger group. Furthermore, Nyagah & Gathumbi, (2017) conducted research in Kenya, and the results proved that older teachers have more tremendous potential to improve the quality of their learning than younger teachers. However, based on this research, teachers' attitudes toward HOTS stimulation for students do not differ significantly. This could be because older teachers have the advantage of more teaching experience, while younger teachers have the advantage of their more recent HOTS experience.

Other findings in this research prove that teachers' attitudes towards HOTS stimulation do not differ significantly based on the length of service the teacher has. According to Borg, (2015), teachers' teaching experience influences their knowledge and actions. This opinion is strengthened by the research results of Zafer & Aslihan, (2012), which found that teachers with more extended teaching experience had better attitudes than teachers with less experience. In addition, they have received additional training that can increase their knowledge, skills, and experience (Donkoh, 2017). However, this study has proven that teachers with more extended teaching experience are not always better at HOTS than teachers with shorter experience. Teachers' awareness of the importance of HOTS for students since elementary school may affect this. Wijnen, et al., (2023, p.560) showed that most teachers who teach in primary schools already think that stimulating HOTS in students is essential. This includes PE teachers with long or short experience.

Study It is hoped that this can contribute to the Indonesian government's efforts to increase student HOTS. The government believes that a teacher certification program can correct the low level of HOTS among Indonesian students. According to Miri et al., (2007), there is great potential and robust scientific evidence that this will work if teachers consistently and actively foster HOTS in students. Most students like PE as a subject (Martins, et al., 2023), and they can be pioneers in increasing HOTS in students. These findings also provide information about the effectiveness of the teacher certification program (PPG), which has been proven to increase knowledge and understanding about HOTS among certified PE teachers in West Sumatra Province, Indonesia.

The low level of student HOTS in Indonesia could be caused by a lack of teacher attitude, motivation and commitment to implementing HOTS into their learning process. Many teachers are not certified and only gain experience from workshops, which influences this. Research results Putri, et al., (2022) have shown that the training or workshops given to teachers are more aimed at designing HOTS-based questions only. As a result, it won't be easy to achieve learning objectives that contain HOTS elements (Seman, et al. 2017). HOTS is not limited to preparing questions; it also considers various approaches, strategies, models, and methods that help students encourage HOTS through various movement experiences.

For this reason, training materials and other certification programs must also cover the concepts and practices of implementing HOTS through various learning models.

Conclusion

In conclusion, our study showed a clear difference in the attitudes of certified and non-certified physical education teachers toward stimulating HOTS in primary school students. Based on mean comparisons, certified teachers showed more positive attitudes toward HOTS stimulation in primary school students than non-certified teachers. In addition, this study found no significant effect of gender, age, or work experience on teachers' attitudes toward HOTS stimulation.

The limitation of this study is that it only reveals differences in the attitudes of certified and non-certified PE teachers towards HOTS stimulation based on the demographics of gender, age and teaching experience towards stimulating HOTS in students in elementary schools; therefore, it is hoped that in the following study to explore more broadly about teacher attitudes in stimulating higher order thinking in junior high schools and senior high schools. Furthermore, this study used an accidental sampling technique, so the study results cannot be generalized to the entire population. In addition, it is also necessary to research teachers' ability to develop HOTS-based lesson plans and how teachers implement this into the physical education learning process.

Conflict of Interest

There is no conflict of interest.

Reference

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