Analysis of Multiple Intelligence of Elementary Students in Physical Education Lessons in Yogyakarta Indonesia
Análisis de las inteligencias múltiples de estudiantes de primaria en lecciones de educación física en Yogyakarta Indonesia

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Abstract. The application of learning based on multiple intelligences has implications for collective awareness about diversity, uniqueness and equitable education. The objective of this study is to describe the level of multiple intelligences of students learning physical education in elementary schools, as well as to identify differences in the levels of each type of multiple intelligences based on the gender of the students. This study is a descriptive and comparative quantitative study. Purposive sampling was used to collect the samples. The 124 respondents included 57 male and 67 female students from Yogyakarta's Syuhada Mosque Elementary School. The instrument employs a questionnaire comprised of 21 statements derived from the substance of multiple intelligences. The instrument employs a Likert scale of 1 to 4. The instrument was developed using theory, with expert consultation, and its validity and reliability were tested. Descriptive statistical data analysis used frequency distribution to describe the state of multiple intelligences, and non-parametric Mann-Whitney Test analysis used to determine differences in multiple intelligences based on gender. Based on the frequency distribution analysis, it was determined that the highest frequency of intelligence corresponds to the following criteria: the "low" category is in logical-mathematical (22.58%), the "moderate" category is in visual spatial (40.32%), the "high" criterion is in intrapersonal (58.06%), and the "very high" category is in bodily-kinesthetic (54.03%). According to the Mann-Whitney Test analysis, The value of Sig > 0.05 indicates that the hypothesis that elementary school male and female students learn physical education differently in terms of their multiple intelligences (musical, verbal linguistic, intrapersonal, visual spatial, interpersonal, bodily-kinesthetic, logical-mathematical) is rejected. Meanwhile, the hypothesis that male and female students have different levels of naturalist intelligence when learning physical education in primary schools is accepted because the Sig < 0.05. Elementary school students' levels of each type of multiple intelligence in physical education are quite variable. The Mann-Whitney Test analysis revealed that there was no significant difference in the level of multiple intelligences (musical, verbal-linguistic, intrapersonal, visual-spatial, interpersonal, bodily-kinesthetic, logical-mathematical) based on the gender of the students, but there were significant differences in the level of naturalist intelligence in learning physical education for elementary schools based on the gender of the students.
Key words: Multiple intelligence (MI), Students, Elementary School, Physical Education (PE)

Resumen. La aplicación del aprendizaje basado en inteligencias múltiples tiene implicaciones para la conciencia colectiva sobre la diversidad, la singularidad y la educación equitativa. El objetivo de este estudio es describir el nivel de inteligencias múltiples de los estudiantes de educación física en escuelas primarias, así como identificar diferencias en los niveles de cada tipo de inteligencias múltiples en función del género de los estudiantes. Estudio cuantitativo comparativo. Para recolectar las muestras se utilizó un muestreo intencional. Entre los 124 encuestados se encontraban 57 hombres y 67 mujeres estudiantes de la escuela primaria Syuhada Mosque de Yogyakarta. El instrumento emplea un cuestionario compuesto por 21 afirmaciones derivadas de la esencia de las inteligencias múltiples. El instrumento emplea una escala Likert de 1 a 4. El instrumento fue desarrollado utilizando la teoría, con consulta de expertos, y se probó su validez y confiabilidad. El análisis de datos estadísticos descriptivos utilizó la distribución de frecuencia para describir el estado de las inteligencias múltiples, y el análisis no paramétrico de la prueba de Mann-Whitney se utilizó para determinar las diferencias en las inteligencias múltiples según el género. A partir del análisis de distribución de frecuencias se determinó que la mayor frecuencia de inteligencia corresponde a los siguientes criterios: la categoría "baja" es en lógico-matemático (22,58%), la categoría "moderada" es en visoespacial (40,32%), el criterio "alto" es en intrapersonal (58,06%), y la categoría "muy alto" es en corporal-kinestésico (54,03%). Según el análisis del Test de Mann-Whitney, El valor de Sig > 0,05 indica que se rechaza la hipótesis de que los alumnos y alumnas de primaria aprenden educación física de forma diferente en función de sus inteligencias múltiples (musical, verbal lingüística, intrapersonal, visoespacial, interpersonal, corporal-cinestésica, lógico-matemática). Ientras tanto, se acepta la hipótesis de que los estudiantes hombres y mujeres tienen diferentes niveles de inteligencia naturalista cuando aprenden educación física en las escuelas primarias porque la Sig < 0,05. Los niveles de cada tipo de inteligencia múltiple en educación física de los estudiantes de primaria son bastante variables. El análisis del Test de Mann-Whitney reveló que no existía diferencia significativa en el nivel de inteligencias múltiples (musical, verbal-lingüística, intrapersonal, visoespacial, interpersonal, corporal-kinestésica, lógico-matemática) en función del género de los estudiantes, pero hubo diferencias significativas en el nivel de inteligencia naturalista en el aprendizaje de educación física en las escuelas primarias según el género de los estudiantes.
Palabras clave: Inteligencia múltiple (IM), estudiantes, educación primaria, educación física (EF).

Introduction

Howard Gardner proposed the concept of multiple intelligences in the late 1970s and early 1980s. According to this notion, humans have eight or more independent intelligences. Multiple intelligences are defined as multiple potentials and the ability to adapt to a variety of situations and difficulties. Everyone has eight intelligence profiles, but

each person has their own strengths as the dominant intelligence profile (Ardha et al. 2018). This theory challenges the conventional conception of intelligence, which recognises only one type of intelligence and employs only one style of instruction, resulting in the loss of the majority of students' prospects for effective education (Alsalhi 2020).

Students' multiple intelligences can be seen in the learning process, including physical education. Even though physical education is linked with movement activities or kinesthetic intelligence, various intelligences can be discovered and developed during the learning process. A physical education teacher's major goal is to encourage all students (whether they are good or bad at sports) to live a healthy life, which is easier to do if they comprehend the notion of multiple intelligences (Ardha et al. 2018). Discovering students' diverse skills and giving diverse experiences are critical components in assisting students to become physically educated individuals (National Association for Sport and Physical Education. 1992).

In general, pupils have a variety of intelligences that can be aided in the learning process. (Treviño et al. 2020) the previous reserch has undertaken to differentiate multiple intelligences based on gender. The sample included 71 female and 90 male aged 8 to 13 from a school in Monterrey, Nuevo Leon, Mexico. A similar study in Oman intended to investigate multiple intelligences in junior high school pupils (Al Hosni and Al-Manthari 2021). The research sample comprised of 112 students chosen at random. Similar studies with different research subject areas discovered multiple intelligences of pupils in sports education. (Yildiz, Öntürk, and Efek 2020) There is no research that seeks to analyse multiple intelligences specifically in physical education in elementary schools based on this pertinent research. The instrument utilised is still general. Research on intelligence is general (Treviño et al. 2020), with research subjects including junior high school pupils (Al Hosni and Al-Manthari 2021) and university students (Yildiz et al. 2020). Furthermore, no description of the frequency of any multiple intelligence is provided in the relevant research.

The purpose of this study is to discover anything new regarding multiple intelligences in elementary school physical education. This study employs physical education-specific instruments. This study is descriptive since it employs a frequency distribution that has not been discovered in previous research. It is intended that the study's findings will provide an overview of the multiple intellectual conditions of elementary school students when combined with physical education. According to (Carlín, Salazar, and Cortés 2013) it is essential to assess students at first in order to provide beneficial information to researchers as well as to develop instructional strategies to fulfil student needs by implementing particular methods and then evaluating progress made by students. This study is thought to conclude research on multiple intelligences and their relationship to curriculum and education. The

study's findings can potentially be valuable for future curriculum development and improvement by education experts and administrators. The research findings are expected to provide an overview of the state of students' multiple intelligences, serve as the foundation for developing a learning model, and serve as the foundation for subsequent relevant research. This research is especially significant in supporting Indonesia's "Freedom to Learn" policy in light of the diversity and challenges of the globalisation period. In our twenty-first-century global society, we must acknowledge the wide-ranging Theory of Multiple Intelligences as the most practical and successful foundation for twenty-first-century educational and teaching techniques (Donovan and Farlane 2011).

Many previous studies discuss sports science or human movement science in its three scientific dimensions, which are ontology, epistemology, and axiology. Studies related to the achievement of physical education learning outcomes have been conducted by (Septiantoko et al. 2024); (Martono et al. 2024). Studies related to the curriculum and management of physical education learning have been conducted by (Mardiyah et al. 2024). Studies related to health and fitness sports have been conducted by (Widiyanto et al., 2024a); (Widiyanto et al., 2024b). Studies related to therapeutic sports have been conducted by (Zanada et al. 2024). Studies related to sports training and sports performance have been conducted by (Bahtra et al. 2024); (Kurniawan et al. 2024). Studies related to the management of sports education and achievement have been conducted by (Setyawan et al., 2023a); (Setyawan et al., 2023b); (Setyawan et al., 2024a); (Setyawan et al., 2024b);(Setyawan et al., 2024c); (Komari et al. 2024); (Hamsyah et al. 2024); (Mulyanti et al. 2024); (Destriani et al. 2024). Studies related to movement skills have been conducted by (Pranoto et al. 2024); (Anam et al. 2024). Studies related to intelligence in students at school have been conducted by (Sánchez and Rodríguez-Romo 2019); (Pérez and Rico 2021); (Fernandez et al. 2022); (Gani et al. 2023); (Rezavandzayeri et al. 2024). However, there is still very little scientific research that analyzes the multiple intelligence of students in PE learning in elementary schools in Indonesia. Meanwhile, PE is one of the essential teaching areas in healthy individual development and efficient education (Karagülmez Sağlam & Dogan, 2023). Therefore, the purpose of this study is to determine the frequency distribution of each type of multiple intelligences in physical education, and identify the differences in the level of each type of multiple intelligences based on students' gender.

Methods

Participants

Purposive sampling was used to collect the samples. The 124 respondents consisted of 57 male and 67 female students from Syuhada Mosque Elementary School in

Yogyakarta, Indonesia. The sample consists of students in grades IV, V, VI with, aged is 9-13 years.

Study design and data collection

Data collection was carried out utilising instruments in the form of a questionnaire. A google form questionnaire was created to find out the level of intelligence of pupils learning physical education in elementary schools. The questionnaire is divided into two parts: the first part contains general information from students, and the second part has 21 statement items linked to the research aims. Table 1 shows item assertions for each category of intelligence.

Table 1.
Dimensions of multiple intelligences questionnaires in physical education

Dimensions	Items
Musical	1, 9, 17
Verbal Linguistic	2, 10, 18
Intrapersonal	3, 11
Visual Spatial	4, 12, 19
Interpersonal	5, 13, 20
Naturalist	6, 14
Bodily Khinestetic	7, 15, 21
Logical Mathematical	8, 16

Table 2.
The validity of multiple intelligences instruments in physical education.

Dimensions	r count Pearson Correlation		
	Item 1	Item 2	Item 3
Musical	.838**	.829**	.800**
Verbal Linguistic	.751**	.770**	.739**
Intrapersonal	.872**	.826**	-
Visual Spatial	.790**	.763**	.761**
Interpersonal	.778**	.719**	.776**
Naturalist	.821**	.879**	-
Bodily Khinestetic	.725**	.796**	.735**
Logical Mathematical	.845**	.850**	-

(**) means there is a correlation between each item score and the total score with a significance level of 1%.

Table 3.
The reliability of multiple intelligence instruments in physical education

Dimensions	N of Items	Cronbach's Alpha
Musical	3	.761
Verbal Linguistic	3	.613
Intrapersonal	2	.612
Visual Spatial	3	.657
Interpersonal	3	.623
Naturalist	2	.613
Bodily Khinestetic	3	.613
Logical Mathematical	2	.608

The questionnaire's statements were developed using intelligence theory along with relevant instrument. For closed statements, researchers employ a 4-point scale. To ensure the validity of the questionnaire, the questionnaire was sent to three experts, including physical education experts, sports psychologists, and learning psychologists, who provided written grades, comments, and suggestions. The researchers then modified certain statements to ensure the research objectives were met. Before being used in research, the instrument was assessed for validity (Product Moment Pearson Correlation SPSS) and reliability (Alpha Cronbach's SPSS). The Product Moment Pearson Correlation validity test findings show that all question items have an r-count value greater than r-table 0.175 and

a sig value (2-tailed) of 0.000 < 0.05 at a significance level of 5%, indicating that all question items are valid. The reliability test findings on Cronbach's alpha are more than 0.6, implying that all question items are considered reliable or consistent. The table below clarifies the validity and reliability results.

Statistical analysis

The first analysis utilises descriptive statistics to describe the various conditions of multiple intelligences showed by students during the process of acquiring knowledge in the field of physical education. Descriptive statistics refer to statistical techniques employed for the analysis of data by providing a description of the obtained data in its original form, without drawing any overarching inferences (Sugiyono 2019). The cumulative score for each answer item is calculated by summing the individual scores, which is then changed into a numerical number using the following formula:

$$Percentage = \frac{Score\ obtained}{Maximum\ Score} x100$$

The score is then calculated using percentages based on the results to determine the suitability criteria for multiple intelligences of pupils learning physical education, sports, and health in elementary schools in the DIY region. The percentage calculation formula is based from the percentage formula (Riduwan 2015); very low (0-20%), low (21-40%), moderate/moderate (41-60%), high (61-80%), and very high (81-100%).

Tabel 4.
Intelligence level criteria

Dimensions	Max	Very low	Low	Moderate	High	Very high
Music	12	0-2,4	2,5-4,8	4,9-7,2	7,3-9,6	9,7-12
Verbal	12	0-2,4	2,5-4,8	4,9-7,2	7,3-9,6	9,7-12
Intra	8	0-1.6	1,7-3,2	3,3-4,8	4,9-6,4	6,5-8
Visual	12	0-2,4	2,5-4,8	4,9-7,2	7,3-9,6	9,7-12
Interp	12	0-2,4	2,5-4,8	4,9-7,2	7,3-9,6	9,7-12
Natural	8	0-1.6	1,7-3,2	3,3-4,8	4,9-6,4	6,5-8
Body	12	0-2,4	2,5-4,8	4,9-7,2	7,3-9,6	9,7-12
Logis	8	0-1.6	1,7-3,2	3,3-4,8	4,9-6,4	6,5-8

The second data analysis employed the non-parametric Mann-Whitney Test statistic to determine gender differences in each type of multiple intelligence of pupils in physical education learning in elementary schools.

Results

Descriptive Analysis Results

Based on descriptive data processing, it is possible to show that there are numerous categories and frequencies for each type of intelligence. Each respondent's answer to the statement regarding the eight various intelligences is transformed into a percentage. The percentage of each intellect is divided into very low, low, moderate, high, and very high categories. The frequency distribution data is generated using SPPS based on the percentage range provided by each sample. Table 5 describes the frequency distribution of each intelligence. Specifically, the

intelligence of male students can be explained in table 6, female students in table 7.

Table 5.
Frequency distribution of multiple intelligence levels in physical education (N=124)

Dimensions	Low		Moderate		High		Very High	
	f	%	f	%	f	%	f	%
Musical	9	7.26	34	27.42	41	33.06	40	32.26
Verbal Linguistic	4	3.23	47	37.90	55	44.35	18	14.52
Intrapersonal	7	5.65	18	14.52	72	58.06	27	21.77
Visual Spatial	6	4.84	50	40.32	43	34.68	25	20.16
Interpersonal	0	0.00	21	16.94	46	37.10	57	45.97
Naturalist	1	0.81	4	3.23	58	46.77	61	49.19
Bodily Kinesthetic	1	0.81	13	10.48	43	34.68	67	54.03
Logical Mathematical	28	22.58	31	25.00	54	43.55	11	8.87

The table above describes the variety of frequencies and multiple intelligence criteria of primary school children in physical education. Musical intelligence is represented by 9 respondents or 7.26% of the total respondents in the low category, 34 respondents (27.42%) in the moderate category, 41 respondents (33.06%) in the high category, and 40 (32.26%) respondents in the very high category. Linguistic verbal intelligence was measured by 4 (3.23%) respondents in the low group, 47 (37.90%) in the medium category, 55 (44.35%) in the high category, and 18 (14.52%) in the very high category. In terms of intrapersonal intelligence, 7 (5.65%) respondents fell into the low category, 18 (14.52%) fell into the medium category, 72 (58.06%) fell into the high category, and 27 (21.77%) fell into the very high category. The low category had 6 (4.84%), the moderate category had 50 (40.32%), the high category had 43 (34.68%), and the very high category had 25 (20.16%). Interpersonal intelligence in the moderate category is 21 (16.94%), in the high category is 46 (37.10%), and in the very high category is 57 (45.97%). Low naturalist intellect was 1 (0.81%), moderate intelligence was 4 (3.23%), high intelligence was 58 (46.77%), and very high intelligence was 61 (49.19%). Bodily spatial kinesthetic intelligence was 1 (0.81%) in the low category, 13 (10.48%) in the moderate category, 43 (34.68%) in the high category, and 67 (54.03%) in the very high category. The low category of logical mathematical intelligence is 28 (22.58%), the moderate category is 31 (25%), the high category is 54 (43.55%), and the very high category is 11 (8.87%). Diagram 1 depicts the frequency distribution of different intelligences in elementary school physical education.
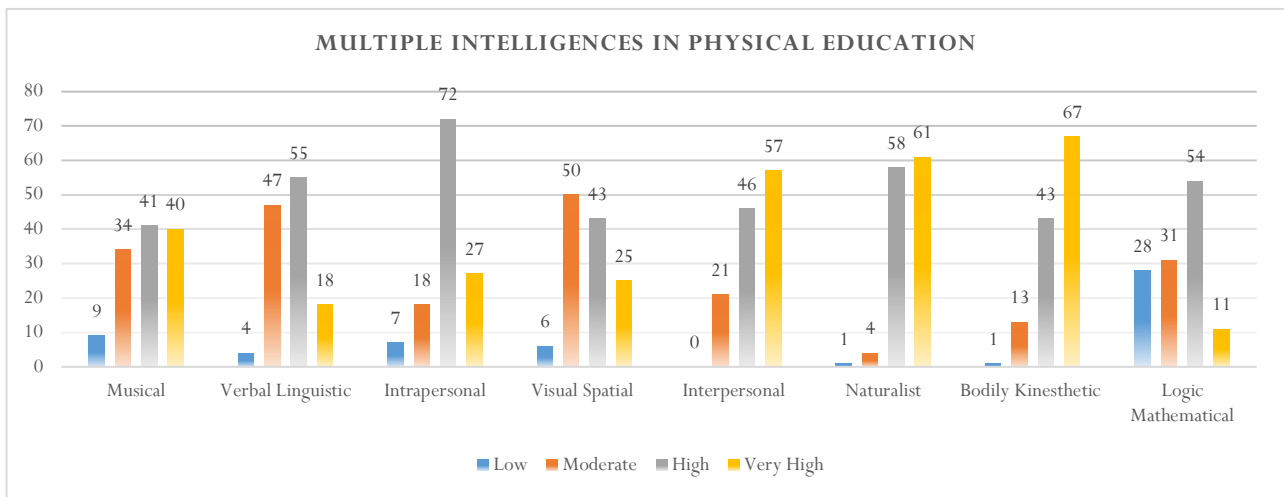

Figure 1. Frequency distribution related to multiple intelligences

Based on the diagram above, it is possible to describe the frequency of each requirement for each type of intelligence. The intelligence with the largest frequency in the low criterion is logical-mathematical intelligence (22.58%), musical intelligence (7.26%), and intrapersonal intelligence (5.65%), followed by other intelligences. Visual-spatial intelligence (40.32%), verbal intelligence (37.90%), musical intelligence (27.42%), and other Intelligences are the intelligences with the highest frequency in the medium category. The largest frequency of intelligence in the high criterion was in intrapersonal intelligence (58.06%), naturalist (46.77%), linguistic verbal (44.35%), and other intelligences. Meanwhile, intelligence is included in the very high category based on the chart and the number of frequencies discovered in body kinesthetic intelligence (54.03%), naturalist (49.19%), and interpersonal (45.97%), followed by other intelligences.

Comparative Analysis of Mann-Whitney Test

The Mann-Whitney test was used to determine whether there are gender differences in each category of multiple intelligence of elementary school children in Yogyakarta (male and female). The Mann-Whitney Test was used because the normality test as a prerequisite for parametric statistics was not met. The normality test for data on the multiple intelligence levels of male and female is not normally distributed. Based on the normality test using Shapiro-Wilk, the majority of types of intelligence have a sig value <0.05.

In the Mann-Whitney Test, if the Sig value is less than 0.05, Ho is rejected and Ha is accepted; if the Sig value is greater than 0.05, Ho is accepted and Ha is rejected.

Table 5.
Normality Test levels of each multiple intelligence based on gender

Dimensions	Shapiro-Wilk	
	Male	Female
Musical	.019	.008
Verbal Linguistic	.034	.001
Intrapersonal	.001	.003
Visual Spatial	.024	.123
Interpersonal	.004	.002
Naturalist	.000	.000
Bodily Kinesthetic	.000	.004
Logical Mathematical	.007	.005

Table 6.
Mann-Whitney Test Results Differences in levels of each multiple intelligence based on gender

Dimensions	Male (N=57)		Female (N=67)		Mann-Whitney U	Asymp. Sig. (2-tailed)
	Median	Mean	Median	Mean		
Musical	9.0000	7.9825	9.0000	8.4776	1678.000	.241
Verbal Linguistic	8.0000	8.1930	8.0000	7.6716	1628.000	.151
Intrapersonal	6.0000	5.6842	5.0000	5.4179	1691.000	.260
Visual Spatial	8.0000	7.8421	8.0000	7.8955	1872.000	.849
Interpersonal	9.0000	9.4035	9.0000	9.3134	1883.500	.895
Naturalist	6.0000	6.1930	7.0000	6.7313	1391.500	.007
Bodily Kinesthetic	10.0000	9.8070	9.0000	9.3433	1609.000	.124
Logical Mathematical	5.0000	4.8421	5.0000	4.4627	1652.500	.188

The significance level of each variable is shown based on the results of a Mann-Whitney test, as shown below. The scores were as follows: musical $0.241 > 0.05$, verbal linguistic $0.151 > 0.05$, intrapersonal $0.260 > 0.05$, visual spatial $0.849 > 0.05$, interpersonal $0.895 > 0.05$, naturalist 0.07 0.05, bodily kinesthetic $0.124 > 0.05$, and logical mathematicals of $0.188 > 0.05$. The value of Sig > 0.05 indicates that the hypothesis that there are gender differences in the development of multiple intelligences (musical, verbal linguistic, intrapersonal, visual spatial, interpersonal, body kinesthetic, logical mathematicals) in elementary school physical education is rejected. While the hypothesis that there is a difference in naturalist intelligence between male and female pupils in acquiring physical education in primary schools is accepted because the Sig value is less than 0.05.

These results can give the meaning that; 1) there is no difference in the level of musical intelligence in the process of learning physical education in elementary schools between male students and female students, 2) there is no difference in the level of linguistic verbal intelligence in the learning process of physical education in elementary schools between male students and female students, 3) there is no difference in the level of intrapersonal intelligence in the process of learning physical education in elementary schools between male students and female teachers, 4) there is no difference in the level of visual-spatial intelligence in the learning process of physical education in elementary schools between participants male students and female students, 5) there is no difference in the level of interpersonal intelligence in the process of learning physical education in elementary schools between male students and female students, 6) there is a difference in the level of naturalist intelligence in the learning process of physical education in schools basic between male students and female students, 7) there is no difference in the level of kinesthetic body intelligence between male and female students in the process of learning physical education in elementary schools. 8) There is no difference in the level of mathematical logical intelligence between male and female students in the process of learning physical education in elementary schools.

Discussion

Essentially, the purpose of this research is to examine how children' multiple intelligences influence physical education in elementary schools in the Yogyakarta region. The study's findings give an overview of the various requirements for each form of multiple intelligence. Based on the chart and the number of frequencies, the types of intelligence in the very high category in this study were body-kinesthetic intelligence (54.03%), naturalist (49.19%), interpersonal (45.97%), and continued with other intelligences. Similar findings were obtained in a study (Treviño et al. 2020) of primary school pupils in Mexico on the identification of various intelligences in general. The three intelligences that dominate elementary school children in Mexico based on the average of each type of intelligence are interpersonal (39.68), kinesthetic (37.99), and linguistic (37.99). Naturalists and linguists have similar intelligence dominance. Similar research with different research subject categories (Yildiz et al. 2020) identified multiple intelligences of students in sports education, with the findings explaining that the most dominant intelligence possessed by participants was

kinesthetic intelligence, with verbal intelligence being the farthest modality of intelligence. According to (Carlín et al. 2013), the highest multiple intelligences are physical, interpersonal, and intrapersonal kinesthetic. However, the findings of a study aimed at examining multiple intelligences among class IX children in the Al Batinah Utara Governorate in the Sultanate of Oman (Al Hosni and Al-Manthari 2021) are significantly different. The research sample included 112 students that were chosen at random. According to the study's findings, the top, second, and third rankings among students in general are in favour of interpersonal, logical-mathematical, and visual-spatial intelligence, respectively.

Each student in a class possesses a variety of intelligences. Even if physical education emphasises learning through movement activities, it is likely that the kids in that class do not have a strong sense of bodily-kinesthetic intelligence. The findings of this study show that each form of multifaceted intelligence in physical education is owned by each student using quite different criteria. The study's findings reveal that, while kinesthetic intelligence has the highest frequency with extremely high category, 1 student falls into the low category and 13 into the medium category. Although logical mathematical intelligence has the largest frequency in the low group, 11 pupils have very high mathematical intelligence. This circumstance is consistent with statement (Ardha et al. 2018), which states that each person has eight intelligence profiles, yet each person has their own strength as the dominant intelligence profile. Because each individual has distinct qualities, the learning process is most efficient when it fits the intelligence characteristics of the individual (Kılıç and Sert 2015).

This study specifically aimed to examine the various types of multiple intelligences in physical education learning at elementary schools in Yogyakarta based on the gender of the pupils. According to the non-parametric Mann-Whitney Test, there is no difference in the degree of various intelligences (musical, verbal linguistic, intrapersonal, visual spatial, interpersonal, bodily kinesthetic, logical-mathematical) between male and female students. According to the findings of similar studies, there are no significant differences between male and female pupils in musical intelligence, verbal linguistic, visual spatial, interpersonal, bodily kinesthetic, and logical mathematical (Treviño et al. 2020).

This study discovered one intelligence that differed significantly by gender among the eight types of multiple intelligences in physical education learning. Naturalist intelligence differs significantly between male and female students when it comes to learning physical education. When measured against the mean, male students have a naturalist intelligence of 6.1930, whereas female students have a naturalist intelligence of 6.7313. Similar conditions were confirmed by the findings of a study of students aged 8-16 years, which found that girls have higher naturalistic intelligence ratings (Hernández, Prada, and Rincón 2019).

Similar findings are mentioned in the research findings (Treviño et al. 2020), and while there are no significant differences depending on gender, female students have a higher mean value of natural intelligence than male students.

Based on the variety of intelligences possessed by primary school pupils, the physical education learning process must take numerous intelligences into account. The world of education must handle student diversity by developing an educational model that fits to these situations (Setianingsih and Listyarini 2019). In order to respond to the multifaceted human paradigm, physical education supports the integral line of welfare and development in various circumstances (Rivera Sosa et al. 2020). Students should not be handled in the same way because each brain is unique and has a dominant intellect that plays a vital role in learning (Abdelhak and Romaissa 2022).

Learning physical education through different intelligences can be a viable alternative to traditional physical education challenges. According to one survey, 20% of children dislike physical education classes. Furthermore, there is evidence that an increasing number of students regard physical education as less relevant, interesting, and enjoyable (Gard, Hickey-Moodey, and Enright 2013). According to a journal article, physical education teachers place a high value on learning that focuses on prescribed technical skills while ignoring the surroundings and students' aspirations (Kaloka, Nopembri, and Yudanto 2023). Such circumstances lead to a suboptimal function of physical education as an educational medium in the context of developing the child's entire personality (Rachman 2011). This situation contradicts the goal of physical education. Physical education learning is oriented at the total development of kids, not just the development of sports abilities (Taryatman and Rahim 2018).

The implementation of multiple intelligences theory in learning makes teaching and learning activities more exciting for both students and teachers, as well as students in school, and helps to improve children's academic progress (Petruța 2013). According to research, using teaching based on the idea of multiple intelligences aids to the development of logical, critical, and creative thinking skills, as well as higher order thinking (Calık and Birgili 2013). It is essential to design developmentally appropriate and exciting programmes to ensure that kids like their physical education experience and stay active (Martin and Morris 2013). When planning lessons, teachers should pay more attention to multiple intelligences (Griggs et al. 2009). Awareness of intelligence differences and changes in teaching tactics can boost learning motivation and memory, hence quickening the learning process (Sulaiman, Abdurahman, and Rahim 2010). According to the literature on multiple intelligences in tennis instruction (Mitchell and Kernodle 2004), teachers or coaches can increase learners' verbal/linguistic intelligence by providing larger learning experiences while teaching technical skills and game

strategy. Students that are mathematically and logically gifted can be helped to become game statisticians (Martin and Morris 2013). According to one study, teaching basketball in college with different intelligences enhances students' initiative and willingness to learn basketball (Xie and Xu 2022).

Conclusions

This study's findings and discussion can lead to two conclusions. The first conclusion is that children in physical education have a wide range of multiple intelligences. Based on the frequency distribution analysis, the type of intelligence is classified as low in logical-mathematical intelligence (22.58%), medium in visual-spatial intelligence (40.32%), high in intrapersonal intelligence (58.06%), and very high in body kinesthetic intelligence (54.03%). The second conclusion is that, while there is no significant difference in the level of multiple intelligences (musical, verbal linguistic, intrapersonal, visual spatial, interpersonal, body kinesthetic, mathematical logic) based on the gender of students, there is a significant difference in the level of naturalist intelligence in elementary school physical education learning based on the gender of students. These conditions can be utilised as reinforcement for physical education teachers who are expected to develop creative physical education programmes that take into account the diversity of students' many intelligences. The findings of this study can be utilised as a consideration in the field of curriculum, school principals, and offices linked to training or development of numerous intelligence-based physical education learning models that are effective and can be applied according to the school curriculum. Based on the findings of this study, it is desired that appropriate research will be conducted that looks more deeply into multiple intelligences in physical education in primary schools.

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

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