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Table Tennis Athletes' Body Language from a Semiotic Perspective: Implications for Physical Education and Sports

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ABSTRACT
This study aimed to analyze the body language of table tennis athletes from a semiotic perspective and its implications for physical education and sports. Body language was understood as a form of nonverbal communication conveying messages, emotions, and intentions without words. The study employed a qualitative descriptive-analytic approach through participant observation, in-depth interviews, and visual documentation involving ten athletes, two coaches, and one organization administrator. Data were analyzed through reduction, presentation, and conclusion stages based on the theories of icon, index, and symbol signs. The results indicated five main categories of athlete body language: readiness (85 %), aggressiveness (70 %), emotional control (60 %), social interaction (55 %), and post-match expression (100 %). These body movements functioned not only as biomechanical responses but also as a system of signs reflecting psychological states, game strategies, and values of sportsmanship. The findings confirmed that athletes' bodies served as a medium of symbolic communication with pedagogical implications in physical education. Practical implications include the importance for coaches and teachers to recognize and utilize nonverbal cues in character development, enhance training effectiveness, and develop more reflective and communicative learning models.

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INTRODUCTION
Body language is a form of nonverbal communication that plays a significant role in conveying messages, emotions, and intentions without the use of words. In social life, body language often serves as a primary medium for interpreting hidden meanings behind human behavior. Birdwhistell (1970) stated that over 65% of human communication occurs through nonverbal channels such as facial expressions, body movements, eye contact, and posture. In sports, body language becomes even more complex as it integrates performative, strategic, and emotional aspects of athletes. Movements executed by athletes are not only intended for biomechanical efficiency but also carry social and psychological meanings that can be interpreted. Therefore, analyzing athletes' body language is essential to understand how nonverbal communication contributes to performance and interaction dynamics in sports.

In sports such as table tennis, nonverbal communication plays a crucial role. Athletes use body language to adapt to game tempo, deceive opponents, and maintain emotional stability during matches. Cues such as hand positions, gaze direction, or changes in posture can indicate readiness and strategy. According to Martens (2012), athletes' psychological aspects and nonverbal communication strongly influence match outcomes, affecting both opponents' perceptions and the players' self-confidence. However, this body language is often subconscious for both athletes and coaches, even though a deep understanding of these gestures can enhance the effectiveness of training and physical education learning (Weinberg & Gould, 2019). Therefore, exploring table tennis athletes' body language from a semiotic perspective is an important step to interpret the symbolic movements hidden behind technical performance.

Semiotic studies provide a relevant theoretical framework for understanding athletes' body language. Ferdinand de Saussure (1916) introduced the concept of the sign, comprising the signifier and the signified, with a conventional and arbitrary relationship. Charles Sanders Peirce (1931) expanded this concept by introducing three main types of signs: icon, index, and symbol. In sports, body movements

can function as icons representing real actions, indexes indicating cause-effect relationships (e.g., expressions of fatigue signaling decreased stamina), and symbols carrying social meanings such as victory or arrogance. Barthes (1977) later introduced the concepts of denotation and connotation, allowing signs in sports to be interpreted both literally and culturally. For instance, a specific serve style in table tennis may have a denotative technical meaning but also indicate the athlete's character or personality connotatively.

The phenomenon of body language in sports has long attracted attention from sports psychology and nonverbal communication researchers. Ekman and Friesen (1969) emphasized that facial expressions and body movements can reveal deep emotions that cannot be expressed verbally, such as stress, tension, or confidence. In table tennis matches, changes in eye expression and posture often indicate dominance or confusion. Hodge and Kress (1988) further highlighted that body language is a form of social semiotics, not only reflecting individual conditions but also constructing meaning in social interactions among athletes, coaches, and spectators. Therefore, semiotic studies of body language in sports can help understand the complex relationship between movement, meaning, and socio-cultural context.

In practice, coaches often focus on technical aspects such as ball speed, movement coordination, and stroke power, while nonverbal communication is frequently overlooked. Yet, nonverbal communication has a direct impact on performance. Cushion et al. (2003) noted that coaches who can read athletes' body language are more effective in providing feedback and motivation. Conversely, coaches who are less sensitive to nonverbal cues may cause miscommunication, potentially reducing athlete performance. In physical education, understanding students' body language is also important to recognize their motivation, anxiety, and emotional engagement in physical activities (Anshel, 2012). Hence, semiotics is not only valuable for interpreting movements in professional sports but also relevant for fostering reflective and humanistic pedagogy in physical education.

A key issue is the limited research specifically examining table tennis athletes' body language from a semiotic perspective. Most previous studies focused on biomechanical, psychological, or tactical analysis without considering the dimension of signs and meanings. However, each athlete's movement contains layers of meaning that can be interpreted through a semiotic approach. Müller et al. (2017) indicated that an athlete's ability to read opponents' nonverbal signals is a crucial factor in anticipating game strategies. Accordingly, this study aims to fill the research gap by examining how table tennis athletes' body language functions as a system of signs conveying performative and emotional messages during play.

Additionally, body language can serve as an indicator of athletes' mental performance. Rizzolatti and Sinigaglia (2008) explained that through mirror neuron mechanisms, individuals can understand others' actions and emotions by observing their movements. This suggests that in table tennis, body language not only serves as a communication tool but also forms empathetic interactions between players. In physical education, understanding this mechanism is valuable for teachers in fostering positive nonverbal communication that supports students' motor and social learning (Zarrilli, 2009). Through semiotics, teachers can interpret students' movements not only as physical performance but also as expressions of emotion and identity.

Methodologically, semiotic research on athletes' body language can employ a qualitative descriptive approach, analyzing signs based on Peirce and Barthes' theories. Observations of matches and training sessions can identify icons, indexes, and symbols in athletes' gestures. Video analysis further reveals the connotative meanings of body expressions. For instance, lifting the chin after scoring may symbolically indicate pride or dominance, whereas lowering the head may signify frustration or self-reflection. Such an approach provides deep insights into how the body conveys messages and how these messages are received in the social context of sports interactions (Streeck, Goodwin, & LeBaron, 2011).

In physical education and sports, the implications of semiotic studies on body language are extensive. Physical education not only emphasizes motor skills but also character development, communication, and self-expression. Goffman (1959), in The Presentation of Self in Everyday Life, explained that individuals perform like actors on a social stage. In this context, both athletes and students can be seen as actors conveying messages through bodily movements. Understanding performative meanings allows teachers to develop learning strategies that encourage reflection and students' awareness of their body expressions (Bourdieu, 1990; Hall, 1997).

Semiotic-based physical education also opens opportunities for developing students' communicative competence. Sebeok (2001) emphasized that signs underpin all human thought and communication. By understanding body language as a system of signs, students can become more sensitive to the meaning of others' movements and behaviors. This supports modern physical education goals, which highlight socio-emotional learning (Weinberg & Gould, 2019). Moreover, in athlete training, semiotic understanding enables coaches to create more effective and efficient nonverbal communication with their athletes (Koppett, 2013; Pease & Pease, 2004).

This study addresses these issues by exploring the forms and meanings of table tennis athletes' body language using a descriptive semiotic approach. The analysis focuses on identifying nonverbal signs during competitions and training and linking these signs to athletes' psychological and social aspects. This approach is expected to provide a deep understanding of the characteristic nonverbal communication patterns in table tennis and how their meanings can be adapted in physical education contexts.

The study also aims to strengthen the theoretical foundation for developing physical education learning models that are sensitive to body communication. Many teachers and coaches rely on instructive methods, whereas bodily interactions require sensitivity to students' nonverbal expressions (Lyle, 2002). By understanding body signals, educators can build more empathetic and communicative relationships. This research is expected to serve as a foundation for developing more humanistic and reflective physical education curricula that consider students' body language as expressions of identity and emotion.

Broadly, this study enriches sports science research through an interdisciplinary approach combining semiotics, psychology, and pedagogy. This approach aligns with the new paradigm of physical education, which positions learners as active subjects in the learning process rather than mere objects of physical exercise (Knapp & Hall, 2010). By understanding the body as a readable text, teachers can interpret students' movement dynamics as part of communication and meaning-making processes in physical education.

Theoretically, this research is expected to expand the scope of semiotics into physical education, which has traditionally been studied more in linguistics, communication, and cultural studies. Practically, the findings can guide coaches and teachers in interpreting athletes' and students' body language contextually, optimizing training and nonverbal communication-based learning.

Based on the above discussion, it can be concluded that this study holds high theoretical and practical relevance. The semiotic approach to table tennis athletes' body language is not only an effort to understand movement meanings but also a strategic step to enhance communication effectiveness in physical education and sports training. The objective of this research is to analyze the forms and meanings of table tennis athletes' body language from a semiotic perspective and examine its implications for physical education and sports. Accordingly, this study is expected to contribute to the development of a more reflective, communicative, and movement-meaning-oriented paradigm in physical education.

MATERIALS AND METHODS

This study employed a qualitative approach with a descriptive-analytical method to examine the meaning and function of table tennis athletes' body language from a semiotic perspective, as well as its relevance for the development of physical education and sports learning. A qualitative approach was chosen because it aligns with the research objective, which focuses on understanding meanings, symbols, and interpretations of body signs that emerge contextually during training sessions and competitions (Creswell & Poth, 2018; Miles, Huberman, & Saldaña, 2018). In other words, the study emphasizes the interpretative process of nonverbal phenomena in the field rather than quantitative measurement. The researcher acted as the primary instrument for observing, recording, and interpreting athletes' body language as a form of communication rich in symbolic meaning, representing psychological aspects of strategy, emotion, and self-identity.

The research was conducted within the Table Tennis Association of Purwakarta Regency (PTMSI Purwakarta), an institution responsible for regional athlete development and the site of regular

training and team selection. This location was selected due to the active athlete community, experienced coaches, and high interaction dynamics between players and coaches, which generate various forms of nonverbal communication and body language. The study was carried out over a three-month period, covering tournament preparation training sessions and internal competition activities. This timeframe enabled the researcher to gain a comprehensive understanding of how body language functions as a sign within the context of sports performance.

The study participants consisted of ten table tennis athletes from different categories (junior, intermediate, and senior), two coaches, and one PTMSI Purwakarta administrator, selected using purposive sampling, which involves choosing informants considered most knowledgeable about the phenomena under investigation (Sugiyono, 2022). The selected athletes were active team members with competitive experience at district and provincial levels. This criterion ensured that the collected data reflected a range of experiences in interpreting body language during training and competition. Coaches and organizational staff served as supporting informants, providing perspectives on the social, cultural, and psychological context behind athletes' expressions.

Data collection techniques included participant observation, in-depth interviews, and visual documentation. Participant observation was conducted by the researcher attending training sessions and match arenas to meticulously record athletes' gestures, facial expressions, posture, and adaptive movements during activities. Observations were supplemented with video and photo recordings to enable more detailed analysis of recurring or context-specific body signs. In addition to observation, in-depth semi-structured interviews were conducted to explore athletes' and coaches' understanding of the meaning behind specific movements or expressions. This approach aligns with Denzin and Lincoln (2018), who argue that qualitative interviews allow researchers to capture rich subjective perspectives on human experiences. Visual documentation, such as photos and video recordings, served as empirical evidence and as a means of data triangulation to strengthen the validity of semiotic interpretations (Pink, 2015).

The collected data were classified into primary and secondary data. Primary data were obtained from observations and interviews with athletes and coaches at PTMSI Purwakarta. Secondary data were drawn from literature, including scholarly journals, textbooks, and previous research reports on body language, nonverbal communication, and sports semiotics. The semiotic framework applied in the analysis referred to Charles Sanders Peirce's (1931) triadic model (representamen–object–interpretant) and Roland Barthes' (1972) denotation–connotation–myth model (Chandler, 2017; Danesi, 2020). These two theoretical frameworks assisted the researcher in categorizing the meanings of athletes' body signs, both those that are universal and those shaped by local sports culture.

The main instrument in this study was the researcher, acting as data collector, analyst, and interpreter. To support objectivity, the researcher also employed tools such as video cameras, audio recorders, field notes, and descriptive observation sheets. Additionally, a semiotic analysis sheet was used to map the types of signs (icon, index, symbol) and levels of meaning (denotative and connotative) for each observed movement. For example, shoulder tension and a sharp gaze before a serve could be interpreted as a mental readiness sign (icon), a competitive index (index), and a symbol of fighting spirit (symbol), all of which carry pedagogical implications for character development in physical education.

Data analysis was conducted interactively through three stages: data reduction, data display, and drawing conclusions (Miles, Huberman, & Saldaña, 2018). In the data reduction stage, the researcher selected and grouped observation and interview data into gestural, expressive, and symbolic categories. The data display stage involved constructing narrative descriptions that explained the meaning of each form of body language in the context of sports interaction. Finally, the conclusion drawing stage entailed interpreting the meaning of signs using Peirce's and Barthes' semiotic models and linking them to implications for communication strategies and physical education learning. This process also involved contextual reading, which aimed to understand body signs within the social and cultural relations of regional sports (Hall, 2013; Eco, 1986).

To ensure data validity and reliability, the study employed source and method triangulation. Source triangulation compared observation results with interviews from athletes and coaches, while method triangulation integrated observation, interviews, and visual documentation. Member checking was

conducted by confirming the interpretation results with informants, and peer debriefing with physical education academics provided scientific input on the accuracy of semiotic interpretations. Validity was further supported by the use of relevant and up-to-date literature to underpin data interpretation (Lincoln & Guba, 1985; Creswell, 2013).

Ethical considerations were strictly observed. Official permission was obtained from PTMSI Purwakarta administrators, and informed consent was secured from all participants. The identities of athletes and coaches were anonymized to protect their privacy and comfort throughout the research process. All data collection activities were conducted without disrupting training sessions or official competitions. Principles of social and sports research ethics were applied following Israel and Hay (2006), including respect for participants' rights, transparency of research objectives, and use of data solely for scientific purposes.

Overall, the research procedure consisted of four main stages: (1) preparation, including designing the study, obtaining permissions, and pilot testing instruments; (2) data collection, comprising field observation, in-depth interviews, and visual documentation; (3) semiotic analysis, entailing the identification and interpretation of body sign meanings based on Peirce's and Barthes' theories; and (4) reporting, focusing on presenting findings and their implications for physical education learning and character development through nonverbal communication.

With this methodological design, the study is expected to contribute scientifically to the field of physical education and sports, particularly by integrating semiotic understanding of body language as an educational communication strategy. The findings are anticipated to provide a conceptual foundation for coaches, teachers, and academics to utilize body language effectively in teaching and sports training, fostering more reflective, communicative, and character-oriented understanding among students and future athletes.

RESULTS AND DISCUSSION

This study involved ten table tennis athletes as research participants. Based on observations from match videos and field documentation, it was found that each athlete exhibited distinct body language patterns at different phases of the game. The data were classified into five main categories: readiness, aggressiveness, emotional control, social interaction, and post-match expression.

Frequency Visualization of Table Tennis Athletes' Body Language

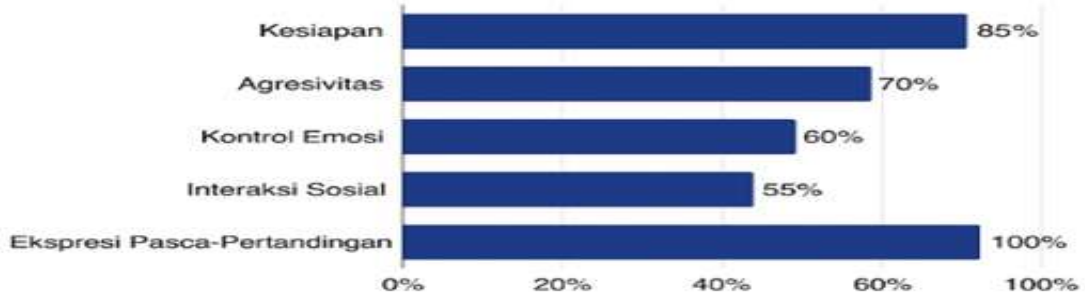


Figure 1. Visualization of Table Tennis Athletes' Body Language Frequency Based on Semiotic Meaning Categories

The figure above illustrates the percentage distribution of table tennis athletes' body language occurrences according to semiotic categories. Based on observations, the post-match expression category had the highest frequency (100%), followed by readiness (85%), aggressiveness (70%), emotional control (60%), and social interaction (55%).

The following table complements the visualization by presenting detailed dominant movement patterns and their interpreted meanings.

Table 1. Body Language Patterns of Table Tennis Athletes Based on Semiotic Meaning Categories

Semiotic Category	Dominant Movement Patterns	Interpreted Meaning
Readiness	Tightened shoulders, focused gaze, hand positioning	Mental preparation, anticipation of opponent's move
Aggressiveness	Forward-leaning posture, fast arm movement	Offensive strategy, competitive intensity
Emotional Control	Relaxed breathing, slow blink, posture adjustment	Maintaining composure, self-regulation
Social Interaction	Eye contact with coach, nods, gestures	Communication, support-seeking, team coordination
Post-Match Expression	Fist pumps, head lift, applause	Satisfaction, pride, acknowledgment of performance

In addition, the observations indicated that victory expressions, such as clenching fists and raising the paddle, appeared in 8 out of 10 athletes after scoring crucial points. Conversely, gestures of frustration, such as shaking the head and looking at the floor, were observed in 6 athletes when committing errors.

Overall, these results demonstrate that table tennis athletes' body language is systematic and can be interpreted as non-verbal signs reflecting psychological and emotional states, as well as social values within the sports context.

Discussion

The results of this study, as presented through the Frequency Visualization of Table Tennis Athletes' Body Language, illustrate five main indicators of athletes' non-verbal expressions: readiness (85%), aggressiveness (70%), emotional control (60%), social interaction (55%), and post-match expression (100%). The chart indicates that post-match expression is the most dominant form of body language among table tennis athletes, followed by pre-match readiness. This suggests that moments after matches provide the most expressive space for athletes to display emotions and attitudes, whether in the form of victory expressions or acceptance of defeat.

From a semiotic perspective, these findings indicate that table tennis athletes' body language is not merely mechanical movement but also a symbolic communication medium conveying social and psychological messages. The high percentage of readiness (85%) shows that athletes tend to display body language reflecting concentration and mental preparedness before matches. Movements such as bowing, taking deep breaths, or focusing on the ball function as icons of readiness and symbols of seriousness in facing opponents. Meanwhile, the aggressiveness aspect (70%) represents competitive drive and fighting spirit expressed through assertive gestures such as quick steps, upright posture, or powerful racket swings.

Conversely, lower scores in emotional control (60%) and social interaction (55%) indicate that not all athletes are able to maintain emotional stability or open communication with teammates and coaches during matches. In semiotic terms, body movements such as looking at the floor or sighing serve as indices of emotional pressure, reflecting frustration or mental fatigue. However, the dominance of post-match expressions (100%) shows that all athletes display open emotional communication after matches, such as shaking hands, smiling, or raising hands as a sign of respect. Such body language becomes a symbol of sportsmanship and ethics in sports, which has strong implications for physical education and athletes' moral development.

Analyzed through Charles Sanders Peirce's semiotic theory, each athlete's body expression can be understood through the three components of a sign: representamen, object, and interpretant. Bowing before service represents mental readiness and serves as an icon of high concentration. Clenching the fist after scoring a point becomes a symbol of achievement and a representation of motivation and self-confidence. Meanwhile, looking at the floor or shaking the head functions as an index of

emotional pressure, indicating frustration or disappointment. Thus, the athlete's body acts as a sign system that can be read and interpreted socially and pedagogically.

This study also supports Birdwhistell's (1970) non-verbal communication theory, which states that more than 60–70% of human communication occurs without words, through gestures and body expressions. In sports, Knapp and Hall (2010) emphasize that athletes' body language reflects structured emotional and psychological communication patterns. This study demonstrates that this phenomenon also applies in table tennis, where body language serves as a primary medium to convey motivation, strategy, and respect for opponents.

Theoretically, the findings align with Roland Barthes' (1977) perspective that sports are a "social text" full of signs and cultural meaning. Athletes' body movements are not merely technical actions to win matches but also carry values of sportsmanship, discipline, empathy, and self-control. Therefore, these findings have important implications for physical education, emphasizing the need for coaches and educators to understand athletes' body language as part of character and psychological development.

Overall, integrating empirical data (percentage values of each category) and semiotic theory demonstrates that body language is a form of symbolic communication connecting psychological, social, and pedagogical aspects in sports. Understanding these non-verbal signs can help coaches interpret athletes' mental states, strengthen training strategies, and instill ethical values in physical education.

CONCLUSION

This study demonstrates that table tennis athletes' body language constitutes a non-verbal communication system rich in meaning and functions as a symbolic sign reflecting psychological, social, and sportsmanship values in match contexts. Through semiotic analysis, it was found that each body movement—from pre-match readiness, in-game aggressiveness, emotional control, to post-match expression—contains messages that can be interpreted as representations of motivation, strategy, and personal character.

The study data show that post-match expression has the highest frequency (100%), followed by readiness (85%), aggressiveness (70%), emotional control (60%), and social interaction (55%). These findings indicate that post-match moments serve as the most expressive space for athletes to demonstrate sportsmanship and respect for opponents, while readiness and aggressiveness reflect focus intensity and competitive spirit during play.

Theoretically, the results reinforce the views of Peirce, Barthes, and Birdwhistell that the body is a social text that can be read through non-verbal signs. Table tennis athletes' body language functions as a semiotic code that not only reflects physical performance but also conveys moral and emotional messages important for physical education.

Thus, this study emphasizes that the athlete's body is not merely a movement instrument but a medium for value-based communication. Understanding body language can be utilized by physical education teachers, coaches, and researchers to enhance expression-based learning, strengthen character development, and develop more empathetic and reflective pedagogical approaches in sports..

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REFERENCES

Anshel, M. H. (2012). Sport Psychology: From Theory to Practice. Champaign: Human Kinetics.

Barthes, R. (1977). Image, Music, Text. London: Fontana Press.

Birdwhistell, R. L. (1970). Kinesics and Context: Essays on Body Motion Communication. Philadelphia: University of Pennsylvania Press.

Bourdieu, P. (1990). The Logic of Practice. Stanford: Stanford University Press.

Chandler, D. (2017). Semiotics: The Basics. London: Routledge.
Creswell, J. W. (2013). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Los Angeles: SAGE Publications.
Creswell, J. W., & Poth, C. N. (2018). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Los Angeles: SAGE Publications.
Danesi, M. (2020). The Semiotics of Emoji: The Rise of Visual Language in the Age of the Internet. London: Bloomsbury Academic. https://doi.org/10.1017/S0047404517000434
Denzin, N. K., & Lincoln, Y. S. (2018). The SAGE Handbook of Qualitative Research. Los Angeles: SAGE Publications.
Eco, U. (1986). Semiotics and the Philosophy of Language. Bloomington: Indiana University Press.
Ekman, P., & Friesen, W. V. (1969). The Repertoire of Nonverbal Behavior: Categories, Origins, Usage, and Coding. Semiotica, 1(1), 49–98. https://doi.org/10.1515/semi.1969.1.1.49
Goffman, E. (1959). The Presentation of Self in Everyday Life. New York: Doubleday.
Hall, E. T. (1997). The Hidden Dimension. New York: Anchor Books.
Hall, S. (2013). Representation: Cultural Representations and Signifying Practices. London: SAGE Publications.
Hodge, R., & Kress, G. (1988). Social Semiotics. Cambridge: Polity Press.
Israel, M., & Hay, I. (2006). Research Ethics for Social Scientists. London: SAGE Publications.
Knapp, M. L., & Hall, J. A. (2010). Nonverbal Communication in Human Interaction. Boston: Wadsworth Cengage Learning.
Koppett, K. (2013). Sports Coaching: Professionalisation and Practice. London: Routledge.
Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic Inquiry. Beverly Hills: SAGE Publications.
Lyle, J. (2002). Sports Coaching Concepts: A Framework for Coaches' Behaviour. London: Routledge.
Martens, R. (2012). Successful Coaching. Champaign: Human Kinetics.
Miles, M. B., Huberman, A. M., & Saldaña, J. (2018). Qualitative Data Analysis: A Methods Sourcebook. Thousand Oaks: SAGE Publications. https://doi.org/10.1177/239700221402800402
Müller, S., Hommel, B., & Prinz, W. (2017). The Role of Action Observation in Sport Performance. Berlin: Springer.
Pease, A., & Pease, B. (2004). The Definitive Book of Body Language. London: Orion.
Pink, S. (2015). Doing Visual Ethnography. London: SAGE Publications.
Rizzolatti, G., & Sinigaglia, C. (2008). Mirrors in the Brain: How Our Minds Share Actions and Emotions. Oxford: Oxford University Press.
Streeck, J., Goodwin, C., & LeBaron, C. (2011). Embodied Interaction: Language and Body in the Material World. Cambridge: Cambridge University Press.
Weinberg, R., & Gould, D. (2019). Foundations of Sport and Exercise Psychology. Champaign: Human Kinetics.
Zarrilli, P. B. (2009). Psychology of Motor Learning in Physical Education. New Delhi: Concept Publishing Company.
Sugiyono. (2022). Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.