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Multiple Intelligence in the Teaching and Learning Process: A Study of Howard Gardner's Thought, Challenges and Opportunities

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Abstract. *This study explores how the theory of Multiple Intelligence proposed by Howard Gardner can be effectively integrated into the teaching and learning process and the challenges faced in its implementation in various educational contexts. This study analyzes existing literature through a literature review approach to find common patterns, research gaps, and best practices in applying Multiple intelligence theory in the classroom. The literature analyzed includes journal articles, academic books, and research reports focusing on teachers' understanding of multiple intelligences, learning methods based on dual Intelligence, student responses, applying these methods, and varied and inclusive assessment systems. The study results show that although the theory of multiple intelligences has been widely recognized in education, its application still faces various challenges. Teachers' understanding of this theory is often limited, and many have been unable to adapt teaching methods to accommodate students' diverse intelligences optimally. In addition, more infrastructure and resources in schools are also needed to support kinesthetic, musical, and visual-spatial Intelligence. Nonetheless, previous research has shown that students respond positively when the learning methods used match their dominant Intelligence, which can improve their motivation, engagement, and learning outcomes. This literature review concludes that a more varied and inclusive learning approach must accommodate all student intelligences. In addition, Assessment and evaluation in education must be more flexible, considering non-cognitive intelligences that have been ignored in standardized tests. This study recommends increasing teacher training, providing supporting infrastructure, and developing a curriculum more adaptive to the diversity of students' Intelligence. The results of this study make an essential contribution to enriching the understanding of applying the theory of multiple intelligences and offering solutions to the challenges faced in modern education.*

Keywords *Multiple Intelligence, Teaching and Learning Process, Challenges, Opportunities*

1. INTRODUCTION

Modern education continues to undergo changes and developments along with the increasing understanding of the diversity of students' learning methods and their various intelligences. For many years, traditional education systems have focused on logical-mathematical and verbal-linguistic Intelligence as the primary measure of academic success. However, this approach ignores other intelligences students possess, such as visual-spatial, kinesthetic, musical, interpersonal, intrapersonal, and naturalistic Intelligence. Howard Gardner, in his theory known as the Multiple Intelligences Theory, argued that human Intelligence is more than just intellectual abilities measured by standardized tests; each individual has a variety of intelligences that function differently (H. Gardner, 1993).

Gardner's theory of multiple intelligences, introduced in 1983, became revolutionary in education because it views Intelligence as something plural, not single (H. Gardner, 2013). Gardner identified eight types of Intelligence, which include verbal-linguistic, logical-mathematical, visual-spatial, kinesthetic, musical, interpersonal, intrapersonal, and naturalistic Intelligence (H. Gardner, 1995). Each of these intelligences is considered equally important in

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the learning process and the development of the individual (Davis et al., 2011). This theory recognizes the diversity of students' learning styles and emphasizes adapting the teaching and learning process to cover this entire spectrum of Intelligence (Afini et al., 2023).

In the context of classroom education, integrating the theory of multiple intelligences requires a fundamental change in teaching methods. (Purwanto, 2023) explained that teachers need to understand that not all students learn the same way and that a more varied approach to teaching methods is required to accommodate students' diverse intelligences. Teachers' understanding of this theory is fundamental because teachers are the main actors in designing and implementing teaching methods to accommodate different intelligences in the classroom (Armstrong, 2000). However, research shows that teachers' understanding of the theory of dual Intelligence still needs to be revised. Many teachers know the basics of this theory, but only some understand how to implement it effectively in daily learning (Cavas & Cavas, 2020). This is exacerbated by limited infrastructure and resources that are often the main obstacles in supporting the implementation of dual Intelligence. Some intelligences, such as kinesthetics and musicals, require special physical facilities, such as musical instruments or motion spaces, which are often only available in some schools (Chen, 2004).

Another challenge is the application of various learning methods that are suitable for multiple intelligences. (Visser et al., 2006) explained that teachers who successfully applied varied learning methods reported increased student engagement because students were more motivated when they were invited to learn in a way that matched their dominant Intelligence. For example, students with kinesthetic Intelligence tend to be more active in physical activity, while students with visual-spatial Intelligence prefer tasks that involve drawing or visualization. Nonetheless, applying this method is not always easy due to time constraints and the pressure to complete a curriculum focusing more on traditional cognitive Intelligence (Harapan et al., 2024).

Students' response to applying dual Intelligence in the teaching and learning process is also very positive. When the teaching method is adapted to their dominant Intelligence, students show increased motivation, engagement, and comprehension of the material (Fudiyah & Harapan, 2021). However, there are challenges in balancing teaching methods to accommodate all the intelligences in a heterogeneous classroom. Students with specific intelligences can feel left behind if the learning method focuses more on other intelligences (Fransiska et al., 2020). Therefore, teachers must create a balanced learning environment where all students' intelligences can be accommodated.

Finally, in applying the theory of multiple intelligences, Assessment, and evaluation must reflect the diversity of intelligence students possess. (Bashir et al., 2008) explain that traditional assessments focusing on written tests and exams cannot comprehensively measure students' abilities beyond verbal-linguistic and logical-mathematical Intelligence. More varied assessment methods, such as portfolios, projects, practical assessments, and observations, must be developed to assess other intelligences, such as kinesthetic, musical, or interpersonal (Iivari & Iivari, 2011; Jackson, 2008). However, the implementation of dual intelligence-based Assessment requires more in-depth time, resources, and training for teacher.

This research is expected to contribute to developing a more inclusive and diverse education. For educators, the results of this research can provide new insights on how to adapt teaching methods based on the dominant Intelligence of diverse students. In addition, this research can also be a reference for education policymakers to improve the curriculum, infrastructure, and teacher training so that applying the theory of multiple intelligences can be carried out more effectively in various schools. Practically, this research can improve the quality of learning, where every student has an equal opportunity to develop according to their intelligence potential. The results of this study are also expected to pave the way for creating a more comprehensive assessment and evaluation system, which can measure students' abilities more equitably and holistically, reflecting their diverse intelligences.

2. LITERATURE REVIEW

Multiple Intelligence

Howard Gardner, a psychologist from Harvard University, proposed the Multiple Intelligences or Multiple Intelligences Theory in 1983 in his book *Frames of Mind*. This theory challenges the traditional view of Intelligence, which is only measured through logical-mathematical and verbal-linguistic abilities, as commonly used in IQ tests. Gardner argues that human Intelligence is not limited to these two aspects but consists of diverse Intelligence that can develop over time (H. et al., 2008).

Gardner's theory of multiple intelligences identifies eight main intelligences each individual possesses to varying degrees (Sternberg, 1994). Each of these intelligences has distinctive traits that reflect how individuals process information, solve problems, and interact with their surroundings. Here is an explanation of the eight intelligences proposed by Gardner:

1) Verbal-Linguistic Intelligence (H. Gardner, 1993)

   This Intelligence is related to a person's ability to use oral and written language to convey ideas or understand information. People with this Intelligence tend to be skilled in reading, writing, debating, speaking, and learning through words.

   - Examples of Professions: Writer, poet, journalist, lawyer, and teacher.

2) Logic-Mathematical Intelligence (H. Gardner, 2013)

   This Intelligence involves thinking logically, solving problems analytically, and understanding mathematical concepts. A person with logical-mathematical Intelligence tends to be good at arithmetic, deductive thinking, and recognizing patterns and logical relationships between various things.

   - Examples of Professions: Scientists, engineers, accountants, mathematicians, and programmers.

3) Visual-Spatial Intelligence (H. Gardner, 1995)

   Visual-spatial Intelligence is related to the ability to think in the form of images, patterns, or three-dimensional visualizations. A person with this Intelligence understands space, shape, and visual orientation.

   - Professions include architect, graphic designer, artist, photographer, and navigator.

4) Kinesthetic-Physical Intelligence (H. Gardner, 2004)

   This Intelligence is related to the ability to use the body or physical movements to express ideas or skills. People with kinesthetic-physical Intelligence excel in physical activities like sports, dance, or crafts.

   - Professions include athletes, dancers, actors, surgeons, and mechanics.

5) Musical Intelligence (H. Gardner, 1995)

   Musical Intelligence relates to rhythm, melody, tone, and sound sensitivity. Individuals with this Intelligence are good at creating, playing, or appreciating music.

   - Examples of Professions are musicians, composers, singers, and conductors.

6) Interpersonal Intelligence (H. et al., 2000)

   Interpersonal Intelligence involves the ability to understand and interact with others effectively. People with this Intelligence excel at understanding others' feelings, motivations, and desires and building good social relationships.

   - Professions include teacher, counselor, manager, social worker, and negotiator.

7) Intrapersonal Intelligence (H. Gardner, 1993)

Intrapersonal Intelligence is the ability to understand oneself, including feelings, thoughts, and goals. People with this Intelligence tend to be reflective and able to regulate their emotions and motivations.

- Examples of Professions: Philosopher, Psychologist, Author, and Spiritual Leader.

8) Naturalistic Intelligence (H. et al., 2008)

Naturalistic Intelligence is related to recognizing, classifying, and understanding nature and the living things around it. Individuals with this Intelligence are usually interested in the environment, animals, plants, and natural phenomena.

- Professions include biologists, farmers, environmentalists, botanists, and climbers.

Ninth Intelligence (Additional Possibility): (H. Gardner, 1993) added Existential Intelligence. Gardner also mentioned the possibility of an additional intelligence called existential Intelligence, which includes the ability to think about and reflect on the big questions about the meaning of life, death, and human existence. However, this Intelligence is still under further study and has not been officially added to the intelligence list recognized by Gardner.

The theory of multiple intelligences opens up new horizons in understanding human potential (Clinchy, 1984; Phillips, 2010). By valuing intellectual diversity, this theory provides a foundation for a more inclusive and adaptive education. Each individual has a unique combination of Intelligence, and understanding and supporting that Intelligence is critical to optimizing everyone's learning and development potential.

1. Teaching and Learning Process

The teaching and learning process linked to Howard Gardner's Multiple Intelligences Theory emphasizes the importance of understanding that every student has diverse intelligences. Therefore, the learning process must be flexible and varied. Each individual has a unique combination of Intelligence, and how they learn and demonstrate their understanding is also different. The teaching and learning process integrated with multiple intelligence theory involves using various adaptive and varied teaching methods to accommodate each student's unique strengths (Bornstein, 1986). By adopting a flexible approach, using authentic assessments, and creating an inclusive learning environment, teachers can provide more significant opportunities for all students to thrive and succeed (Eisner, 1994; Fithian, 2002). This theory helps build an educational approach that values differences so that each student can learn in a way that suits their intelligence potential.

3. METHODS

This research aims to find practical strategy steps to integrate the theory of multiple intelligences in education, identify obstacles, and design more inclusive learning and assessment methods. The research conducted an in-depth literature review on the theory of multiple intelligences, previous related studies, and learning methods used in various educational contexts. This literature includes books, journal articles, and relevant research reports (Aisyah et al., 2024). A literature review that identifies research gaps and theories that support the development of a research framework. In addition, researchers use scientific databases such as Google Scholar, JSTOR, Scopus, and ScienceDirect to access relevant literature. The literature to be reviewed consists of various sources that provide theoretical and empirical insights into applying dual Intelligence in education.

The researcher conducts a critical analysis of the literature that has been collected. The focus is on understanding how the theory of multiple intelligences has been applied in various contexts, both globally and in local settings. The literature is analyzed at this stage to find common patterns, research gaps, and gaps in applying dual intelligence-based teaching methods. Structured literature reviews, categorizing findings based on themes such as teacher understanding, teaching methods, student responses, and assessments. Identify strengths, weaknesses, and gaps in previous research that make room for new contributions.

Then, synthesizing and preparing the theoretical framework, the researcher synthesizes from the literature reviewed to build the theoretical framework that underlies the research. This approach allows researchers to develop a conceptual framework based on the findings of the literature, as well as identify various factors that support or hinder the application of dual Intelligence. A theoretical framework that explains how dual Intelligence can be integrated into teaching and learning, with relevant literature references. The framework includes findings on the method's effectiveness, challenges, and recommendations from previous research.

The researcher discusses the literature review results by highlighting general trends, significant findings, and gaps in previous research. This discussion includes an analysis of how different approaches to the theory of multiple intelligences succeed or fail to be applied in education and the implications of these findings. A complete discussion of the application of dual Intelligence based on the literature, including recommendations from previous research and identification of the most effective strategies in the teaching and learning process. Finally, the researcher prepares a structured report on the results of the literature review. This report

includes an introduction, literature review, study results, theoretical synthesis, discussion, conclusions, and recommendations. A complete literature review report ready to be published in an academic journal or used as a reference for educational practitioners who want to implement the theory of multiple intelligences.

4. RESULTS

This study finds that integrating dual Intelligence in the teaching and learning process offers many opportunities to improve the quality of learning. However, several challenges need to be addressed, including teacher training, limited resources, and adjustments to assessment methods. By overcoming these challenges, applying the theory of multiple intelligences can create a more inclusive educational environment and support the development of various student potentials. The full results of the study are contained below:

1. Teacher's Understanding of the Multiple Intelligence Theory

The theory of multiple intelligences, introduced by Howard Gardner in 1983 through his book *Frames of Mind: The Theory of Multiple Intelligences*, has become one of the revolutionary frameworks of thinking in education. Gardner argued that Intelligence is not limited to traditional cognitive abilities such as logical-mathematical and verbal-linguistic abilities but includes different types of Intelligence that reflect the diversity of human potential. These intelligences include logical-mathematical, verbal-linguistic, visual-spatial, kinesthetic, musical, interpersonal, intrapersonal, and naturalistic Intelligence. In implementing education in schools, teachers' understanding of the theory of multiple intelligences plays a crucial role. Teachers with a good knowledge of this theory can adopt more diverse and individualistic teaching approaches according to the needs and potential of each student. However, research shows that teachers' knowledge of the theory of multiple intelligences still varies widely.

Based on the research results, most teachers have a basic knowledge of the theory of multiple intelligences and can identify some of the critical intelligences proposed by Gardner. They understand that every student has different potential and that only some students learn the same way. Teachers can often recognize logical-mathematical and verbal-linguistic Intelligence, as these two intelligences are the most commonly measured in the traditional education system. However, some teachers usually do not fully understand other intelligences, such as visual-sonly partiallyusical, and kinesthetic,

For example, teachers in specific subject areas, such as mathematics or languages, tend to focus more on Intelligence that corresponds to the material they teach. As a result, they may need to fully consider the importance of accommodating students with other intelligences, such

as students who are more robust in kinesthetic Intelligence (learning through physical movement) or musical Intelligence (learning through rhythm and melody).

In addition to limited theoretical understanding, teachers often need help applying this theory practically in the classroom. Although they may understand the concept of multiple intelligences, many teachers report difficulties in designing learning strategies that genuinely accommodate all types of intelligences (Chatman & O'Reilly, 2016). This is especially the case because most teachers still need adequate training in designing curricula or lesson plans based on the theory of multiple intelligences (Noom-Ura, 2013; Rudibyani, 2019). Teachers also often feel pressured by the demands of a standard curriculum that typically emphasizes traditional academic outcomes, such as written test scores, which need more space to explore other intelligences beyond logic-mathematics and verbal-linguistics.

Applying dual Intelligence in the teaching and learning process demands an individualistic approach. Teachers must recognize each student's dominant Intelligence and adjust their teaching methods. However, research shows that many teachers need help, mainly due to the high student-teacher ratio. In a classroom with many students, teachers find it difficult to give enough individual attention to each student, so applying a dual intelligence-based approach is limited.

In addition, the limited time teachers have to design learning activities that include different types of Intelligence is a significant challenge. (Yuliana et al., 2024) Teachers often feel that they have to structure lessons that target specific outcomes that can be measured with standardized tests, which usually only accommodate a few intelligences, such as verbal linguistics and logic math.

Despite the various challenges, teachers are generally aware of the importance of the theory of multiple intelligences and the great potential this approach has for creating a more inclusive and varied learning environment. Some teachers who have attended training or professional development programs focused on multiple intelligence theory reported improved skills in developing more diverse and relevant lesson plans for students with multiple intelligences.

Teachers more experienced in applying the theory of multiple intelligences show better results in identifying students' dominant intelligences and adjusting more varied teaching materials. However, many teachers still need intensive training to improve the effectiveness of applying this theory in daily learning.

Challenge: Lack of practical training and guidance for teachers on effectively applying this theory in the classroom.

Opportunities: By providing ongoing training, teachers' understanding of this theory can be improved, resulting in more effective integration into the teaching and learning process.

2. Limited Infrastructure and Resources

Limited infrastructure and resources are one of the main obstacles to implementing the theory of dual Intelligence in the teaching and learning process. Inadequate facilities, lack of supporting technology, inflexible classrooms, high student-teacher ratios, and rigorous curriculum demands contribute to implementing dual Intelligence. Although this theory offers a more inclusive approach to learning, with adequate infrastructure and resource support, its application will be more accessible and have maximum impact. Therefore, efforts are needed to improve educational infrastructure, provide adequate teacher training, and revise the curriculum to be more adaptive to diverse intelligences so that all students can learn and develop according to their unique potential.

In this case, there are many advantages in educational theory and practice; its implementation in the field needs to be improved by more infrastructure and resources. This challenge affects how the theory of multiple intelligences is applied in schools' teaching and learning process, especially in providing sufficient support for students with diverse intelligences. The limitations are as follows:

1) Limited Facilities to Support Kinesthetic and Musical Intelligence

Kinesthetic and musical Intelligence require unique spaces and facilities so that students with this Intelligence can fully develop their potential. Kinesthetic Intelligence, for example, demands physical activities such as sports, dance, or drama that require open spaces or sports facilities. Meanwhile, musical Intelligence requires instruments and spaces specifically designed to support music-based activities. These facilities are often minimal or non-existent in many schools, especially in underdeveloped areas. Classrooms are generally intended for traditional learning, with static desks and chairs, making it difficult for students with kinesthetic Intelligence to move freely and learn through physical activity. The same goes for students with musical Intelligence; they cannot express their full musical potential without access to appropriate instruments or practice spaces. This limitation implies that students with kinesthetic and musical Intelligence often feel isolated and poorly accommodated in the learning process. Without adequate infrastructure support, these intelligences are frequently overlooked, even though they have great potential to be developed and applied in learning.

2) Limitations of Technology to Support Visual-Spatial Intelligence

Visual-spatial Intelligence emphasizes the ability to think in images, shapes, and spaces, so students with this Intelligence tend to understand the material through visualizations, diagrams, maps, and pictures. However, in many schools, especially those with budget constraints, access to technologies that support visual-spatial learning, such as computers, graphic design software, projectors, or visual-based teaching materials, is often only available. Modern technology, such as 3D applications, simulations, or graphic design software, can provide an excellent opportunity for visual-spatial students to learn more effectively and interactively. However, technological limitations in many schools force visual-spatial students to adapt to more text-based learning methods or verbal lectures that are less suitable for their learning style. As a result, students with visual-spatial Intelligence often have difficulty understanding abstract concepts without adequate visual support, negatively impacting their motivation and academic achievement.

3) Lack of Interactive Classrooms for Interpersonal and Intrapersonal Intelligence

The theory of multiple intelligences also emphasizes the importance of interpersonal and intrapersonal Intelligence. Interpersonal Intelligence involves the ability to interact with others effectively, while intrapersonal Intelligence is concerned with understanding oneself, emotions, motivation, and reflection. However, most traditional classrooms are designed for lecture-based and individualized learning, which does not provide many opportunities for students to engage in social interaction or self-reflection. The lack of classrooms designed for group work, discussions, or reflective activities causes students with interpersonal and intrapersonal Intelligence to feel less accommodated. Learning activities based on group discussions, teamwork, or personal reflection that should be able to develop this Intelligence are often hampered by static and inflexible classroom layouts. Collaborative learning methods can be very beneficial for students with interpersonal Intelligence. At the same time, an environment that supports self-reflection and personal exploration is vital for developing intrapersonal Intelligence.

4) High Student-Teacher Ratio and Time Constraints

The high student-teacher ratio is a significant obstacle in implementing the dual intelligence theory. Teachers who manage classes with many students often need more time to give individual attention to each student and identify and respond to needs based on their dominant Intelligence. In the context of dual Intelligence, the teaching and learning process should ideally be adjusted to the needs and Intelligence of each student. However, with large classes, teachers often have to use more uniform teaching methods, which tend to overlook the variation

in Intelligence among students. Time constraints also make it difficult for teachers to design varied lessons, as the demands of the standard curriculum often force them to focus on delivering material quickly and efficiently. Consequently, students with Intelligence beyond logical-mathematical or verbal-linguistic Intelligence tend not to get enough attention, which can negatively impact their motivation and achievement.

5) Demands for a Rigorous Standard Curriculum

Many countries' curricula emphasize mastery of traditional cognitive Intelligence, such as logic-mathematics and verbal-linguistics, measured through written exams or standardized tests. This forces teachers to prioritize materials that support these intelligences, while other intelligences, such as musical, kinesthetic, or naturalistic, are given less space in learning. In this context, teachers often feel limited by the demands of the curriculum to achieve specific academic targets that do not reflect the entire spectrum of Intelligence that students have. As a result, opportunities for students to develop their other intelligences through creative activities or personal exploration are minimal.

Challenge: More tools and technologies are needed to support different intelligence-based learning activities, such as a music room for musical Intelligence or a large field for kinesthetic Intelligence.

Opportunity: Digital technologies and platforms like multimedia-based educational apps can help overcome physical infrastructure limitations.

3. Application of Various Learning Methods

Applying various learning methods in the theory of multiple intelligences is the key to creating an inclusive and practical learning experience. By accommodating students' wide range of intelligences, teachers can ensure that each student can learn in a way that suits their unique strengths. Varied learning methods increase student engagement and help them understand and remember information better, ultimately improving overall learning outcomes. The challenge for teachers is how to integrate these methods effectively within the constraints of available time and resources. However, the positive impact of these diverse approaches is significant in supporting the holistic development of student's potential.

In traditional educational practices, teaching methods focus on verbal-linguistic and logical-mathematical Intelligence, as these two intelligences are often considered critical indicators of academic success. Lecture-based, reading, and writing-based learning dominates the classroom, while other intelligences, such as kinesthetic or musical, are less accommodating. However, the theory of multiple intelligences offers a more inclusive framework of thinking, where each Intelligence is considered essential and requires a different

teaching method. Applying various learning methods aims to ensure that each student, with different dominant intelligences, can be actively involved in the learning process and understand the material effectively. For example, students with visual-spatial Intelligence may learn better through images, diagrams, or videos. In contrast, students with kinesthetic Intelligence are more effective at learning through movement, physical activity, or object manipulation. By combining these methods, teachers can create a richer and more varied learning environment that does not just focus on one or two types of Intelligence.

The following teaching methods can be developed and used in several learning domains;

1) Learning Methods for Verbal-Linguistic Intelligence

Students with verbal-linguistic Intelligence tend to excel in reading, writing, and speaking. They can easily understand the concepts conveyed through words and texts. Therefore, teaching methods suitable for students with this Intelligence include:

- Lecture: Detailed and structured oral explanations are practical for students with verbal-linguistic Intelligence.
- Class Discussions: Engaging students in discussions that provoke the use of language will increase their understanding and engagement.
- Reading and Writing: Assigning a text reading assignment or writing an essay will help these students understand and remember information better.

2) Learning Methods for Logic-Mathematical Intelligence

Students with logical-mathematical Intelligence are highly skilled in thinking analytically and solving problems logically. They are interested in patterns, relationships, and abstractions. Teaching methods suitable for them include:

- Problem Solving: Provide logic challenges or math problems that require analytical thinking.
- Scientific Experiments: These students tend to favor an experiment-based approach that allows them to find answers through a logical process.
- Diagrams and Graphs: Visualizations like flowcharts or statistical graphs can help them understand more complex concepts.

3) Learning Methods for Visual-Spatial Intelligence

Students with visual-spatial Intelligence think through images and visualizations. They learn best when they can see or visualize information. Suitable learning methods include:

- Use of Images and Videos: Clarify the concept using illustrations, diagrams, concept maps, or videos.

- Creative Projects: These students will be very interested in assignments involving art, graphic design, or visual presentations.
- Mind Mapping: The mind mapping technique allows students to visual-spatially visualize the relationships between concepts.

4) Learning Methods for Kinesthetic Intelligence

Students with kinesthetic Intelligence prefer to learn through movement and physical experience. They tend to be more engaged in learning when they can actively participate. Suitable teaching methods include:

- Project-Based Learning: Provide projects that allow students to work practically, for example, in science experiments or model building.
- Role-Playing: Simulated scenarios or role-playing helps kinesthetic students learn through action and interaction.
- Physical Activity: Integrating physical movement into the learning process, such as educational games that involve movement, can improve this student's comprehension.

5) Learning Methods for Musical Intelligence

Students with musical Intelligence are sensitive to sound, rhythm, and melody. They learn better through activities that involve music or sound patterns. Learning methods that can be used include:

- Use of Music in Learning: Use songs or rhythms to teach concepts, such as simple songs to memorize information.
- Singing or Playing a Musical Instrument: Students can develop their Intelligence through learning musical instruments or making music.
- Rhythm and Pattern: Provide tasks that involve recognizing sound patterns, such as creating relevant lyrics or rhythms to the subject matter.

Challenge: Teachers need more time to design lesson plans that can include all types of Intelligence. Time constraints and curriculum pressures often hinder overall implementation.

Opportunity: If teachers can take advantage of blended learning approaches, they can more easily develop lesson plans that involve multiple methods to accommodate diverse intelligences.

4. Student Response to Dual Intelligence

Overall, the student's response to applying the theory of multiple intelligences in the teaching and learning process was very positive, significantly when the learning method was

adjusted to their dominant Intelligence. Increased engagement, motivation, understanding, independence, creativity, and confidence are some of the positive impacts of this approach. However, the challenge of accommodating all intelligences in a balanced manner remains, and teachers must have the skills and flexibility to design a learning environment that supports the development of all students' potential. With proper application, the theory of multiple intelligences can create a more inclusive learning experience where every student feels valued and supported in the way they learn. Ultimately, this approach helps create a more diverse and dynamic classroom where all student intelligences are fully empowered.

Students' responses to applying the theory of multiple intelligences vary depending on how the teaching method is adapted to meet the needs of these diverse intelligences. In general, when learning methods are designed according to students' Intelligence, they increase their motivation, engagement, and academic outcomes. Here are some main findings regarding student responses to applying dual intelligence theory in learning.

1) Higher Engagement and Motivation

Students show increased engagement and motivation when they feel that the teaching methods correspond to their dominant Intelligence. For example, students with kinesthetic Intelligence feel more engaged when learning activities involve physical movements, such as role-playing or practical experiments. In contrast, students with visual-spatial Intelligence are more enthusiastic when learning through images, diagrams, or videos. Research shows that when students are exposed to teaching methods that fit their knowledge, they become more passionate about learning. It also boosts their self-confidence, as they feel recognized and valued in the way they learn. This higher engagement directly impacts improved academic achievement**,** as students tend to be more focused and motivated to complete tasks that match their strengths.

2) Increased Understanding and Retention of Materials

The students' responses also showed increased understanding and retention of the material when the learning method was adjusted to their Intelligence. For example, students with logic-mathematical Intelligence have an easier understanding of abstract concepts when given logic or complex math problems. In comparison, students with musical Intelligence have an easier time memorizing information through songs or rhythms. Students with intrapersonal Intelligence, who prefer to learn through self-reflection and a deep understanding of their emotions and motivations, also respond positively when given time to reflect or keep a personal

journal as part of the learning process. Adapting learning methods that suit this learning style helps students internalize and retain information in the long term.

3) Development of a Sense of Independence and Responsibility

One of the most significant responses from students to the application of dual Intelligence is an increased sense of independence and responsibility in the learning process. When students are allowed to learn in a way that suits them best, they tend to feel more responsible for their learning process. Students with intrapersonal Intelligence, for example, become more reflective and independent in evaluating their progress. Students with interpersonal Intelligence who learn through social interaction also improve teamwork and collaboration skills. In classes that apply the theory of multiple intelligences, these students are more motivated to cooperate with their peers, develop communication skills, and build strong interpersonal relationships. This not only improves their academic outcomes but also their social and emotional skills.

4) Challenges for Students with Different Intelligences

Although many students respond positively to applying the theory of multiple intelligences, some students with specific intelligences need help when their learning methods need to match their learning styles. For example, students with verbal-linguistic Intelligence may feel less engaged when teaching methods focus more on kinesthetic or visual activities, which require physical movement or images, and use less text or words. In this situation, teachers need to provide a variety of learning methods that involve a variety of intelligences so that all students can feel accommodated. This challenge emphasizes the importance of flexibility in learning design, allowing each student to engage in a way that suits their strengths. Teachers must be able to recognize students' dominant Intelligence and design learning activities that include a variety of approaches to ensure that no student feels left behind.

5) Improves Social and Teamwork Skills

Students with interpersonal Intelligence, who excel in social interactions, respond very positively when given a group assignment or collaborative project. They feel more comfortable and motivated in an environment where they can collaborate with their friends and discuss and solve problems collectively. Classes encouraging cooperation and social interaction can be an ideal place for students with interpersonal Intelligence to thrive. In contrast, students with intrapersonal Intelligence, who prefer to work alone and reflectively, may feel depressed in group situations. Therefore, teachers need to balance group and individual tasks so that students with interpersonal and intrapersonal Intelligence can feel comfortable and thrive in a learning environment that supports them.

6) Increases Creativity and Self-Expression

Students' responses to applying the theory of multiple intelligences also include increased creativity and self-expression skills. For example, students with visual-spatial or musical Intelligence feel more free to express themselves through artwork, music, or visual media when the learning methods allow them to be creative. This increased freedom helps students feel more engaged and will enable them to develop innovative skills that may not be accommodated in traditional learning approaches**.** Students with naturalistic Intelligence interested in nature and the environment also respond positively to learning methods involving nature observation or environment-based projects. By tapping into their interest in the natural world, these students can demonstrate a better understanding of scientific and ecological concepts through direct engagement with nature.

Challenges: Students with certain dominant intelligences tend to dominate the teaching methods, so other groups of students do not get enough attention.

Opportunities: Integrating dual Intelligence can provide teachers with opportunities to create a more inclusive learning environment by varying activities so that every student feels accommodated.

5. Assessment and Evaluation

Assessments focusing on dual Intelligence have resulted in a more comprehensive measurement of students' abilities. For example, students with kinesthetic Intelligence who previously had difficulty in written assessments performed better in practical assessments.

Assessment and evaluation in the context of dual intelligence theory must be varied, flexible, and holistic. Assessment methods that include various forms such as projects, practical assessments, observations, and portfolios provide a more comprehensive picture of the student's abilities. By providing opportunities for students to demonstrate their Intelligence through various means, dual intelligence-based assessments ensure that each student is assessed according to their unique strengths and potential.

Although implementing these assessments still faces challenges, especially regarding time and curriculum limitations, the benefits for student development are much more significant. Dual intelligence-based assessments more equitably reflect students' potential and encourage them to thrive in different areas of Intelligence, ultimately helping to create a more inclusive and meaningful learning process.

Challenge: Dual intelligence-based evaluation requires more varied methods, which require teachers to design different forms of Assessment (performance assessments, projects, presentations, etc.). Traditional assessments that only focus on written tests still dominate.

Opportunities: By expanding the evaluation format, education systems can assess students' skills more fairly and thoroughly, reflecting their true potential in different types of Intelligence.

5. DISCUSSION

This study highlights various essential aspects of applying dual intelligence theory in teaching and learning. Uneven teacher understanding, limited infrastructure, the application of varied learning methods, positive student responses, and flexible assessments and evaluations are the determining factors for successfully implementing dual Intelligence. Despite facing various challenges, applying dual Intelligence can create a more inclusive learning environment and support the development of each student's unique potential. With more substantial support in teacher training, resources, and curriculum adjustments, the theory of multiple intelligences can be a strong foundation for improving future education quality.

From the first point regarding teachers' uneven understanding, the results show that teachers' knowledge of Howard Gardner's theory of multiple intelligences is diverse. Most teachers already know the basic concepts of this theory, such as recognizing the diversity of Intelligence among students, but many teachers need to fully understand how to implement it practically in daily learning (Nicolini, 2010; Shearer, 2004). Although they agree that each student has a different dominant intelligence, only some teachers have been able to adapt their teaching methods to include the eight types of Intelligence proposed by Gardner (H. Gardner, 2004). This limitation is mainly due to the lack of specialized training that teaches teachers to identify students' dominant intelligences and design learning strategies corresponding to diverse intelligences. Without in-depth understanding and adequate exercise, teachers tend to revert to traditional teaching methods focusing more on verbal-linguistic Intelligence and logical-mathematical Intelligence.

The second analysis is about the limitations of infrastructure. The restriction of infrastructure and resources is one of the main obstacles to applying the theory of multiple intelligences in many schools. Some intelligences, such as kinesthetic and musical Intelligence, require special facilities such as movement spaces or musical instruments, which are often unavailable, especially in schools with limited budgets. In addition, students with visual-spatial Intelligence usually need technology and visual aids such as projectors, computers, or design software, which may also be less affordable in some schools (Bambang & Ariya Agustin, 2022; Budiyanto et al., 2024). These limitations cause students with Intelligence beyond verbal-linguistics and logic-mathematics to feel less accommodated, and their potential needs to be

optimally developed (Dacholfany et al., 2024). Inflexible classrooms and lack of educational technology access also limit the opportunities to apply different learning methods that suit diverse intelligences. This leads to a more homogeneous learning environment, where teaching methods tend to be more suitable for students with specific Intelligence while others are left behind.

The third analysis is regarding the application of varied learning methods; the results explain that although teachers are aware of the importance of adopting various learning methods by dual Intelligence, applying these methods still faces multiple challenges. Teachers who have tried applying varied learning methods report that students become more active and motivated when faced with learning methods that match their dominant Intelligence (Hidayad et al., 2024). For example, students with kinesthetic Intelligence are more engaged when learning involves physical activity, while students with visual-spatial Intelligence are more enthusiastic when given visual tasks. However, the problems faced are time limitations and difficulties in designing a curriculum that includes all intelligences. Teachers also often feel pressured by the demands of a standard curriculum that still focuses on traditional cognitive Intelligence, so applying dual intelligence-based learning methods could be more optimal (Nasar et al., 2024). This is where more intensive teacher training and flexibility in the curriculum are essential so that more varied learning methods can be applied consistently.

Positive student response is the fourth point in this study, which explains that student responses to applying dual Intelligence in learning tend to be very positive. Students who feel that the teaching methods are based on their dominant Intelligence become more motivated and engaged in learning (Melinda et al., 2023). They also show increased comprehension and retention of material when allowed to learn in a way that suits their strengths. However, some students find it difficult when the learning method does not match their Intelligence (Nasar et al., 2023). Students with verbal-linguistic Intelligence, for example, need to improve when learning activities focus more on physical movements or visual projects. To overcome this problem, teachers must balance their approach so that all Intelligence can be accommodated and no student feels left behind (Purwanto, 2021; Ridayani & Purwanto, 2024). Overall, the application of dual Intelligence provides space for students to express their potential better and increase their self-confidence. Students who previously felt unrecognized in traditional learning methods become more confident and motivated to excel when their way of learning is valued.

The fifth point explains Assessment and Evaluation. Assessment and evaluation in applying the theory of multiple intelligences requires a more varied and flexible approach than traditional Assessment. (Taufiqi & Purwanto, 2024) explains that written test-based assessments and exams only measure verbal-linguistic and logical-mathematical Intelligence, ignoring other intelligences such as musical, kinesthetic, or visual-spatial. Therefore, dual intelligence-based assessments include more holistic methods, such as project assessments, observations, portfolios, and authentic assessments relevant to the real world. Portfolios, for example, provide a complete picture of students' abilities in different areas of Intelligence, while project assessments allow students to demonstrate their skills more creatively and practically (Daga, 2021; Yaumi, 2012). However, dual intelligence-based assessments also need help regarding the time and resources required to design and assess varied tasks. Teachers need additional training to evaluate students fairly and thoroughly (RENSTRA Ministry of Education and Culture, 2020). Although dual intelligence-based assessments must be fully implemented, this study shows that more varied evaluations can provide a more comprehensive view of students' potential and help them develop holistically.

The above explanation provides a complete discussion of five main points: teacher understanding, infrastructure limitations, learning methods, student responses, and Assessment. It focuses on the application of the theory of multiple intelligences in education.

6. CONCLUSION

Applying the theory of multiple intelligences in education is crucial to creating a more inclusive, varied, and meaningful learning experience for each student. While there are infrastructure, resources, and Assessment challenges, this approach has great potential to improve the quality of learning. With adequate teacher training, curriculum revision, and more comprehensive Assessment, the theory of multiple intelligences can be more effectively integrated into the education system, which will ultimately help students reach their maximum potential according to their Intelligence. These results can be summarized into several interrelated points in the learning process in the modern era. For the recommendations in this study, a more intensive and focused training program is needed for teachers to understand the theory of multiple intelligences in-depth, including how to identify students' dominant Intelligence and design appropriate teaching methods. The training should also include varied assessment techniques and how to integrate dual Intelligence into the curriculum without overwhelming teachers with excessive tasks. Then, to support the development of various student intelligences, schools need to improve supporting facilities and resources. Providing more

flexible spaces for physical activity (kinesthetic), access to musical instruments (musical), and technology such as computers or graphic design software (visual-spatial) is essential. The government and schools must work together to ensure facilities and infrastructure are available to all intelligences.

7. LIMITATION

The sustainability research that can be developed from this research covers many aspects that have the potential to deepen the understanding of how the theory of multiple intelligences can be applied more effectively in various educational contexts. Future research can further examine the impact of this theory on academic achievement, psychological well-being, technology application, and inclusive Assessment. With continued research, the theory of dual Intelligence can continue to evolve and adapt to the needs of modern education, creating a more inclusive, varied learning environment and supporting each student's unique potential.

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