

Developing Student Intelligence Based on Educational Psychology through Multiple Intelligences in the Learning Process

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Abstract

This study investigates the development of students' intelligence through the Multiple Intelligences (MI) approach as an alternative strategy to enhance learning effectiveness in educational settings. The background of this research stems from the persistent dominance of traditional teaching methods that emphasize linguistic and logical-mathematical abilities, resulting in limited attention being given to other forms of intelligence. Therefore, this study aims to analyze how the integration of MI-based instructional practices can improve student engagement, learning outcomes, and holistic development. The research employed a literature review method, synthesizing empirical findings from recent national and international studies published between 2019 and 2025. The results indicate that MI-based instruction has a positive influence on academic achievement, motivation, creativity, and student participation across various subjects, particularly in language learning and elementary education contexts. Furthermore, MI-aligned learning environments were found to support diverse learning needs and foster more inclusive classroom practices. The conclusion highlights that applying Multiple Intelligences in learning not only enhances students' cognitive performance but also contributes to their emotional, social, and creative growth. This study offers theoretical and practical contributions by reaffirming MI as a relevant framework for modern pedagogy and providing recommendations for teachers to design more differentiated and student-centered learning activities.

Keywords

Intelligence, Learning outcomes, Multiple Intelligences.



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1. INTRODUCTION

Intelligence originates from a complex interplay of genetic predispositions, environmental factors, and experiential learning that collectively shape an individual's cognitive development. It is not solely determined by innate abilities; instead, intelligence evolves through continuous interaction with one's surroundings, including formal education, social dynamics, cultural exposure, and problem-solving experiences. Contemporary theories emphasize that intelligence is multidimensional, encompassing analytical, creative, and practical capacities that develop over time in response to both internal maturation and external stimulation. Thus, intelligence emerges as a dynamic construct influenced by biological inheritance, socio-cultural context, and the individual's active engagement in meaningful

learning processes. IQ isn't the sole determinant of an individual's cognitive capacity or future success, as it represents only a limited portion of the broader spectrum of human intelligence. Other factors such as emotional intelligence, creativity, motivation, resilience, and social competence significantly contribute to overall cognitive functioning and real-world performance. Therefore, a comprehensive understanding of human intelligence must account for these diverse dimensions rather than relying exclusively on traditional IQ measures.

Howard Gardner originally proposed seven forms of intelligence in the first edition of *Frames of Mind* (1983), later expanding his theory in the 1990s by adding naturalistic intelligence and suggesting the potential for an existential intelligence. Education itself is a purposeful, structured, and intentional effort designed to shape or enhance specific behaviors. Learning in schools involves multifaceted and interconnected processes. A common assumption is that individuals must possess a high Intelligence Quotient (IQ) to attain strong academic outcomes, as intelligence is often viewed as an essential asset that simplifies learning and supports optimal performance. However, classroom realities frequently show discrepancies between students' IQ scores and their actual academic results. Some learners with high IQs may perform poorly, while others with modest IQ levels are able to excel academically. This indicates that intelligence alone does not fully determine academic performance or success. Goleman emphasizes that IQ contributes only about 20% to overall success, whereas the remaining 80% is shaped by additional personal strengths, particularly emotional intelligence (EQ), which encompasses self-motivation, the ability to manage frustration, impulse control, emotional regulation, empathy, and cooperation. These two types of intelligence work together in the learning process, as cognitive ability cannot function optimally without the support of emotional competencies.

Studies conducted by researchers at the University of Vermont on the brain's neurological structure, together with LeDoux's behavioral findings (1970), indicate that in significant life situations, emotional intelligence (EQ) frequently operates before rational thought. Strong EQ has been shown to play a crucial role in supporting academic success, shaping effective career development, fostering healthy marital relationships, and reducing aggressive behavior, particularly among adolescents. This article discusses the role of intelligence within the learning process, with the objective of offering a detailed explanation and deeper insight into how intelligence functions in educational contexts.

2. METHODS

This study employed a literature review design, which systematically synthesizes theoretical concepts, empirical findings, and scholarly debates related to intelligence development and Multiple Intelligences in educational psychology. The literature review followed a structured technique that involved identifying, selecting, and critically evaluating relevant scholarly works, both classical and contemporary. The primary data sources consisted of foundational texts authored by Gardner (1983, 1993, 1999), Goleman (1995), Piaget (1972), Wechsler (1958), and Sternberg (1985), which provided theoretical foundations for understanding human intelligence. Secondary sources were obtained from textbooks, peer-reviewed journal articles, and credible academic publications in the fields of educational psychology and developmental psychology. The data collection technique centered on document analysis, which involved extracting conceptual definitions, theoretical assumptions, classifications of intelligence, and findings on factors influencing cognitive development. The inclusion criteria focused on literature published in reputable academic presses, indexed journals, and historical works that made significant contributions to the development of intelligence theories.

The data analysis technique employed in this study was qualitative content analysis, comprising three stages: data reduction, data presentation, and data interpretation. In the reduction phase, key ideas from each source were identified, highlighted, and categorized into thematic clusters, including definitions of intelligence, theoretical frameworks, factors influencing intelligence, classifications of IQ, and the pedagogical implications of Multiple Intelligences. The presentation stage synthesized these themes into a coherent narrative, integrating perspectives from various experts to reveal similarities, differences, and theoretical contributions. In the interpretation stage, the researcher critically examined

the relationships among theories, interpreted their relevance to contemporary educational contexts, and formulated comprehensive conclusions regarding the development of student intelligence in learning processes. This method ensured that the findings were grounded in credible academic literature, providing a holistic understanding of intelligence from both psychological and educational perspectives.

FINDINGS AND DISCUSSION

Intelligence According to Experts

Thorndike, a psychologist known for his connectionist perspective, described intelligence as an individual's capacity to produce appropriate responses based on truth or factual accuracy, meaning a person is considered intelligent when their reactions effectively match the stimuli they receive. Several scholars have offered definitions of intelligence. Alfred Binet (1905) viewed intelligence as the ability to judge, understand, and reason well, highlighting fundamental mental processes that could be measured through testing. David Wechsler (1958) defined intelligence as a comprehensive ability that enables individuals to act with purpose, think logically, and respond effectively to their surroundings, emphasizing that intelligence encompasses more than cognition by including adaptive and social aspects. Jean Piaget (1972) argued that intelligence reflects one's capacity to adjust to new situations and environmental changes, aligning with his broader theory of cognitive development. Howard Gardner (1983) explained intelligence as a biopsychological potential for processing information, which becomes active within cultural contexts to solve problems or produce culturally meaningful outcomes, forming the basis of his theory of multiple intelligences. Robert Sternberg (1985), through his Triarchic Theory, defined intelligence as mental activity aimed at adapting to, selecting, and shaping environments relevant to one's life.

Debates remain regarding the factors that contribute to intelligence. Thorndike's multifactor theory suggests that intelligence consists of numerous components built from smaller elements, which themselves originate from basic stimulus-response units. In contrast, Spearman proposed the Two-Factor Theory, asserting that intelligence comprises a general factor (g) present in all cognitive activities and specific factors (s) associated with particular domains. Individuals who possess strong s-factors such as in music—tend to perform well in that specific area. Piaget maintained that intelligence corresponds to psychological structures tied to developmental stages. Super and Cites described intelligence as the ability to adapt or learn from experience, while Garrett emphasized the importance of symbolic understanding in problem-solving.

Prayitno (2008) identified five forms of human intelligence: rational intelligence, related to numerical and linguistic abilities; emotional intelligence, referring to emotional regulation; spiritual intelligence, associated with faith and devotion; social intelligence, which supports interactions within society; and instrumental intelligence, which involves generating solutions. These five capacities collectively form the foundation of creativity, which encompasses reasoning, thinking skills, cognitive functions, and brain processes (Prayitno, 2008)

Factors That Influence the Development of Intelligence.

Human intelligence develops through the combined influence of internal elements—such as genetic and biological factors and external conditions, including the environment, education, and social experiences. This interplay is often described as the interaction between nature and nurture. First, genetic inheritance contributes substantially to intelligence, as shown in twin studies indicating that around 40–60% of IQ differences can be linked to heredity (Bouchard, 2009). Second, biological conditions, including brain health, the nervous system, and nutritional status, play a major role; deficiencies in essential nutrients like protein and iodine during childhood can hinder cognitive growth (McGregor, 2007). Third, environmental influences such as cognitive stimulation, access to books, educational activities, and socioeconomic conditions shape the formation of neural connections and determine access to learning resources (Bradley & Crowyn, 2002). Additionally, education and parenting quality, including effective teaching and supportive, structured parenting styles, significantly

promote cognitive advancement (Berk, 2018). Fourth, psychosocial and emotional factors like emotional stability, security, and motivation are crucial, while prolonged stress or early trauma can impair the development of key brain areas such as the hippocampus and prefrontal cortex (Blair & Ravens, 2012). Fifth, cultural context affects how intelligence is expressed and valued; for instance, collectivist societies tend to highlight interpersonal skills, whereas individualist cultures prioritize analytical and creative abilities (Greenfield, 1997).

Djaali (2013) similarly identifies five determinants of intelligence: innate characteristics present at birth; personal interests and unique traits that guide behavior and motivation; formative influences from external conditions that shape cognitive development; maturation processes through which physical and psychological functions reach optimal levels; and the capacity for independent decision-making, which allows individuals to choose problem-solving strategies. These factors work together, and intelligence cannot be attributed to one single element alone.

Classification of Intellectual Intelligence

Intelligence quotient (IQ) is usually classified based on IQ scores obtained from standardized tests such as the Stanford-Binet Intelligence Scales or the Wechsler Adult Intelligence Scale (WAIS). This classification is used to understand a person's level of cognitive ability. IQ Classification According to Lewis Terman (1916) and the Stanford-Binet Intelligence Scale, Lewis Terman, the developer of the Stanford-Binet test, created the following IQ classification:

Table 1. IQ Range Categories

No	IQ Range	Category	Information
1	140 and above	Genius / Very Superior	Very genius, very creative, extraordinary intellectual level.
2	120 – 139	Superior Intelligence	Very intelligent, above-average academic ability.
3	110 – 119	High Average	Above average intelligence.
4	90 – 109	Average	On average, the majority of the population falls within this range.
5	80 – 89	Low Average	Below average, sometimes experiences academic difficulties.
6	70 – 79	Borderline	Requires special attention, at risk of learning difficulties.

IQ Classification According to David Wechsler (WAIS), David Wechsler (1958 & 1997), developer of WAIS (Wechsler Adult Intelligence Scale), Wechsler emphasized that IQ is only one indicator, and must be seen together with social, emotional, and environmental adaptation factors also classify IQ:

Table 2. IQ Range Categories and Their Interpretations

No	IQ Range	Category
1	130 and above	Very Superior
2	120–129	Superior
3	110–119	High Average
4	90–109	Average
5	80–89	Low Average
6	70–79	Borderline
7	69 and under	Extremely Low / Intellectually Disabled

IQ Classification According to WHO & APA (DSM-5)

Health organizations such as the WHO and the American Psychiatric Association (APA) use IQ as one of the indicators for the classification of Intellectual Disability (ID):

Table 3. Classification of Intellectual Disability Levels Based on IQ Range

No	IQ Range	Category	Information	IQ Range
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1	50–69	Mild ID	Can be independent with little help	50–69
2	35–49	Moderate ID	Need more intensive support	35–49
3	20–34	Severe ID	Requires full supervision and assistance	20–34
4	Under 20	Profound ID	Total dependence on others	Under 20

Types of Intelligence (Based on Multiple Intelligences)

Howard Gardner originally introduced seven forms of intelligence in the first edition of *Frames of Mind* (1983). In the 1990s, he expanded his framework by adding naturalistic intelligence, while also proposing the potential existence of existential intelligence. Gardner's theory ultimately presents eight primary types of intelligence, each representing a distinct human capability. Linguistic intelligence refers to the capacity to use language effectively in both oral and written forms, allowing individuals to articulate ideas, interpret meaning, and appreciate the subtleties of words; this intelligence is often demonstrated through strong speaking, writing, storytelling, and debating skills, commonly found in professions such as journalism, literature, law, and public speaking. Logical–mathematical intelligence involves the ability to reason systematically, identify patterns, and apply mathematical principles, and it is frequently assessed in traditional IQ measurements; individuals strong in this area tend to enjoy analyzing data, solving logical problems, or working with numbers, making them well suited for fields such as science, engineering, economics, and programming.

Musical intelligence encompasses sensitivity to rhythm, tone, melody, and harmony, as well as the ability to create or appreciate musical patterns; those with high musical intelligence typically excel in singing, composing, or playing instruments, and are often found in careers such as musicianship, composition, conducting, or audio engineering. Bodily–kinesthetic intelligence reflects the ability to use the body effectively to express ideas, create products, or solve problems; it is evident in individuals skilled in dance, athletics, acting, craftsmanship, or professions that require refined motor coordination such as surgery. Visual–spatial intelligence is characterized by the capacity to think in images, visualize spatial relationships, and manipulate objects mentally, a skill set that supports abilities such as reading maps, understanding diagrams, or recognizing visual patterns, and aligns with careers such as architecture, design, aviation, navigation, or photography.

Interpersonal intelligence concerns the ability to understand and interact effectively with others, including recognizing emotions, motivations, and intentions, and maintaining positive social relationships; this form of intelligence is reflected in strong communication and leadership abilities and is commonly observed in teaching, counseling, psychology, negotiation, and various leadership roles. In contrast, intrapersonal intelligence centers on self-understanding, awareness of one's thoughts and feelings, the ability to identify personal goals, and the capacity for reflective thinking; individuals with strong intrapersonal skills often excel in fields such as counseling, philosophy, writing, or spiritual leadership. Naturalistic intelligence, added later by Gardner, involves the ability to identify, categorize, and interpret elements of the natural world, including plants, animals, and environmental patterns; people with strengths in this domain tend to enjoy observing nature and are frequently found in professions such as biology, environmental science, veterinary work, and agriculture.

Effort Educators in Developing Students' Intelligence in the Learning Process

Educators hold a critical responsibility in nurturing the full spectrum of students' abilities, extending far beyond intellectual intelligence alone. In practice, this requires teachers to understand each learner's unique intelligence profile through observation, interviews, or questionnaire-based assessments, allowing instructional strategies and learning media to be tailored to students' preferred modes of learning. The use of diverse teaching approaches, such as project-based or problem-based

learning, helps accommodate different intelligence strengths while creating a rich and stimulating learning environment that supports exploration and creativity through resources like books, digital tools, laboratories, and reading spaces. A classroom climate that emphasizes emotional safety, mutual respect, and supportive interaction is equally important for fostering interpersonal, intrapersonal, and emotional development. Learning challenges that align with Vygotsky's concept of the zone of proximal development further encourage students to think critically and progress academically without feeling overwhelmed. Assessment practices that reflect authentic learning—through portfolios, performance tasks, projects, presentations, and reflective activities—provide a more comprehensive and equitable measure of students' varied abilities. Integrating character values into instruction also ensures that cognitive growth aligns with the development of moral and social competencies, as emphasized in the P5 initiative of the Independent Curriculum.

The synthesis of the present study highlights that the application of the multiple intelligences framework expands the understanding of human capability beyond traditional IQ assumptions, reaffirming theoretical contributions from Gardner, Piaget, Wechsler, and Sternberg. By situating these classical perspectives alongside recent empirical research, the study reinforces the view that intelligence is multidimensional, shaped by context, and grounded in cultural experience. Evidence from contemporary research demonstrates that instruction informed by multiple intelligences can significantly enhance academic outcomes and student participation. Findings from Indonesian elementary classrooms, for instance, indicate that MI-driven approaches lead to more effective learning and greater engagement among students, underscoring the practical value of the theory as both a conceptual and pedagogical model.

Additional empirical work supports the relationship between MI profiles and academic achievement in diverse settings. A 2024 study of secondary school students in Lucknow revealed strong positive associations between most types of intelligence and academic performance, while research conducted in Ghana with university economics students showed that recognizing students' MI profiles offers valuable insight into their learning strengths and can guide more personalized teaching. Collectively, these studies reinforce the idea that intelligence is not a singular construct but consists of multiple interrelated capacities that may predict different kinds of academic success depending on context and subject matter. The conclusions drawn in this review therefore align with and extend earlier research, emphasizing that educators who intentionally cultivate varied forms of intelligence contribute to more inclusive, differentiated, and impactful teaching practices.

From the standpoint of educational psychology, the integration of MI into classroom instruction is more than an effort to raise academic achievement; it corresponds with developmental and sociocultural theories of learning. Piaget's conception of intelligence as a process of adapting cognitive structures through interaction with one's environment is complemented by MI theory, which suggests that these structures express themselves differently according to individuals' biological potential and cultural experiences. Teaching that draws on MI principles encourages the balanced growth of cognitive, emotional, social, and creative domains rather than concentrating solely on academic skills. Recent research supports this broader impact, showing that MI-based instruction not only enhances performance but also increases motivation, engagement, and self-confidence, particularly in areas requiring complex thinking or language learning.

3. CONCLUSION

Intelligence can be understood as the capacity to form meaningful connections and integrate various aspects of thought and experience. Stern explains it as the ability to adjust to new conditions by employing mental tools that align with personal goals. Numerous scholars—including Alfred Binet, David Wechsler, Jean Piaget, Howard Gardner, Robert Sternberg, and Spearman—have offered influential perspectives on the concept. Spearman proposes that intelligence consists of two core elements: a general ability, known as the G factor, and a range of specific abilities, referred to as S factors, a view widely recognized as the Two-Factor Theory. Piaget, on the other hand, views intelligence as a

collection of psychological structures that emerge and evolve in accordance with particular stages of cognitive development.

The growth of human intelligence is shaped by a combination of genetic inheritance, biological conditions such as physical and neurological health, environmental influences including stimulation and socioeconomic background, educational experiences and parenting practices, emotional and psychosocial dynamics, and broader cultural contexts. Intellectual capacity has been categorized in several ways, including the IQ classifications developed by Lewis Terman through the Stanford–Binet scale, the Wechsler system (WAIS), and the criteria used by the WHO and the APA in the DSM-5.

Gardner expands the understanding of intellectual potential through his theory of Multiple Intelligences, identifying eight distinct forms: linguistic, logical–mathematical, musical, bodily–kinesthetic, visual–spatial, interpersonal, intrapersonal, and naturalistic intelligence. In educational settings, teachers hold a central role in fostering these diverse abilities, supporting not only students' intellectual intelligence but also their broader cognitive, emotional, social, and creative capacities in line with MI theory and principles of cognitive development.

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