Multiple Intelligences in Prospective Biology Teachers and Their Role in Self-Awareness and Learning Strategies

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Abstract

This study explores the multiple intelligences of prospective teachers and their role in self-awareness and learning strategies, with a focus on second-year students in the Biology Education program at UIN Kiai Haji Achmad Siddiq Jember. Using a qualitative descriptive research design, the study gathered data from 44 voluntarily participating students through multiple intelligence assessments, self-reflection questionnaires, semi-structured interviews, and Focus Group Discussions. The findings reveal that the most dominant intelligence type among respondents was intrapersonal intelligence (25%, n=11), followed by naturalistic intelligence (20.5%, n=9), and then musical intelligence (18.2%, n=8). This was followed by four intelligence types with the same percentage (6.8%, n=3), namely bodily-kinesthetic intelligence, spatial-visual intelligence, interpersonal intelligence, and logical-mathematical intelligence. Lastly, two intelligence types had the same number of respondents (4.5%, n=2), namely existential intelligence and linguistic intelligence. Students with high intrapersonal intelligence exhibited strong self-reflection and independent learning tendencies, while those with naturalistic intelligence preferred experiential, nature-based learning. This study highlights the importance of self-awareness in optimizing learning strategies and suggests that teacher education programs incorporate multiple intelligence-based approaches to support diverse learning styles.

Keywords: Multiple Intelligences, Prospective Teachers, Self-Awareness, Learning Strategies, Teacher Education

INTRODUCTION

The concept of multiple intelligences has gained significant attention in educational research as it provides a more comprehensive understanding of cognitive diversity among learners (Daheri et al., 2022; Silwana et al., 2021; Sener & Çokçaliskan, 2018). Howard Gardner's (2008) Theory of Multiple Intelligences challenges the traditional view of intelligence as a single, measurable entity and instead proposes that individuals possess a constellation of cognitive strengths, including linguistic-verbal, logical-mathematical, spatial-visual, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic intelligences. This theoretical shift has profound implications for education, particularly for the design and implementation of teacher training programs, where understanding and addressing learner diversity is crucial (Romdaniyah et al., 2023; Nasution et

al., 2023; Shearer, 2018; Dolati & Tahriri, 2017).

Prospective teachers, who will soon transition from learners to educators, must develop a heightened awareness of their own cognitive profiles and learning strategies. Such self-awareness not only supports their academic success during their studies but also prepares them to adopt inclusive, differentiated instructional practices in their future classrooms (Gimbert et al., 2023; Galiakberova et al., 2020; Dolev & Leshem, 2017). However, despite the growing body of research on multiple intelligences, there remains a critical gap in understanding how prospective teachers perceive, internalize, and leverage their intelligence profiles to inform their own learning processes. In many cases, teacher education still focuses heavily on standard cognitive approaches, without adequately encouraging students to explore their individual strengths and preferred modes of learning.

Moreover, existing curricula in education often emphasize content mastery and pedagogical techniques, while overlooking the importance of personal cognitive development and self-regulated learning skills (Wahyudi et al., 2024; Mulyati, 2019). As a result, many future teachers may lack the necessary self-awareness to optimize their own learning journeys and, consequently, may struggle to recognize and nurture the diverse intelligence profiles of their future students.

This study aims to address these gaps by exploring the multiple intelligences of second-year students in the Tadris Biology program at UIN Kiai Haji Achmad Siddiq Jember and examining how their dominant intelligences influence their levels of self-awareness and the learning strategies they adopt. By investigating the intersection between cognitive profiles, self-reflection, and learning practices, this study seeks to uncover how multiple intelligences can serve as a foundation for developing more personalized and effective learning approaches among prospective teachers.

The importance of this research lies in its potential contribution to the enhancement of teacher education. Developing a deep understanding of cognitive diversity among prospective teachers can foster greater self-efficacy, autonomy, and adaptability, qualities that are essential for implementing student-centered learning approaches. As education systems increasingly emphasize inclusive and differentiated instruction (Lawrence-Brown, 2020; Lindner & Schwab, 2020), prospective teachers must be equipped not only with content knowledge and pedagogical skills but also with the metacognitive awareness to reflect upon and utilize their own cognitive strengths. By integrating multiple intelligence-based strategies into teacher education programs, institutions can better prepare future educators to support and empower the diverse learners they will encounter in their professional practice.

METHOD

This study utilizes a qualitative descriptive research design to explore the multiple intelligences of second-year students in the Biology Education program at UIN Kiai Haji Achmad Siddiq Jember as prospective teachers. The research aims to understand students' awareness of their dominant

intelligence types and how these intelligences influence their learning strategies. A voluntary sampling technique was utilized, allowing only those willing to participate to be included in the sample. As a result, out of three available classes, 44 students voluntarily took part in this study. This study uses a qualitative approach that focuses on students' perspectives, providing an in-depth understanding of how multiple intelligences manifest in an educational setting.

The population of this research consists of all second-year students in the Biology Education program. The sample selection followed a voluntary sampling approach, a non-probability sampling technique where participants self-select based on their willingness to participate (Bucher, 2023). This technique was chosen to ensure that only motivated individuals who genuinely engaged with the topic were included in the analysis. Since the study focuses on qualitative insights rather than statistical generalization, the sample size was deemed appropriate for obtaining rich, detailed responses from the participants.

The research employed a combination of survey questionnaires and semi-structured interviews to collect data. The process unfolded in several stages. First, students were asked to complete an online multiple intelligences test provided by IDRlabs at https://www.idrlabs.com/multiple-intelligences/test.php. This test is based on Howard Gardner's Theory of Multiple Intelligences and categorizes cognitive strengths into different intelligence types (Gardner, 2008). The test results provided initial data on students' dominant and secondary intelligence types, serving as a foundation for further exploration of their self-awareness and learning strategies.

Following the intelligence assessment, students responded to a self-reflection questionnaire designed in Google Forms. The questionnaire aimed to gather insights into their cognitive strengths and self-awareness. The key questions included inquiries about their highest intelligence category, whether they were previously aware of it, how they discovered it, and how it shapes their learning preferences. Students were also asked to propose learning strategies that best suit their intelligence type and recommend strategies for others with similar dominant intelligences. These questions were repeated for the students' second-highest intelligence category, allowing for a more comprehensive analysis of their cognitive profiles.

To validate and further expand the findings, a Focus Group Discussion was conducted. This discussion allowed students to share their insights and refine their understanding of how their dominant intelligences shape their learning behaviors. Additionally, the FGD served as a platform to confirm the accuracy of the self-reported data.

To ensure the validity and reliability of the data, the study employed methodological triangulation (Sugiyono, 2013) by using multiple sources of data collection, including surveys, interviews, and focus group discussions. Additionally, member checking (Sugiyono, 2013) also was used, where participants were asked to review and confirm the accuracy of their responses and the researcher's interpretations.

RESULTS AND DISCUSSION

Results

Dominant Multiple Intelligences Identified Among Respondents

Based on the research findings, it was discovered that the dominant intelligence type among the respondents, second-year biology education students and prospective teachers, was Intrapersonal Intelligence (25%, n=11), followed by Naturalistic Intelligence (20.5%, n=9), and then Musical Intelligence (18.2%, n=8). This was followed by four intelligence types with the same percentage (6.8%, n=3), namely Bodily-Kinesthetic Intelligence, Spatial-Visual Intelligence, Interpersonal Intelligence, and Logical-Mathematical Intelligence. Lastly, two intelligence types had the same number of respondents (4.5%, n=2), namely Existential Intelligence and Linguistic Intelligence. The diagram is presented in Figure 1.
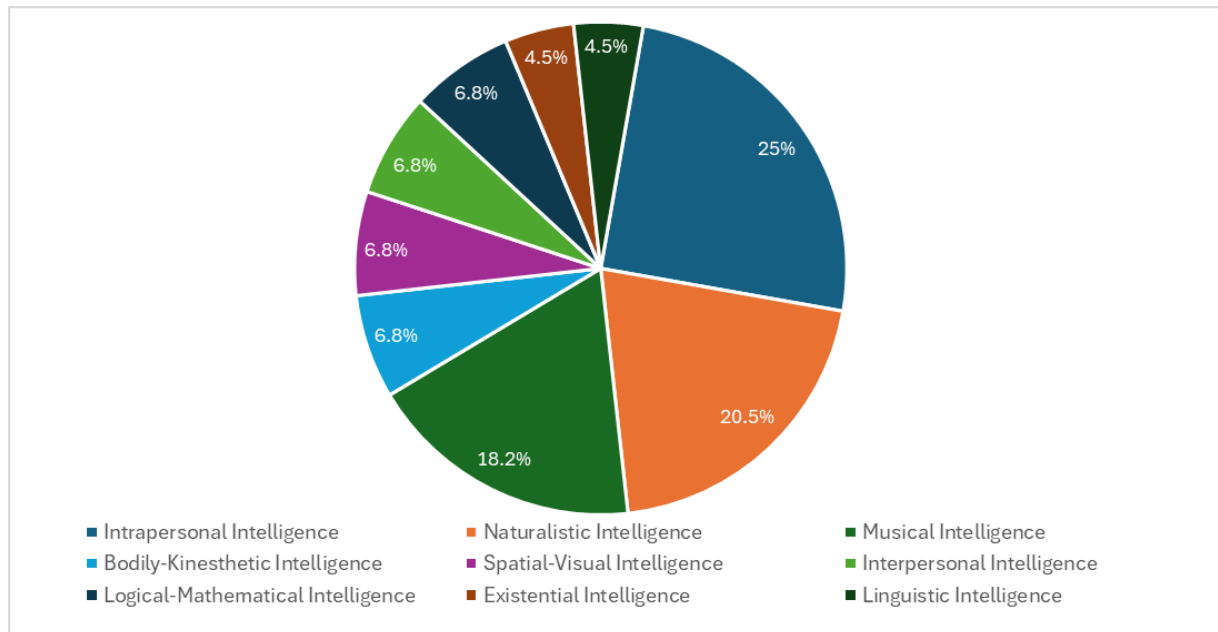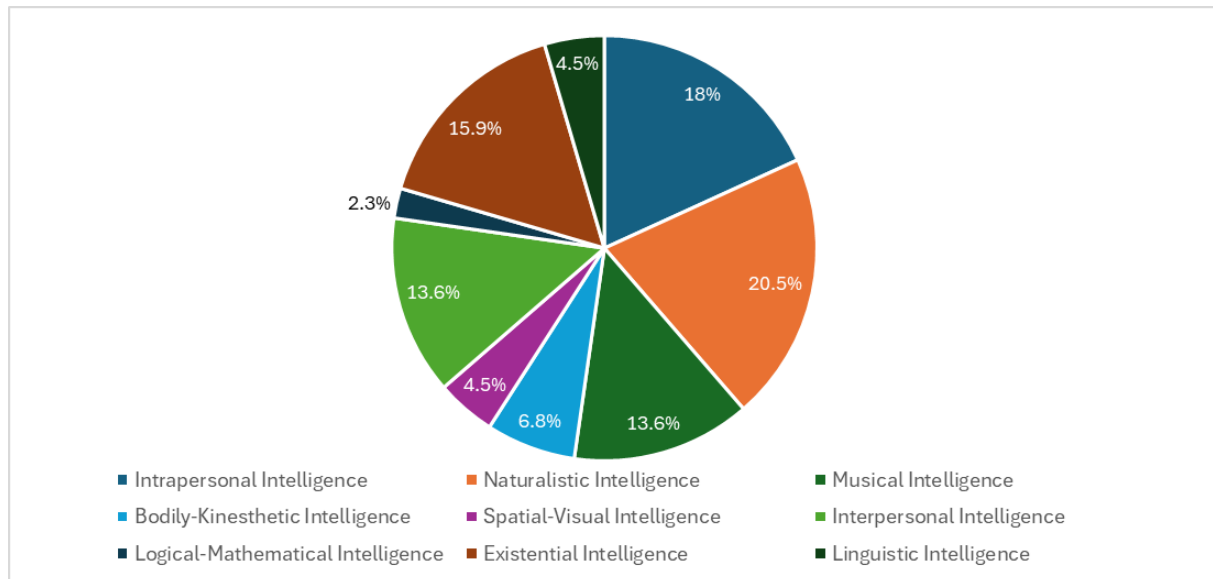

Figure 1. The dominant intelligence types from Multiple Intelligences among respondents.

This suggests that a significant number of second-year biology education students have a strong ability to self-reflect, understand their emotions, and regulate their thoughts. Such intelligence is crucial in the teaching profession, as self-awareness and emotional regulation play vital roles in personal development and effective classroom management (Saidi, 2020; Savitha & Vijayalaxmi, 2018). Future educators with high intrapersonal intelligence are likely to be more introspective, self-motivated, and capable of making thoughtful pedagogical decisions that enhance both their own learning and that of their students.

Second-Highest Multiple Intelligence Identified Among Respondents

The study found that the second most dominant intelligence type among the respondents was Naturalistic Intelligence (20.5%, n=9), followed by Intrapersonal Intelligence (18.2%, n=8), and then Existential Intelligence

(15.9%, n=7). This was followed by two intelligence types with the same percentage (13.6%, n=6), namely Interpersonal Intelligence and Musical Intelligence. Next was Bodily-Kinesthetic Intelligence (6.8%, n=3), followed by two intelligence types with the same percentage (4.5%, n=2), namely Spatial-Visual Intelligence and Linguistic Intelligence. Lastly, Logical-Mathematical Intelligence had the lowest percentage (2.3%, n=1).

Figure 2. Second most dominant intelligence types from Multiple Intelligences among respondents.

Discussion

Self-Awareness and Learning Preferences in Multiple Intelligences

The analysis of respondents' awareness of their highest intelligence category, combined with insights from interviews and Focus Group Discussions (FGDs), reveals diverse perspectives on self-recognition and learning preferences. While many respondents acknowledged their dominant intelligence, others demonstrated partial awareness or uncertainty, often influenced by their learning experiences and social interactions.

Intrapersonal intelligence emerged as the most dominant category, with many respondents recognizing their ability to reflect on personal emotions, engage in deep self-evaluation, and make deliberate decisions. One respondent shared, "I tend to consider different perspectives, both positive and negative, before making decisions." This was further explored in FGDs, where students with high intrapersonal intelligence described preferring independent learning strategies, such as self-reflection, journaling, and using mind-mapping techniques to structure their thoughts. The interview findings supported this, as several participants expressed that their learning process is significantly influenced by their ability to introspect and regulate emotions.

Naturalistic intelligence was the second most dominant category, with respondents highlighting their strong connection to nature and animals.

Many described how being in nature provides a sense of peace and personal fulfillment. One participant explained, "Nature has its own aesthetics and reminds me of the diversity of God's creations." During FGDs, students with this intelligence type expressed a preference for hands-on learning experiences involving outdoor activities, environmental exploration, and observation-based studies, which align with their academic background in biology education.

Musical intelligence was also frequently mentioned, with respondents emphasizing the role of music in their lives for emotional comfort, motivation, and identity. One respondent stated, "Music is life, motivation, and an extraordinary joy for me." This sentiment was reinforced during FGDs, where participants shared that music helps them concentrate, regulate emotions, and enhance memory retention during learning activities.

Other intelligence types, including Bodily-Kinesthetic, Spatial-Visual, Interpersonal, and Logical-Mathematical intelligence, were acknowledged by some respondents but with a lower percentage. In FGDs, students with interpersonal intelligence reflected on their ability to connect with others, emphasizing their role as active listeners and empathetic communicators. Meanwhile, those with spatial-visual intelligence described their preference for diagrams, illustrations, and visual-based learning materials.

Lastly, Existential and Linguistic intelligence were the least dominant categories among respondents. Some students with existential intelligence expressed their deep interest in philosophical discussions and contemplation of life's meaning, while those with linguistic intelligence noted their enjoyment of reading, writing, and verbal expression.

However, not all respondents were fully aware of their dominant intelligence. Some expressed uncertainty due to a lack of self-exploration or limited exposure to varied learning experiences. For instance, one interviewee admitted, "Honestly, I rarely engage in physical activities like sports, so I don't see myself in that category." Others in the FGDs revealed that external feedback from peers and educators played a crucial role in shaping their perception of their intelligence. One participant noted, "I do enjoy listening to people's stories, and my friends often confide in me, so I guess interpersonal intelligence makes sense." This suggests that while self-perception may not always be immediate, social interactions and feedback can help individuals recognize their cognitive strengths over time.

Overall, the integration of survey responses, interviews, and FGDs indicates that self-awareness of multiple intelligences is a dynamic process, influenced by personal experiences, learning environments, and social interactions (Sholeh et al., 2021; Sarnoto & Fathoni, 2020; Soleh & Nurhidayati, 2017). While some individuals confidently affirm their dominant intelligence, others require further exploration and validation. These findings highlight the importance of fostering reflective learning practices and providing diverse educational experiences to help students better understand and embrace their unique cognitive abilities.

Personalized Learning Strategies Through Dominant Multiple Intelligences

The qualitative analysis of respondents' learning strategies, combined with findings from interviews and Focus Group Discussions, highlights diverse approaches tailored to their dominant intelligence categories. A

recurring theme across responses is the emphasis on personalized and experiential learning, where individuals prefer strategies that align with their cognitive strengths and personal interests.

For respondents with musical intelligence, the most effective learning approach involves integrating music into their study routines. Many mentioned that listening to music while learning enhances focus and retention. One respondent noted, "Music makes learning more comfortable and keeps me motivated." This aligns with the FGD discussions, where participants shared that rhythm and melody help them memorize concepts more effectively. Additionally, strategies such as converting learning material into songs or utilizing audio recordings were frequently mentioned as beneficial techniques.

Those with visual-spatial intelligence emphasized the importance of graphical representation and structured note-taking. Respondents suggested using diagrams, tables, and mind maps to organize information in a visually appealing manner. One individual explained, "I make my notes as interesting as possible to stay motivated." Interviews revealed that many students with this intelligence type struggle with purely textual explanations and prefer incorporating colors, charts, and spatial organization into their study methods.

For individuals exhibiting intrapersonal intelligence, independent learning and self-reflection were central strategies. They expressed a strong preference for solitary study environments where they could process information at their own pace. One respondent stated, "I need time to understand things deeply, so I study alone and reflect on what I've learned." This was further reinforced in the FGD, where participants described self-assessment techniques, such as journaling and goal setting, as crucial for their learning success.

Students with bodily-kinesthetic intelligence gravitated towards hands-on, movement-based learning experiences. Several respondents mentioned that engaging in practical applications, experiments, or even physical activity before studying enhanced their comprehension. One participant highlighted, "Learning outside the classroom, through direct experience, helps me grasp concepts better." The FGD discussions supported this notion, with participants emphasizing the value of outdoor activities, simulations, and role-playing exercises in reinforcing theoretical knowledge.

For those with naturalistic intelligence, connecting learning with real-world environmental interactions was key. These respondents preferred studying in nature, visiting locations relevant to their subjects, and drawing links between concepts and the surrounding environment. One respondent explained, "Understanding ecology is much easier when I can directly observe nature." Interviews further revealed that students with this intelligence type often perform best when lessons incorporate case studies related to sustainability, biodiversity, and environmental conservation.

In contrast, respondents with linguistic intelligence favored verbal expression, writing, and discussion-based learning. Many emphasized the importance of rewriting notes, engaging in storytelling, or explaining concepts to others as a way to solidify their understanding. One individual remarked, "I understand better when I write things down and discuss them

with my peers." Meanwhile, those with interpersonal intelligence stressed the significance of social learning, collaboration, and group-based activities. They expressed a preference for study groups, interactive discussions, and role-playing exercises. One respondent stated, "Sharing ideas and experiences with friends helps me understand concepts better."

Interestingly, across multiple intelligence types, a preference for a stress-free and enjoyable learning experience emerged as a consistent pattern. Many respondents noted that learning is most effective when it is engaging, interactive, and aligned with their intrinsic interests. Some preferred a structured approach with clear guidelines, while others thrived in flexible and exploratory settings. The findings suggest that educational environments should cater to multiple intelligences (Akkuzu & Akçay, 2011; Alsaif, 2011) by incorporating a variety of teaching methods, including music integration, visual aids, practical activities, collaborative discussions, and nature-based learning experiences.

Self-Awareness and Recognition of Second-Highest Multiple Intelligence

The responses to the question regarding awareness of secondary multiple intelligences reveal a spectrum of self-recognition, ranging from strong affirmation to uncertainty or even rejection. Many respondents acknowledged their secondary intelligence but expressed varying degrees of confidence in its applicability to their personal and professional lives. Others, however, were either unaware of it or hesitant to associate themselves fully with the identified intelligence.

A common pattern among those who recognized their secondary intelligence was the ability to link it to personal experiences and everyday behaviors. For instance, individuals with Logical-Mathematical Intelligence often expressed their curiosity about how things work and their analytical thinking in problem-solving. One respondent reflected, "I always find myself questioning how things function, which aligns with the characteristics of this intelligence." Similarly, those with Interpersonal Intelligence often noted that they were naturally drawn to social interactions, guiding others, or being seen as approachable figures for advice, as reflected in the statement, "People around me frequently share their problems with me, which makes me realize that I might have this intelligence."

However, uncertainty was also prevalent. Some respondents, while acknowledging the identified intelligence, questioned its accuracy in relation to their abilities. For example, a respondent with Linguistic Intelligence doubted their communication skills, particularly in formal settings such as presentations, yet noted their ability to converse easily with unfamiliar individuals. Likewise, those with Naturalistic Intelligence sometimes hesitated to accept their classification, stating that while they appreciated nature, they did not necessarily engage in all aspects associated with this intelligence.

Through in-depth interviews and focus group discussions, it became evident that individuals with Bodily-Kinesthetic Intelligence often showed indirect recognition of their abilities. Instead of explicitly identifying with this intelligence, they described a preference for physical learning, movement, and hands-on activities, such as dancing or working with objects. A

respondent stated, "I understand concepts better when I learn by doing or directly experiencing them."

For respondents with Intrapersonal Intelligence, self-awareness played a crucial role in their reflections. Many described their tendency to introspect, assess their strengths and weaknesses, and make decisions based on careful self-evaluation. One individual noted, "I always try to understand myself before understanding others, and I can step out of my comfort zone when necessary." This finding suggests that self-perception may be more pronounced in individuals with intrapersonal intelligence, reinforcing the idea that they naturally engage in self-reflection as part of their cognitive process.

In contrast, some respondents explicitly rejected their secondary intelligence, either due to a perceived lack of interest in its associated traits or because they felt their strengths lay elsewhere. This skepticism highlights the complexity of self-perception in intelligence recognition. Overall, the findings demonstrate that while some respondents readily embraced their secondary intelligence, others required further self-exploration or external affirmation to fully integrate this aspect into their self-identity (Awwali, 2023).

Personalized Learning Strategies Through Second-Highest Multiple Intelligence

The qualitative analysis of respondents' answers indicates a strong preference for experiential and interactive learning strategies among individuals whose second-highest intelligence falls into categories such as Spatial-Visual, Linguistic-Verbal, and Logical-Mathematical intelligences. Many respondents emphasized that learning by doing or direct observation enhances comprehension, particularly in subjects requiring spatial awareness or problem-solving abilities. For instance, one respondent noted, "I prefer seeing and learning directly about mangrove trees and their parts rather than just reading about them," highlighting the importance of visual engagement in learning processes.

For those with strong Linguistic-Verbal intelligence as their second-highest capability, effective learning strategies often involve verbalization and interpersonal engagement. The data reveal that individuals in this category benefit significantly from explaining concepts to others, engaging in discussions, and utilizing storytelling techniques to reinforce their understanding. One respondent mentioned that "teaching others or making a video about what I learned helps me retain information better," suggesting that articulation plays a crucial role in knowledge consolidation. Similarly, discussion-based learning and participation in study groups were highlighted as essential tools, reinforcing the importance of dialogue in cognitive retention.

For respondents who ranked Logical-Mathematical intelligence as their second-highest, a preference for problem-solving activities, experimentation, and structured analytical approaches was evident. One participant shared, "I like experimenting and trying things firsthand because it helps me understand the logic behind them" indicating that hands-on learning fosters deeper comprehension. The incorporation of problem-based learning (PBL)

was also frequently suggested, aligning with the analytical and structured mindset characteristic of this intelligence type.

Respondents with a Naturalistic inclination as their secondary intelligence expressed a preference for outdoor activities, field observations, and real-world applications of theoretical concepts. Statements such as "learning outside the classroom and being in nature makes studying more enjoyable" suggest that a change in learning environment can significantly impact motivation and retention. Moreover, integrating music or rhythm into learning processes was another recurring strategy among those with Musical intelligence, with one respondent stating, "Turning lessons into songs makes it easier to remember information."

While social and interactive learning methods were prevalent, some respondents emphasized the importance of self-reliance and intrinsic motivation. Comments such as "always relying on myself rather than depending on others" and "giving myself positive reinforcement to stay motivated" indicate that independent study habits remain valuable, especially when complemented by personalized learning techniques. Additionally, the integration of reflective practices, such as keeping structured notes or reviewing concepts repeatedly, was mentioned as a means of reinforcing knowledge retention.

This study highlights the diversity in learning strategies preferred by individuals based on their second-highest intelligence type. Whether through direct observation, verbal articulation, problem-solving, environmental exposure, or self-motivation, the findings suggest that an effective learning approach is multifaceted, blending interactive, experiential, and reflective methods. These insights can be instrumental in developing tailored educational frameworks that align with varied cognitive strengths, ultimately enhancing learning outcomes and engagement.

CONCLUSIONS AND SUGGESTIONS

The findings revealed that the most dominant intelligence type among the respondents was Intrapersonal Intelligence (25%, n=11), followed by Naturalistic Intelligence (20.5%, n=9), and Musical Intelligence (18.2%, n=8). Futhermore it's revealed that Naturalistic Intelligence (20.5%, n=9) is the second most dominant, followed by Intrapersonal (18.2%, n=8) and Existential Intelligence (15.9%, n=7), with Interpersonal and Musical Intelligences both at 13.6% (n=6).

Students' dominant intelligence types significantly influenced their learning preferences and strategies. Those with strong intrapersonal intelligence displayed better self-reflection skills, preferred independent learning, and showed greater self-awareness. Meanwhile, students with naturalistic and musical intelligences favored experiential, nature-based activities and auditory learning approaches. However, not all students were fully aware of their intelligence profiles; some required external feedback to recognize their cognitive strengths.

These findings highlight the critical role of multiple intelligences in fostering self-awareness and shaping learning strategies among prospective teachers. Encouraging students to understand and reflect on their own

cognitive strengths can help them become more autonomous learners and more adaptive educators. Integrating multiple intelligence-based learning approaches into teacher education programs can better prepare future teachers to accommodate the diverse learning needs of their students.

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