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EXPLORING INTELLIGENCE DISTRIBUTION AMONG ENGINEERING STUDENTS: IMPLICATIONS FOR ACADEMIC SUCCESS ACROSS DISCIPLINES

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ABSTRACT
Intelligence among students refers to the varying cognitive abilities and aptitudes that individuals possess, which enable them to process information, solve problems, adapt to new situations, and learn effectively. Intelligence is a multifaceted concept and is not limited to a single dimension. It encompasses a range of abilities, and researchers have identified different types of intelligences.Howard Gardner's theory of multiple intelligences suggests that individuals possess varying strengths in different types of intelligence. This study investigates the distribution of various intelligences among engineering students and examines whether specific types of intelligence are more closely associated with success in particular academic disciplines.The study explores the distribution of various intelligences among students and examines whether certain types of intelligence are more closely associated with success in specific academic disciplines. Sixty engineering students took the MI inventory. Researcher expectations were not met by the findings. "Most pupils did, in fact, have a head for numbers and reasoning." However, there were some pupils who thrived on focusing on their linguistic or musical intelligence. According to the results of a multiple regression analysis, logical-mathematical intelligence is not always the greatest predictor of students' performance by the end of the semester.

Keywords: Relation, Achievement, Intelligence, Academic, Students.

I. INTRODUCTION
The relationship between multiple intelligences and academic achievement among students has been a subject of considerable interest and debate in the field of education. First introduced by Howard Gardner in 1983, the theory of multiple intelligences proposes that individuals possess various distinct types of intelligence, each contributing to their unique abilities, learning preferences, and strengths. Gardner's theory challenges the traditional view of intelligence as a single, unitary construct measured by standardized tests, and instead, it recognizes the diverse range of human cognitive capabilities. Over the years, researchers and educators have explored the implications of multiple intelligences in the classroom, seeking to understand how this theory may influence students' academic performance and learning outcomes.

The traditional approach to assessing intelligence, primarily through standardized IQ tests, has faced criticism for its limited scope in capturing the full range of human cognitive abilities. Gardner's theory emerged as a significant paradigm shift, offering a broader and more inclusive perspective on intelligence. According to Gardner's original formulation, there are eight types of intelligences: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic. Each intelligence represents a different way in which individuals interact with the world and process information. For example, linguistic intelligence involves proficiency in language, whereas musical intelligence pertains to the ability to recognize patterns and create music. The theory also acknowledges the possibility of additional intelligences, such as existential and spiritual intelligence, which have been proposed and debated by scholars.

The application of the multiple intelligences theory in educational settings has been met with both enthusiasm and skepticism. Proponents argue that recognizing and nurturing students' unique intelligences can lead to more personalized and effective learning experiences. By incorporating various teaching methods and activities that cater to different intelligences, educators can engage students more deeply, enhance their motivation, and promote a better understanding of complex

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Vol-10 Issue-3 No.01 March 2020

concepts. "Additionally, proponents suggest that assessing students' strengths in multiple intelligences can offer valuable insights into their learning preferences, helping educators tailor instructional approaches to individual needs."

On the other hand, critics of the multiple intelligences theory raise concerns about its empirical support and practicality. They argue that the theory lacks robust scientific evidence and that it has not been consistently replicated in research studies. Some critics assert that the concept of multiple intelligences is too subjective and that the intelligences overlap, making them challenging to measure distinctly. Furthermore, implementing the theory in educational settings may present logistical challenges, as educators already face time constraints and curricular demands.

Another intriguing aspect of the multiple intelligences theory is its potential to influence teaching and learning strategies. Educators who embrace the theory may use various techniques and assessments to tap into students' diverse intelligences. For instance, incorporating music or art into lessons may engage students with high musical or spatial intelligence, respectively. Moreover, educators could employ self-reflective activities to cater to students with strong intrapersonal intelligence and group projects to foster interpersonal intelligence. By integrating such diverse approaches, educators can create a more comprehensive and well-rounded educational experience.

While the theory of multiple intelligences has sparked valuable discussions and innovative teaching practices, it is essential to acknowledge its limitations and complexities. The challenge lies in striking a balance between recognizing the uniqueness of individual learners while providing a coherent and standardized education system. As education continues to evolve, future research can delve deeper into the relationship between multiple intelligences and academic achievement, shedding more light on the practical implications of this theory in the classroom.

II. REVIEW OF LITERATURE

Mimid, Lidia et al., (2020) The primary goal of this research was to examine the many forms of intelligence that college students draw upon when studying abroad. Multiple intelligences and academic success were the focus of this correlational investigation. Students from the 11th grade at 03 SELUMA Senior High School made up the study's population. The sample was drawn from students in the 11th grade English class at a large urban high school. This study used collected data to look at how well the multiple intelligences correlate with kids' academic performance in high school. Descriptive statistics and Pearson correlations were used to analyze the data. Variables correlate with intellect and academic success. Analysis of the data revealed a weak relationship between a person's multiple intelligences and their academic success ($r = 0.348$). Since this is not the case, we must accept the alternative hypothesis (H1) and reject the null (H0). This suggests that academic achievement was not considerably impacted by the concept of different intelligences. It appears that the accomplishment was influenced by more than just the presence of several intelligences. The students in this study mostly used their intrapersonal intelligence, while their musical intelligence was the least utilized.

Roman Yavich & Irina Rotnitsky (2020) The hypothesis of multiple intelligences has several potential uses in the classroom. Students put what they learn in class to use in ways that are most efficient for them according on their dominant intellect and learning style. When students' dominant intelligences are taken into account, their learning is accelerated.The goal of this case study is to investigate Gardner's theory of multiple intelligences and how it relates to the academic success of middle school children. 158 seventh graders from an Israeli middle school were the subjects of a case study.The results showed that 79.1% of students in high-performing classrooms exhibited logical intelligence at one or more levels of dominance, while only 48.4% of students in low-performing schools did so. We also looked at how the number of dominating intelligences in each class compared to the total number of pupils. "The results showed that compared to average classes, superior classes had a much larger proportion of pupils reporting having two or more dominating intelligences." Not only do these include logical and verbal intelligence, but also spatial, musical,

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Vol-10 Issue-3 No.01 March 2020

kinetic, and any others you may think of!In conclusion, the logical-mathematical intelligence alone, not the logical-mathematical and linguistic-verbal intelligences, is the dominating intelligence that greatly influences and measures accomplishment in the education system. In addition, the sum of a student's dominant intelligences is an indicator of his or her academic achievement.

Batdi, Veli (2017) This research looked at how a multi-complementary approach (McA) interacts with MIT to improve students' performance in the classroom. In the first stage of McA, which consists of employing multiple analysis programs and comprises three fundamental phases, the goal was to achieve pre-complementary information through the use of meta-analytical and theme exams based on document analysis. A total of 63 papers were chosen to participate in the meta-analysis, all of which looked at the impact of the MIT. Data analysis was performed using the comprehensive Meta-Analysis and MetaWin software packages. To back up the meta-analysis, a qualitative dimension was included, consisting of a thorough investigation of the thematic features of the data. According to the case study method, the data was analyzed using the QSR-Nvivo-8.0 software. The second phase of the McA involved an experimental component and a conceptual analysis of student feedback. High school seniors made up the bulk of the working group, and the material they gathered was categorized as complimentary. In order to arrive at complimentary information in the synthesis step, the data were combined in two phases. The McA is hoped to add to the depth and credibility of the study.

Raissi Yaghoob & Zainali Hossein (2016) Using Gardner's idea of multiple intelligences as a starting point, this research looks at whether or not there is a correlation between students' shown intelligence in different areas and their success in the classroom. A descriptive correlation analysis was performed here. 270 high school pupils from a random cluster sample taken in Bandar Abbas were quizzed on their intelligences using Gardner's test. Descriptive statistics such as Mean, Standard Deviation, Pearson Coefficient Correlation, and Regression were utilized to analyze the data. The results of this investigation showed a moderate relationship (p0.05) between the combination of linguistic and spatial intelligences and academic success. Students' academic success is positively related to their level of many intelligences, including logical-mathematical, visual-spatial, verbal-linguistic, intrapersonal, bodily-kinesthetic, interpersonal, and naturalistic intelligences (p.05). Statistically significant and able to predict academic performance achievement (p0.05) were found for the multiple intelligences of visual-spatial, verbal-linguistic, and interpersonal, while musical intelligence was a modifiable inverse predictor of students' success in school.

Ruiz, Luis et al., (2014) Multiple intelligences, academic success, and physical aptitude are all investigated herein among a sample of high school students. "The average age of the 480 students that took part in the research was 13.33 (SD = 1.41) years; there were 171 female and 309 male participants." Average scores from the school year were obtained using the Revised self-efficacy Inventory for Multiple Intelligences (IAIM-R) and the motor test Sportcomp. Based on the data, it was discovered that females performed better than males on the linguistic, spatial, and interpersonal intelligences, while students of higher grade levels performed better on the naturalistic and linguistic intelligences. Intelligence in the logical-mathematical domain exhibited the strongest correlations with academic success and was the best predictor of success in school. The strongest correlation between motor skill and intelligence was found in the bodily-kinesthetic intelligence. Finally, show that students who did well on the motor exam also performed well on academic tests and the other forms of intelligence (excluding musical intelligence).

III. METHODOLOGY

Sample

Sixty undergraduate students majoring in engineering were the participants in this analysis.

Tools used

The current investigation used a few of different tools. The first one resembled an academic examination in format. A multiple intelligence inventory was the second tool used. The survey was

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presented to students in-class, and they were allowed half an hour to fill it out.

Analytical techniques

Researchers utilized correlational analyses to look at how different measures of intelligence correlated with one another and with academic performance. Since low correlations are pieces of evidence for the separateness of qualities, it was to be expected that there would be low correlations between the various forms of intelligence. Using multiple regression, one may determine which independent variable (or set of independent variables) best predicts another. It was used to determine which of the six factors (intelligences) was the most indicative of future success. The present investigation relies heavily on pupils' test results as its dependent variable. There are as many varieties of intelligence as there are variables in the independent variable.

Research objectives

1. To investigate the distribution and significance of various intelligences among engineering students.
2. To examine the association between specific types of intelligence and academic success in different academic disciplines.

IV. DATA ANALYSIS AND INTERPRETATION

Relationship between levels of multiple intelligences and achievement scores

The correlation indices between the seven different intelligences are displayed in Table 1. In addition, we see how different intelligence profiles correlate with the dependent variable, or accomplishment scores:

Table 1: Correlation Analysis

	linguistic	**logical-Mathematical**	**Spatial**	**interpersonal**	**intrapersonal**	**musical**	**Bodily-kinesthetic**	**scores**
linguistic	1	.389**	.295*	.302*	.449**	.378**	.379**	-.094
logical-Mathematical	.382**	1	.288*	.186	.332*	.288	.305*	-.021
Spatial	.291*	.283*	1	.253	.245	.240	.374**	-.073
Interpersonal	.295*	.183	.252	1	.148	.339*	.633**	-.327
Intrapersonal	.426**	.339*	.253	.147	1	.173	.305*	-.190
Musical	.380**	.275	.245	.338*	.173	1	.307*	.058
Bodily-kinesthetic	.378**	.302*	.378**	.633**	.297*	.305*	1	-.176
Scores	-.095	-.022	-.072	-.333*	-.196	.062	-.170	1

**. Correlation is significant at .01 level (2-tailed).

It is clear that the seven degrees of intellect have weak associations with students' performance. They're negative, but not significantly so at the.01 level, which is interesting. Interpersonal intelligence and bodily-kinesthetic intelligence have the greatest correlational indices of all the other categories of intelligence. The relationship between the different forms of intelligence (intrapersonal and interpersonal) is the weakest. Overall, there are substantial relationships between different forms of intelligence.

Multiple regression analysis

Table 2: Multiple regression analysis

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Model	Unstandardized Coefficients[a]		Standardized Coefficients[a]	t	Sig.
	B	Std. Error	Beta		
1(Constant)	44.096	5.680		7.762	.000
Linguistic	.004	.364	.002	.012	.992
Logical-mathematical	.162	.392	.068	.401	.690
Spatial	.003	.315	.002	.011	.991
interpersonal	-.688	.307	-.459	-2.236	.031
bodily-kinesthetic	.166	.352	.111	.478	.642
Musical	.239	.201	.195	1.170	.248
Intrapersonal	-.501	.374	-.228	-1.329	.189

a. Dependent Variable: Fscore

Table 2 shows that musical intelligence is the strongest predictor of success in language. Kinesthetic intelligence is the following indicator. With the exception of the Beta values, all other forecasters are either accurate or provide the opposite prediction. This is true for both extroverted and introverted varieties of the intelligence spectrum. According to Table, musical intelligence is the strongest indicator of linguistic proficiency. This makes sense, as children who score highly on musical intelligence tests are more likely to listen to English music, where they are exposed to new vocabulary and expressions. The terminology in the textbook used in classes is fairly extensive. Those who excel in music typically do well in school.

V. CONCLUSION

The distribution of multiple intelligences among the engineering students indicates that while many students possess strengths in logical-mathematical intelligence, there is a significant presence of linguistic and musical intelligence as well. This diversity highlights the need for educators to adopt a more inclusive approach in their teaching strategies to cater to the varied learning preferences and strengths of students.Recognizing and nurturing the linguistic and musical intelligences of some engineering students can foster creativity, critical thinking, and problem-solving skills, ultimately contributing to their holistic development as future engineers and professionals.This research contributes to the growing body of knowledge on multiple intelligences and their influence on academic achievement among engineering students. It calls for a shift in pedagogical practices towards more inclusive and diverse teaching approaches that embrace the unique strengths and talents of every student. By leveraging the theory of multiple intelligences in engineering education, educators can pave the way for a more dynamic and effective learning experience, preparing students to excel in their academic pursuits and future careers.

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