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Meeting students' needs: teachers' practice of multiple intelligences in English as second language classrooms

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ABSTRACT

The multiple intelligence (MI) theory suggests that students learn in different ways based on their intelligence strengths, thus, proposes teachers employ a variety of intelligences to engage students in the teaching and learning process. This study explores the application of MI in the Malaysian English as second language (ESL) classrooms and the extent to which teachers provide instructions that meet the needs of the students in the classroom. Data were procured from a survey questionnaire that gauged teachers' teaching activities in ESL classrooms under Gardner's eight constructs of MI: linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, bodily-kinesthetic, naturalist, and musical. Descriptive statistics using mean score and independent sample t-test was employed in the data analysis procedures. The findings reveal that only 58% of the teachers had knowledge of the MI theory, with only 12% having received formal pedagogical training on MI. In addition, the eight intelligences were not practiced equally. Interpersonal, linguistic, intrapersonal, and spatial intelligences seemed to be the most common strategies employed by teachers in their teaching as these MI are usually measured in the standardized tests while naturalistic and musical intelligences were the least frequently integrated as they are not included in the assessment scale in ESL. Such findings have significant pedagogical implications as classroom teachers should acknowledge the different levels of strengths and motivations in learning among the students. The study highlights the need to provide teachers with training and integrating personalized learning, utilizing students' strong aspects, and employing a variety of teaching methods in the classroom.

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1. INTRODUCTION

The school environment presents students with a diversity of experiences, strengths and intelligences. Such differences may lead to different attitudes and motivations toward learning, hence, different responses to classroom environments and instructional practices. Gardner [1], best-known theory on multiple intelligences (MI), exerts that human intelligence is not dominated by a single ability but rather multidimensional. The theory suggests that combining learning styles with dominant intelligences improves students' learning process [2]. Empirical studies have supported this contention that understanding how

students learn according to their strengths will be positively reflected in their achievement and success in school [3]–[5]. It is, therefore, imperative that teachers understand the differences among the students to enable them to provide instructions that meet the needs of the students.

Utilizing the MI theory in the classroom can improve students' motivation and, in turn, enhance their academic performance. This is because when both students and teachers are aware of their strengths or strongest intelligence(s), they can bring the intelligences to a higher level. When provided with instructions that match their intelligence, students tend to be more interested and engaged, and consequently learn more. On the other hand, if teachers only focus on certain intelligences, they may end up neglecting intelligences that the students are strong at. This may increase the chances for students to develop low self-esteem and may also prevent them from learning new content [6].

The theory of MI on its role in learning attainment has been brought forward immensely since its first conception. However, the theoretical discussion and the practical use in the classroom may be different. While it has been successfully applied in the education and teaching reform in the west, the same cannot be said across the curriculum in this country. There have been only a few studies found on the integration of MI in the English as second language (ESL) classrooms in Malaysia [7]–[9]. Thus, information on the teachers' practice in providing instruction that cater to the needs of the students in classroom is rather sparse. The present study intends to fill the gap by examining the teachers' practice of applying MI in the ESL classrooms and to come out with some pedagogical recommendations to further promote MI in the teaching and learning process. These can be best expressed by the following research questions: i) what is the teachers' level of MI integration in their ESL classroom instructions? and ii) what are the most and the least constructs of MI integrated in the ESL classroom instructions?

2. LITERATURE REVIEW

The MI theory postulates the idea that each individual has his/her own strengths and can thrive in certain learning environments that suit their skills and abilities. The MI theory, created by Gardner [1], proposes the diversity of individuals' intelligences, hence, their individual learning method. The theory, suggests teachers to adopt different strategies that can match the learners' intelligence and compatible learning methods. In other words, MI theory requires teachers to take into account the learners' abilities and characteristics in the classroom instructions. This, in turn, can promote the highest level of communication, creativity, production and innovation [3]–[5]. Gardner [1] basically classifies MI into eight constructs: i) linguistic intelligence which is considered as the highest level of intelligence [10], as it concerns the ability to deal with and use the language while reading, writing, speaking and listening, and understand the complex meaning; ii) logical-mathematical intelligence which refers to the ability to use numbers effectively and solve problems through reasoning and analysis; iii) spatial intelligence that is concerned with the ability to visualize and manipulate the surroundings for the purpose of solving problems or making adjustments; iv) interpersonal intelligence that refers to the ability to interact with others, understand both verbal and non-verbal expressions, and maintain relationships; v) intrapersonal intelligence which refers the individuals' ability to understand and recognize their own feelings, and be aware of their strengths and weaknesses; vi) bodily-kinesthetic intelligence which is associated the ability to moving and controlling the body to express ideas and physical activities; viii) naturalist intelligence which refers to the individuals' sensitivity and appreciation towards the natural environment such as plants, animals and the earth; and viii) musical intelligence which refers to the ability to appreciate, create or compose and perform music.

While Gardner's MI theory [1] has been criticized as lacking experimental research [11], proponents of the theory argue that the theory constitutes an educational theory rather than scientific elements. It basically stresses that each learner has all the intelligences, only some intelligences may be more dominant than others. Thus, from an educational standpoint, the theory puts forward that teachers should be aware of learners' strengths and differences so as to make their teaching more meaningful and beneficial.

Studies on the integration of MI in classroom instructions have indicated the positive effects on students' performance, motivation and engagement when the activities match their skills and interests. For example, Djamila [3], in her investigation on the integration of MI in enhancing learners' participation in English language classrooms found that the different types of activities customized based on learners' intelligence did enhance participation. In addition, it helped teachers to control their classes as students were engaged in the activities.

Along the same line, Tamilselvi and Geetha [12], in their research on integrating various instructional strategies for different constructs of intelligence and the effects on students' progress suggest that the strategies could assist students' learning. The MI activities also provided the students with the optimum learning environment as the activities helped them to achieve their potential in the skilled areas and interests. In addition, Pratiwi *et al.* [4] determined a positive relationship between the MI-based learning

approach and students' concept, mastery and interest in learning. This supports Gökhan and Omer earlier findings [13] that MI-based learning was more effective in terms of student achievement levels and their attitudes toward learning. Similarly, Winarti *et al*. [14] showed that the integration of MI strategies improved students' science process skills and also be a significant predictor of students' MI development. In the same vein, Freedman [15] looked into the provision of the MI approach in teaching reading in English. The approach positively affected the students' learning by improving their reading ability, stimulating their reading interest, as well as enhancing participation and their learning passion. Lastly, in a different context of learning, Ghaznavi *et al*. [5] investigated the impact of teaching to physically disabled learners guided by the MI theory. The analysis also pointed out that the implementation of MI theory in the classroom instructions contributed to significant improvement in the students' MI and enhanced their engagement during learning.

3. METHOD

This is a quantitative study, using a survey questionnaire as the means of data collection. The questionnaire was adapted from the questionnaire on MI strategies in classrooms [16]. This research instrument was piloted to determine its validity prior to the main data collection. Three male teachers and 12 female teachers (N=15) were involved in the pilot study. All of them were qualified English teachers and had been teaching for between one to 20 years. The score of 0.95 using Cronbach's alpha indicates the validity and reliability of the instrument. The questionnaire consists of two sections. The first section gauged the participants' demographic background and their level of knowledge and training received with regard to the application of MI in their classroom instructions. The second part contains 40 statements under Gardner's eight constructs of MI that elicited the participants' integration of MI in the classroom. The five-point Likert scale of 1 (never) to 5 (always) was employed.

The questionnaire was distributed online via Google Form and the invitation to take part in the study was extended to schools upon getting permission from the Malaysian Ministry of Education and the university's research ethics committee. The questionnaire was emailed to all potential participants teaching in various schools in one of the districts in the country. The researchers chose the secondary level teachers as samples because at the secondary level of learning, students were older (aged between 13 to 17 years old) and might bring with them a wider repertoire of skills to the classroom, hence, giving teachers a wider opportunity to integrate various kinds of intelligence in the teaching and learning process. The questionnaire was made available for a period of three months and the participants were able to access it using the link provided.

As this was a survey done online, the potential issue is non-response [17]. Those who received the invitation might decide to participate in the survey or not. Thus, the researchers opted for non-probability samples or convenience samples. In this type of sampling, the probability that every respondent included in the sample cannot be determined, or it is left to the discretion of each individual respondent to decide whether or not to participate in the survey. This method of sampling, thus, allows for the selection of a probability-based sample without the need to enumerate a sampling frame [18]. Although the results may not be generalized for the total population, they can be useful in identifying the issues at hand [18]. A total of 10 male and 62 female ESL teachers (N=72) who were teaching at the secondary schools at the time the data were collected responded to the survey. This number included the pilot group as the questionnaire used was valid and reliable, thus, their responses could be used together with the main sample of the study. Statistical analysis in the form of mean, standard deviation, independent sample t-test and one-way ANOVA was carried out on the data using SPSS Version 28.0. In addition, to assist the interpretation of the data, the mean scores were categorized into three levels: high (3.68–5.00), moderate (2.34–3.67), and low (1.00–2.33) as summarized in Table 1.

Table 1. Mean score and category level of MI integration

Total mean score	Categories of integration level
1.00–2.33	Low
2.34–3.67	Medium
3.68–5.00	High

4. RESULTS AND DISCUSSION

This section presents the analysis, interpretations and discussions of the data. The findings are presented based on the research questions set earlier, that is, the level of teachers' MI integration in the classroom and the MI constructs integrated in the classroom. The former discusses the MI integration against the teachers' gender, knowledge of MI, training received on MI and academic qualification. The latter looks into the most and least integrated constructs of MI in the classroom.

4.1. Teachers' level of multiple intelligence integration in their ESL classroom instructions

The analysis of the data shows that the teachers' MI integration in their ESL classroom instructions was only at a moderate level with an overall mean score of 3.40 as shown in Table 2. The finding, thus, indicates that the teachers did not really integrate MI in their classroom despite the wide opportunities for different types of intelligence to be applied in a subject that allows creativity and multiple skills such as English. The study analyzed some possible affective factors for the moderate level of MI integration among the teachers. Statistical analysis on the aspects of respondents' gender, knowledge on MI, academic qualification, teaching experience and MI training received were carried out to find their correlation with the MI integration in the classroom instructions.

Table 2. Level of MI integration in ESL classroom

Variable	N	Mean	SD	Level
MI strategies	72	3.40	.535	Moderate

An independent sample t-test was conducted to compare the scores for MI strategies application among the respondents according to their gender. The analysis indicates that there was no significant difference in MI strategies application between male teachers (mean score=3.71, SD=.265) and female teachers (mean score=3.36, SD=.663; t (70)=1.98, p=.061) as shown in Table 3. Thus, this finding shows that gender is not a valid indicator in determining the instructors' application of MI strategies during their teaching instruction practice. This is in line with previous findings [19] that there was no significant gender difference in teachers' preferred MI intelligence teaching strategies.

Table 3. Gender and MI integration in ESL classroom instructions

	Gender	N	Mean	SD	t	df	Sig.
MI strategies application	Male	10	3.71	.265	1.98	70	.061
	Female	62	3.36	.553			

However, while gender was not considered a prevalent factor in MI integration in this present study, the overall results might not be conclusive. The analysis shows that there was a significant difference in the frequency of musical intelligence strategies application between male teachers (mean score=3.08) and female teachers (mean score=2.38, SD=.858; t (70)=2.44, p=.017) as shown in Table 4, indicating that male teachers favored more musical intelligence strategies compared with their female counterparts. These findings however are contradictory to previous study [20] that reported female teachers in Pakistan were found to employ more naturalistic intelligence in their teaching English language teaching (ELT) practices than the male teachers. So, it can be concluded that males and females are not significantly different in the preferences of MI strategies.

Table 4. Gender and types of MI integration in ESL classroom instructions

	Gender	N	Mean	SD	t	Df	Sig.
Linguistic intelligence	Male	10	4.04	.556	.46	70	.646
	Female	62	3.95	.539			
Intrapersonal intelligence	Male	10	4.20	.298	1.42	70	.161
	Female	62	3.91	.633			
Mathematical intelligence	Male	10	3.44	.735	1.44	70	.156
	Female	62	3.08	.727			
Spatial intelligence	Male	10	4.16	.246	1.27	70	.209
	Female	62	3.90	.646			
Interpersonal intelligence	Male	10	4.28	.454	.19	70	.854
	Female	62	4.24	.678			
Bodily-kinesthetic Intelligence	Male	10	3.48	.316	1.95	70	.056
	Female	62	2.92	.903			
Musical intelligence	Male	10	3.08	.713	2.44	70	.017
	Female	62	2.38	.858			
Naturalistic intelligence	Male	10	3.00	.481	1.80	70	.076
	Female	62	2.46	.917			

Khaliq *et al.* study [21] which found that when teachers did not have sufficient information about the MI theory, they tended not to integrate MI in their instruction despite the many benefits of the MI in learning. The present study, however, shows a contrasting finding. The survey reported that 42 out of 72 respondents (58.3%) had more than 50% knowledge of the MI theory while the remaining 30 (41.7%) had less than 50% knowledge of the theory.

An independent sample t-test was conducted to compare the scores for multiple intelligence strategies application among the teachers according to their MI knowledge. The analysis recorded that there was no significant difference in MI strategies application between those who had less than 50% of MI knowledge (mean score=3.36, SD=.413) and those with more than 50% of MI knowledge (mean score=3.44, SD=.630; t (70)=-.64, p=.552) as shown in Table 5. This finding shows that MI knowledge was not a valid indicator in determining the teachers' application of MI strategies during the teaching and learning process. In fact, there was no significant difference for all types of MI strategies according to the teachers' MI knowledge as shown in Table 6.

Table 5. Knowledge of MI and integration in ESL classroom instructions

	MI knowledge	N	Mean	SD	t	Df	Sig.
MI strategies application	Less than 50%	30	3.36	.413	-.64	70	.552
	More than 50%	42	3.44	.630			

Table 6. Knowledge on MI and integration of all types of MI in ESL classroom instructions

	MI knowledge	N	Mean	SD	T	Df	Sig.
Linguistic intelligence	Less than 50%	30	4.00	.426	.44	70	.660
	More than 50%	42	3.94	.609			
Intrapersonal intelligence	Less than 50%	30	3.94	.500	-.03	70	.969
	More than 50%	42	3.95	.675			
Mathematical intelligence	Less than 50%	30	3.16	.572	.25	70	.797
	More than 50%	42	3.11	.837			
Spatial intelligence	Less than 50%	30	3.99	.628	.62	70	.536
	More than 50%	42	3.90	.604			
Interpersonal intelligence	Less than 50%	30	4.11	.700	-1.53	70	.129
	More than 50%	42	4.34	.599			
Bodily-kinesthetic intelligence	Less than 50%	30	2.85	.645	-1.17	70	.246
	More than 50%	42	3.10	.990			
Musical intelligence	Less than 50%	30	2.37	.629	.86	70	.393
	More than 50%	42	2.55	1.007			
Naturalistic intelligence	Less than 50%	30	2.43	.611	.90	70	.368
	More than 50%	42	2.62	1.039			

The data from the survey showed that only 22 of the respondents (30.6%) had received formal training on the application of MI theory in teaching while the other 50 (69.4%) had not. An independent sample t-test was conducted to compare the scores for MI strategies application among the teachers according to the training that they received. The analysis shows a significant difference of MI strategies application between those who had participated in MI strategies training (mean score=3.70, SD=.536) and those who had not (mean score=3.27, SD=.483; t (70)=3.37, p=.001) as shown in Table 7.

Table 7. Training received in MI and integration in ESL classroom instructions

	MI training	N	Mean	SD	t	Df	Sig.
MI strategies application	Yes	22	3.70	.536	3.37	70	.001
	No	50	3.27	.483			

Table 8 shows that there were statistically significant differences between these two groups in the application of intrapersonal intelligence strategies [t (70)=2.03, p=.046)], mathematical intelligence strategies [t (70)=2.40, p=.019)], bodily-kinesthetic intelligence strategies [t (70)=4.76, p=.000)], musical intelligence strategies [t (70)=3.22, p=.002)], and naturalistic intelligence [t (70)=2.82, p=.008)]. Such significant differences imply that training received by the teachers affects the integration level of MI strategies in their classroom instructions. This is in line with findings from previous studies that showed significant improvement in teachers' implementation of various MI strategies and increased ability in designing lesson plans and learning materials following the training of MI-based learning [22], [23].

Another independent sample t-test was also conducted to compare the scores for MI strategies application among the teachers according to their academic qualifications. The demographic data revealed that 20 of the respondents (27.8%) had a bachelor's degree, while the remaining 52 (72.2%) had a postgraduate degree. The analysis shows a significant difference in the frequency of MI strategies application between bachelor's degree holders (mean score=3.30, SD=.441) and postgraduate degree holders (mean score=3.68, SD=.664; t (70)=2.81, p=.006) as indicated in Table 9.

The teachers with postgraduate degree qualifications used MI strategies in their instructions more frequently compared to those with bachelor's degree qualifications. The significant difference implies that teachers' academic qualifications can affect the application of MI strategies in the classroom. This concords with the study by Fricker [19] that showed teachers with higher professional qualifications were highly adept at teaching with existentialistic, linguistic, and interpersonal teaching strategies, but less adept at teaching with visual and musical teaching strategies. Thus, it was suggested proper training modules and course curricula were developed to promote expanded MI strategies in teaching practices.

Table 8. Training received in MI and integration in ESL classroom instructions

	MI training	N	Mean	SD	t	df	Sig.
Linguistic intelligence	Yes	22	4.00	.572	.34	70	.730
	No	50	3.95	.527			
Intrapersonal intelligence	Yes	22	4.16	.755	2.03	70	.046
	No	50	3.85	.506			
Mathematical intelligence	Yes	22	3.43	.718	2.40	70	.019
	No	50	3.00	.706			
Spatial intelligence	Yes	22	4.09	.547	1.46	70	.148
	No	50	3.86	.630			
Interpersonal intelligence	Yes	22	4.40	.501	1.35	70	.179
	No	50	4.17	.698			
Bodily-kinesthetic Intelligence	Yes	22	3.63	.646	4.76	70	.000
	No	50	2.71	.802			
Musical intelligence	Yes	22	2.94	.786	3.22	70	.002
	No	50	2.27	.829			
Naturalistic intelligence	Yes	22	2.96	.779	2.82	70	.008
	No	50	2.35	.872			

Table 9. Academic qualification and MI integration in ESL classroom instructions

	Academic qualification	N	Mean	SD	t	Df	Sig.
MI strategies application	Bachelor's degree	20	3.30	.441	2.81	70	.006
	Postgraduate degree	52	3.68	.664			

4.2. Multiple intelligence strategies application according to constructs in the ESL classroom instructions

Although the study only recorded a moderate level of MI integration in the classroom, the teachers, however, did, apply the MI strategies in their teaching to enhance students' learning. Previous study [24] confirmed that teachers employed certain teaching strategies that can accelerate the activation of different intelligences in individual students. The analysis revealed that certain MI was favored by the teachers, hence, frequently used in their teaching instructions. Some other MI, on the other hand, were less favored, thus, less employed. Table 10 presents the level of MI application based on each of the MI constructs.

Table 10. MI strategies integration according to constructs

Constructs	N	Mean	SD	Level
Linguistic intelligence strategies	72	3.97	.538	High
Intrapersonal intelligence strategies	72	3.95	.605	High
Mathematical intelligence strategies	72	3.13	.734	Moderate
Spatial intelligence strategies	72	3.93	.612	High
Interpersonal intelligence strategies	72	4.24	.649	High
Bodily-kinesthetic intelligence strategies	72	2.99	.867	Moderate
Musical intelligence strategies	72	2.48	.869	Moderate
Naturalistic intelligence strategies	72	2.54	.887	Moderate
MI strategies	72	3.40	.535	Moderate

The data show that four MI constructs were highly employed by the teachers with interpersonal intelligence topping the list (mean score=4.24). This is not surprising as there are many activities involving

interpersonal communication that can be integrated into a language class such as delivering presentations, role-playing, and working in groups [25], [26]. The second most integrated construct was linguistic intelligence (mean score=3.97). Activities like finding the meaning of words in the dictionary, reading and writing are commonly practiced in ESL class [27]. The next most employed constructs were intrapersonal intelligence (mean score=3.95) with activities like writing journals and creating mind maps and spatial intelligence (mean score=3.93) with activities like solving puzzles and playing matching games. On the other hand, mathematical, bodily-kinesthetic, naturalistic, and musical intelligence constructs were seen as less favored by the teachers as they only fell under the moderate level of integration with mean scores of 3.13, 2.99, 2.54, and 2.48 respectively. This, however, does not come as a surprise as these intelligences are not usually required and practiced in a language class. Analysis of the mean scores for the data was also carried out to determine the frequency of use for each strategy in each type of the constructs. Table 11 provides a detailed analysis.

As can be seen from Table 11, all the strategies in the interpersonal intelligence construct scored high in terms of their integration into classroom instruction. It seems that the teachers highly encouraged the students to practice their interpersonal skills by having activities involving social interaction and group work. This can be seen in the high mean scores for peer tutoring (mean score=4.44) and cooperative group work (mean score=4.33). This confirms earlier findings [28] that indicated ESL teachers used interpersonal teaching strategies more frequently in class compared to other MI strategies.

As for the linguistic intelligence construct, the findings indicate that teachers put emphasis on the linguistic productions of the students like speaking and writing skills that are deemed important and beneficial for assessments and examinations. This is indicated by the scores in activities like communication (mean score=4.50), discussion and debate (mean score=4.11) and writing (mean score=3.97). On the other hand, passive activities like teachers reading or lecturing in class (3.64) and reading (mean score=3.61) were given less attention in the classroom. Earlier studies have shown similar findings that ESL teachers tend to use more MI-framed teaching strategies that enhance students' abilities to perform better in assessments [29]–[31].

Strategies under the intrapersonal intelligence construct were also highly employed by the teachers. Activities performed in the classroom were mainly to develop students' confidence and to see the purpose of learning. This is shown by the scores in the activities that allow students to express their feelings (mean score=4.31) and make connections between classroom learning and real life (mean score=4.25). There was a positive impact of interpersonal MI teaching strategy and students' English oral fluency [25], [26].

The spatial intelligence construct also received a high score in its integration into classroom instruction. However, this is not a surprise as strategies such as using visual presentations (mean score=4.47), multimedia (mean score=3.92) and visual aids (mean score=3.83) are very common. Furthermore, this type of intelligence is usually practiced in teaching regardless of the subject(s) taught.

The mathematical intelligence construct was only moderately integrated in the ESL classes. The findings suggest that activities involving high-order thinking skills like performing logical problem-solving exercises (mean score=3.53), mathematical problem-solving (mean score=2.47), scientific thinking (mean score=3.44) and experimentation (mean score=2.34) were less favored by the instructors. One of the reasons could probably be the failure of the instructors to see the connection between the language and the content subject of mathematics or science unless English is used in a content and language in integrated learning (CLIL) or English as a medium of instruction (EMI) [32].

Strategies that relate to bodily-kinesthetic intelligence were also moderately integrated in the classroom. Most of the activities in this dimension involve physical body movement as part of the learning process. Unless the physical movements were part of the communicative activities like body language (mean score=3.39) or drama and dance (mean score=3.06), other activities like physical relaxation exercises received just a moderate mean score (2.64). The teachers might not favor this construct as it does not directly contribute to the assessment scale in ESL. This supports the contention that exam-based instructions are given more priority in teaching as highlighted in previous studies [25], [26].

The data also show that strategies in the naturalistic intelligence construct were among the least integrated MI in classroom instruction. This is probably due to the fact that nature is not included in the ESL curriculum per se, thus, instructors might not see the need to employ the strategies in the teaching and learning process. Since naturegogy is not mandated in the curriculum, naturalistic intelligence might not be included in the standardized assessments or examinations. Hence, activities like going on a field trip to explore the natural environment and studying about plants and animals were less favored in the ESL learning process (mean score=1.83 and mean score=2.34 respectively). This is opposite to other research [20] that found Naturalistic intelligence was a highly preferred MI strategy employed by Pakistani teachers in ELT.

Last but not least, the least integrated construct of MI is musical intelligence. The teachers did not incorporate music in lessons as they might not see it as real learning and would not benefit students in their learning process. Thus, the teachers might not be willing to play recorded music to the students (mean score=2.89) or use musical instruments in the class (mean score=2.17). Tiansoodeenon and Sitthitikul [33]

supports such claim in which his investigation of the English language workbook used in African schools found the musical intelligence teaching and learning materials and activities were completely missing. In addition, incorporating musical activities in the class requires some musical talent and interest on the teachers' part. This might be the reason for the teachers' reluctance to use rhythms, chants, raps, or songs (mean score=2.64) or singing melodies while teaching (mean score=2.19).

Table 11. Mean scores analysis of MI integration

Construct	N	Mean	SD	Level
Interpersonal intelligence strategies				
I encourage my students to perform group brain-storming.	72	4.06	.785	High
Students have the opportunity to work in cooperative groups.	72	4.28	.736	High
I encourage students to peer tutor or help each other in class.	72	4.33	.814	High
I encourage students to develop socially through their classroom interactions.	72	4.44	.822	High
I encourage students to share with one another.	72	4.24	.690	High
	72	4.24	.649	High
Linguistic intelligence strategies				
I read or lecture to my students.	72	3.64	.983	Moderate
My students have the option to discuss or debate during class.	72	4.11	.703	High
I encourage students to employ their verbal skills to communicate, solve problems, and express inner feelings.	72	4.50	.605	High
I require my students to read during class.	72	3.61	.865	Moderate
I require students to perform writing activities in the class.	72	3.97	.731	High
	72	3.97	.538	High
Intrapersonal intelligence strategies				
My students have the opportunity to set their own personal goals.	72	3.72	.938	High
My students have the opportunity for introspection or deep thinking.	72	3.67	.712	Moderate
I encourage my students to make connections between what is being taught in class and what they experience in real life.	72	4.25	.801	High
I give my students opportunities to make decisions about their learning experiences.	72	3.81	.850	High
I allow my students to express their feelings during the class (e.g. happy).	72	4.31	.744	High
	72	3.95	.605	High
Spatial intelligence strategies				
I use visual presentations during class (e.g., write on chalkboard and use overhead projector).	72	4.47	.691	High
I encourage my students to visually represent the concepts being taught/discussed.	72	3.75	.765	High
I encourage my students to visualize what they read or hear during class.	72	3.69	.944	High
I use visual aids in class such as maps, charts, and diagrams.	72	3.83	.839	High
I show videos, slides, or movies during class.	72	3.92	.931	High
	72	3.93	.612	High
Mathematical intelligence strategies				
I encourage my students to think scientifically about things.	72	3.44	.991	Moderate
I encourage my students to logically organize and sequence concepts.	72	3.89	.742	High
My students perform logical problem-solving exercises.	72	3.53	.839	Moderate
I incorporate mathematical problem-solving in my teaching.	72	2.47	1.02	Moderate
I encourage students to perform scientific demonstrations/experimentation.	72	2.34	1.16	Moderate
	72	3.13	.734	Moderate
Bodily-kinesthetic intelligence strategies				
I provide my students with the opportunity to learn by manipulating objects or by making things with their hands.	72	2.97	1.10	Moderate
I provide my students with tactical materials and experience.	72	2.92	1.14	Moderate
I teach my students physical relaxation exercises.	72	2.64	1.01	Moderate
My students have the opportunity to use drama, dance or physical activity as a part of their learning process.	72	3.06	1.20	Moderate
I encourage students to react and use body language as part of classroom communication.	72	3.39	1.30	Moderate
	72	2.99	.867	Moderate
Naturalistic intelligence strategies				
I incorporate nature into curriculum themes.	72	3.14	.983	Moderate
My students classify or sort objects, events, living things, or phenomena into clusters according to their common characteristics.	72	2.58	1.12	Moderate
Students have the opportunity to work with or study about natural phenomena.	72	2.81	1.10	Moderate
I provide field trips for my students to explore the natural environment.	72	1.83	1.02	Low
My students have the opportunity to study about different plants and animals.	72	2.34	1.08	Moderate
	72	2.54	.887	Moderate
Musical intelligence strategies				
I play recorded music with my students.	72	2.89	1.18	Moderate
My students have the opportunity to express their ideas musically.	72	2.50	1.04	Moderate
I incorporate the use of musical instruments into my classroom teaching.	72	2.17	.993	Low
I use rhythms, chants, raps, or songs in my classroom teaching.	72	2.64	1.09	Moderate
I make tapping sounds or sing little melodies while teaching.	72	2.19	.973	Low
	72	2.48	.869	Moderate

5. PEDAGOGICAL IMPLICATIONS

Despite the seemingly challenging task of providing instructions that meet the students' needs, there are some viable pedagogical recommendations on how teachers can differentiate instructions according to the differences in intelligence among the students. The findings of the current research have shown that the level of teachers' knowledge of MI is rather low which may have affected its integration in their classroom instructions. Thus, teachers need to receive formal training on how to integrate the MI theory in the classroom. The findings have indicated that training and academic qualifications pose a significant influence on the integration of MI. This concurs with previous studies that present the positive impact of teacher training in MI instructional strategies on classroom teaching [34], [35]. Hence, perhaps the best solution is to include a compulsory course on MI in the teacher training curriculum.

On the practical side, teachers can implement teaching and present content that promotes personalized learning. Instead of using the traditional approach of teaching, which always emphasizes all of the students learning a common lesson, using a common methodology, teachers should try tailoring students' learning according to their skills and interests. To achieve this, teachers may apply a variety of instructional methods that students can follow. These can include students working together in small group projects, class projects, working on individual tasks or following instructional software. Many classroom practitioners recommend activities that are non-textbook-bound to make lessons more appealing and interesting to the students [36]–[39]. Utilizing students' strong aspects may lead to the optimal learning experience in their respective talented areas. This will also enhance creativity and improve students' performance.

Creating a classroom environment that can encourage problem-solving and critical thinking skills is another approach that can be adopted by teachers in differentiating their classroom instructions under the guidance of the MI theory. Such an environment can encourage discovery learning and is likely to develop students' creativity and motivation. Discovery learning not only requires students to utilize their strong intelligence and bring it to a higher level, but it also allows students to retain the new content learned for a longer period. Previous studies have confirmed that students' learning outcomes improved with the implementation of discovery learning in the classroom as the activity encouraged their creativity and problem-solving skills [40]–[42].

Teachers can also take advantage of the students' varying intelligences by customizing lessons and classroom activities that can involve all students. As each student learns differently, activities like role play, spatial activities, musical activities, interpersonal activities and intrapersonal activities, can attract interest and participation. By engaging the students in different types of activities that suit their intelligence, the learning experience can be richer and beneficial.

Last but not least, another method that can integrate MI is through blended learning or flipped classrooms. The method is worth considering as it consists of a combination of different modes of teaching and delivery [43]. Several studies [44], [45] explored and suggested various models and tools of blended learning approach that teachers can integrate into their teaching. The combination of face-to-face and online instruction can make the learning content more accessible as students can choose the pace and mode of their own learning. They can choose to learn at the level that matches their own ability [46]. Recent studies have shown that blended learning that is based on MI enhances student learning [47], [48] and has a positive impact on academic achievement [49].

6. CONCLUSION

This study has shown that while there have been many discussions that advocate the benefits of integrating multiple intelligence in the classroom; in practice this has been wide off the mark. The ultimate goal of MI theory is to increase student understanding of the subject matter. Classroom activities should activate more than one of the MI. The findings of the study indicate that teachers employed more interpersonal, linguistic, intrapersonal and spatial intelligence in class compared to the other MI constructs. Teachers should integrate more of the other MI strategies in their instruction practice so that they can meet the learners' needs based on the students' strengths and weaknesses. Teachers must learn how to practice a variety of intelligences to engage the largest number of students possible in the learning process. With the knowledge and integration of MI, teachers can see a learner's potentials rather than their weaknesses or disabilities. The students would also realize that there are multiple ways to learn and that they possess multiple types of academic strengths and life skills.

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