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The influence of multiple intelligences on learning styles in teaching and learning

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Abstract

The purpose of the study is to investigate the relationships between the multiple intelligences and learning styles. The quantitative approach was the method used in the research. A sample of freshman and sophomore students as a non- random systematic sample was selected to be investigated in the research. A structured questionnaire was used to gather the primary data from the students in the study. Chi-square test for independence is used to explore the relationship between multiple intelligences and learning styles' categorical variables. Based on multiple intelligences-learning styles crosstabs outputs, there is an association between multiple intelligences dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. According to Pearson Chi-Square values as well as on values of Cramer's V there is an association between multiple intelligences and learning styles. Maximum 10-15 lines.

Keywords: multiple intelligences; learning styles; teaching; learning

1. Introduction

The multiple intelligences and learning styles are supposed to be the important variables that contribute to shaping the frame of the students, their interests and priorities, as well as their choices. The study aims to investigate the relationship between multiple intelligences and learning styles. Multiple intelligences choose conventionally in the study as independent variables include: (1) verbal-linguistic intelligence: ability to perceive and generate spoken or written language; (2) logical-mathematical intelligence: ability to appreciate and use numerical, abstract and logical reasoning to solve problems; (3) musical intelligence: ability to create, communicate and understand meanings made out of sound; (4) spatial-visual intelligence: ability to perceive, modify, transform and create visual and/or spatial images; (5)

bodily-kinesthetic intelligence: ability to use all or part of one's body to solve problems or fashion products; (6) interpersonal intelligence: ability to recognize, appreciate, and contend with the feelings, beliefs and intentions of other people; (7) intrapersonal intelligence: ability to understand oneself, including emotions, desires, strengths and vulnerabilities, and to use such information effectively in regulating one's own life; and (8) naturalist intelligence: ability to distinguish among critical features of the natural environment (Christodoulou, 2009). Learning styles choose conventionally in the study as dependent variables include includes: (1) visual: learners respond to images and graphics, (2) auditory: learners prefer verbal presentations, and (3) kinesthetic: learners prefer a physical, hands-on approach.

The research questions include: (1) Is there an association between verbal-linguistic intelligence and visual, auditory and kinesthetic learning styles? (2) Does higher scores of logical-mathematical intelligence associate with higher scores of visual, auditory and kinesthetic learning styles? (3) Is there an association between higher scores of spatial-visual intelligence associate and higher scores of visual, auditory and kinesthetic learning styles? (4) Is there an association between musical intelligence and visual, auditory and kinesthetic learning styles? (5) Does higher scores of bodily-kinesthetic intelligence associate with higher scores of visual, auditory and kinesthetic learning styles? (6) Is there an association between higher scores of interpersonal intelligence and higher scores of visual, auditory and kinesthetic learning styles? (7) Is there an association between intrapersonal intelligence associate and of visual, auditory and kinesthetic learning styles? (8) Do higher scores of naturalist intelligence associate with higher scores of visual, auditory and kinesthetic learning styles?

2. Theoretical framework and literature review

Conceptual framework

The theoretical framework is based mainly on Gardner's work on Multiple Intelligences. Gardner (2011) theorized an original list of seven intelligences, as he expanded the list totalling nine intelligences to date. "The seven intelligences he identified: (a) linguistic, (2) musical, (3) logical-mathematical, (4) spatial, (5) bodily-kinesthetic, (6) interpersonal, and (7) intrapersonal. Later [Gardner] added (8) naturalistic intelligence, and (9) existentialist intelligence" (Hall, Quinn, & Gollnick, 2017, p.431).

The theoretical framework is also based on an extensive review of existing evidence about multiple intelligences and learning styles through ERIC, Sage, and EBSCO, using the

keywords "multiple intelligences", and "learning styles". Figure 1 summarizes the results from the review and proposes a set of relationships among two main constructs: multiple intelligences and learning styles.

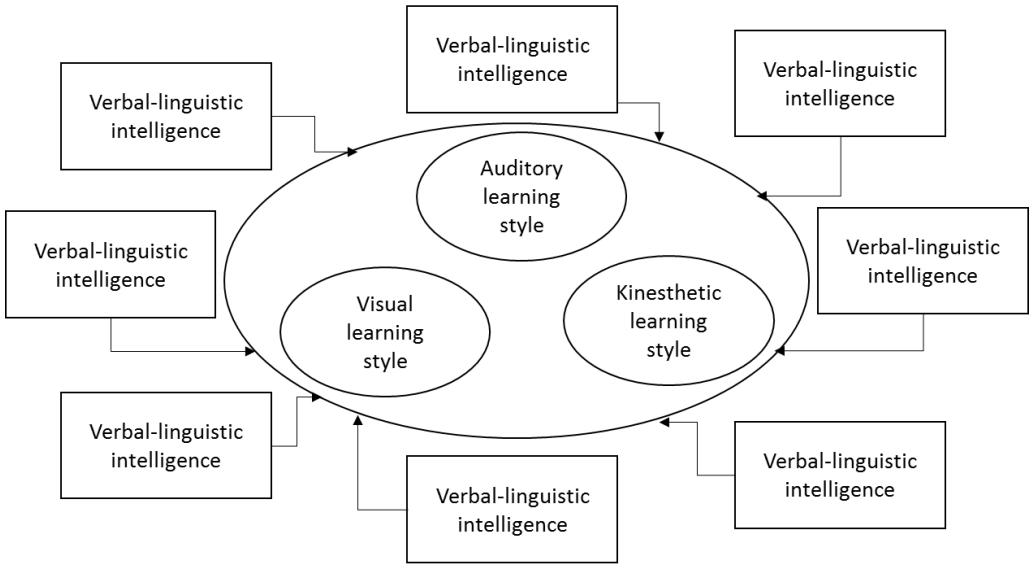

Figure 1: Conceptual framework of multiple intelligences and learning styles

Multiple intelligences and learning styles

Samarakou, Tsaganou, and Papadakis (2018) identified three dimensions for learning styles: conceptualization, visualization, and progression, meanwhile Alrabah, Wu, and Alotaibi (2018) indicated that while the dominant learning styles were global, extroverted, hands-on, and visual, their dominant multiple intelligences were interpersonal, visual, and kinesthetic. The visual and kinesthetic intelligence types received the highest score (Sener and Çokçaliskan, 2018), meanwhile, Ozgen, Tataroglu, and Alkan (2011) found out the logical-mathematical and visual-spatial are the dominant intelligence domains. Ürgüp and Aslan (2015) found that intra-personal intelligence was determined as the highest intelligence area, and after bodily-kinesthetic intelligence, existential intelligence was found to be the second-highest area for students, and Çeliköz (2017) found that the mathematical-logic, verbal, interpersonal and intrapersonal intelligence are found to be more dominant and their naturalist and visual intelligence are among the lowest intelligence areas.

Teachers used strategies steeped in spatial, logical, and linguistic intelligences to teach students how to draw, think, and write (Davis, 2017), meanwhile, Kandeel (2016) showed an overall appearance of all multiple intelligences' patterns of the sample students in the following order: self, social, bodily, logical, verbal, visual, musical and natural intelligence.

Tabari, and Tabari (2015) showed that there is a large number of the spatial and the interpersonal intelligences, whereas they had the least number of the intrapersonal, the musical, and the bodily-kinesthetic intelligence across knowledge understanding and application levels in the textbooks, meanwhile, Ebadi, and Beigzadeh (2016) revealed that the least dominant intelligence was intrapersonal, musical, and naturalist intelligence types and no example of the bodily-kinesthetic intelligence was observed in the analysed textbooks' activities. Ünsal (2018) revealed that the students preferred the visual learning style predominantly, followed by kinesthetic and auditory learning respectively, and very few multiple learning styles, meanwhile, Sener and Çokçaliskan (2018) revealed that the students had almost all these types of learning styles but mostly they were found to be tactile and auditory learners.

Literature review

The relationship between multiple intelligences and learning styles

Lee (2015) show that the learners with multiple major learning styles and with tactile or kinesthetic learning styles tended to have higher levels of expectation, and David (2005) revealed that the students perceived their strengths in interpersonal, intrapersonal, and verbal-linguistic intelligence and their weaknesses in bodily-kinesthetic and naturalist intelligence. Wilson (2018) found out that co-creating and multiple intelligence practices have transformed the classroom experience, and Eissa and Mostafa (2013) indicated the effectiveness of differentiated instruction by integrating multiple intelligences and learning styles on solving problems, achievement in, and attitudes towards math in the target students. Arulselvi (2018) pointed out that in the student-centered approach, individual students' needs, interests, and strengths make sense and every student has a different intellectual profile, and Winarti, Yuanita, and Nur (2019) revealed that multiple intelligences strategy of teaching has an effect on and can be a significant predictor of the development of students' multiple intelligences. Leasa, Corebima, and Ibrohim (2017) show that kinesthetic learners have a higher emotional intelligence than those of the auditory and reading learners, as much as 8.35% and 6.11% respectively, meanwhile students' retention was significantly weaker in traditional teaching when compared with the multiple intelligence classes (Ghamrawi, 2014; Irmscher, 2019).

Multiple intelligences can be tracked and facilitated through multimodal learning analytics in an online mode, as well as can be evaluated (Perveen, 2018; Garmen, Rodríguez, García-Redondo, & San-Pedro-Veledo, 2019). Kandeel (2016) found out an impact of visual intelligence, bodily, logical, and sometimes social, musical and natural on the mathematics'

achievement, meanwhile, Dolati and Tahriri (2017) revealed that only teachers of logical-mathematical type were influenced by their dominant intelligence that influences the types of activities being implemented in the classes. Gardner's multiple intelligence theory was considered as an explanatory variable of the emotional response within the different educational parts, and there is a weak significant correlation between the analytic domain of multiple intelligences and the objective part of the curriculum (Sánchez-Martín, Álvarez-Gragera, Dávila-Acedo, & Mellado, 2017; Sadiq, 2019).

Multiple intelligences create a student-centered classroom environment and integrating multiple intelligences activities in the lesson plans to aid students' learning, as well as managed students' motivation, and improve their skills (Davis, 2017; Geetha, 2015; Madkour & Mohamed, 2016). Different activities such as linguistics, logic, mathematics, spatial, physical and body-movement, music and rhythm skills, ability of human relationship, self-understanding, love of natural environment and higher level of existence it has resulted in an increase of multiple intelligence capabilities of students (Siphai, Supandee, Raksapuk, Poopayang, & Kratoorerk, 2017), and a variety of multiple intelligences support the learners' performance (Milad, 2018). Yaumi, Sirate, and Patak (2018) revealed that multiple intelligence-based instructions, designing student-centered approach, and mentoring the implementation of student-centered learning indicated significant contribution on multiple intelligences development and Widiana, and Jampel (2016) showed that the implementation of multiple intelligence approach improved the students' creative thinking and achievement in learning. Students' learning styles, after controlling for other variables, are associated with academic performance (Tan & Laswad, 2015; Chen, Jones & Xu, 2018), and Anbarasi et al. (2015) found out that teaching methods tailored to students' style of learning improve their understanding, performance, and retrieval of the subject.

Dueñas and Fredy (2013) found that students' interest not only foster learning but maximize students' multiple intelligences, and Elban (2018) found that the learning styles of pre-service teachers accounted for 28% of their academic success, but Rorie, William, and Frank (2003) indicated that learning style was not related to the students' overall performance. Sistani and Hashemian (2016) revealed that there was a strong positive relationship between intrapersonal intelligence and their cognitive and metacognitive strategies, and Sanchez-Martin, Alvarez-Gragera, Davila-Acedo, and Mellado (2017) depicted that both studied variables underwent a statistically significant enhancement through the application of the multiple intelligence-based educational methods. Moafian and Ebrahimi (2015) showed that linguistic and intrapersonal

intelligence were positive predictors of learners' efficacy, whereas mathematical intelligence was the negative predictor of students' self-efficacy, meanwhile, Cheema and Kitsantas (2016) showed that preferred learning styles were the most important predictors of learning strategies used in mathematics. Storek and Furnham (2013) revealed that mindset beliefs were not significantly related to multiple intelligences test scores, Azid, Yaacob, and Shaik-Abdullah (2016) revealed favourable responses towards the modular enrichment activities and the inclusion of multiple intelligences on improving each multiple intelligence profile. Medeiros, Leandro, Ferasso, and Schröeder (2014) pointed out that open and distance learning can revolutionize traditional pedagogical practice, meeting the needs of those who have different forms of cognitive understanding, and Alqarni (2018) showed that the teachers' awareness of multiple intelligence practices had the highest relationship with the practice of bodily-kinesthetic intelligence and the least relationship with the linguistic intelligence.

Rusli and Negara (2017) concluded that there was no interaction effect between the factors of visualization type and learning styles, meanwhile, Ebadi and Beigzadeh (2016) did not show any significant effect of proficiency level on application of intelligence types. Kim (2009) concluded that CALL software can be effectively used to enhance the many kinds of human intelligences employed when learning, and Savas (2012) indicated that multiple intelligences and foreign language learning have an ongoing, complex, and interactive relationship. Intan, Shaheen, and Schubert (2008) found that the performance of students who had undergone information literacy training through the application of learning styles was superior in their project work, and David (2005) revealed that personal intelligence suggesting that reflection and interpersonal skills contributed substantially to these learning activities. Hong-Ren, Chih-Hao, and Wen-Shan (2013) indicated that using interactive whiteboards, the learning achievement of the students with weaker logical-mathematical intelligence was higher than that of those with strong logical-mathematical intelligence, meanwhile, Angela (2007) found that the electronic inventory to assess learning styles of adults with intellectual difficulties were seen as an inclusion strategy to aid learning and achievement. Sener and Çokçaliskan (2018) revealed that most of the intelligence types and learning styles had a moderate positive correlation, as well as Narli, Ozgen, and Alkan (2011) revealed that there is a positive relationship between individuals' multiple intelligence areas and their learning styles. But, Ozgen, Tataroglu, and Alkan (2011) found out that a high-level correlation was not found between learning style dimensions and multiple intelligence domains. In conclusion, it has resulted that prior research is focused on the relationship between multiple intelligences and

different variables of teaching and learning or learning styles and different variables of teaching and learning. Thus, based on the literature review, there is a gap in studying the relationship between multiple intelligences and learning styles. Few studies only revealed the positive relationship between multiple intelligences and learning styles. Therefore, it is mainly hypothesized that:

Higher scores of multiple intelligences associate with higher scores of learning styles (Main Hypothesis).

Based on the main hypothesis, operational hypotheses have been formulated as follows:

H # 1: There is an association between verbal-linguistic intelligence and visual, auditory and kinesthetic learning styles.

H # 2: Higher scores of logical-mathematical intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.

H # 3: There is an association between higher scores of spatial-visual intelligence and higher scores of visual, auditory and kinesthetic learning styles.

H # 4: There is an association between musical intelligence and visual, auditory and kinesthetic learning styles.

H # 5: Higher scores of bodily-kinesthetic intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.

H # 6: There is an association between higher scores of interpersonal intelligence and higher scores of visual, auditory and kinesthetic learning styles.

H # 7: There is an association between intrapersonal intelligence and visual, auditory and kinesthetic learning styles.

H # 8: Higher scores of naturalist intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.

3. Methodology

Method and design

The quantitative approach was the method used in the research. The verbal-linguistic intelligence, logical-mathematical intelligence, musical intelligence, spatial-visual intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence were chosen in a conventional way to be used as independent variables. Meanwhile, visual, auditory, and kinesthetic learning styles were chosen in a conventional way to be used as dependent variables.

Participants

A sample of freshman and sophomore students as a non- random systematic sample was selected to be investigated in the research (N = 267). Systematic sampling is a probability sampling method because all elements have the same probability of selection (Fraenkel, Wallen & Hyun, 2017). Systematic sampling was used to increase the representativeness of the population in the sample. 87 students or 32.6% were selected in the economic faculty of the university; 101 or 37.8% were selected in law faculty; meanwhile, 79 students or 29.6% were selected in the information technology and innovation faculty of the university. The sample of respondents is composed of 160 or 60% females and 107 or 40% males.

The instrument

A structured questionnaire was used to gather the primary data from the students in the study. The questionnaire is based on the School of educators (2008), and on School on wheels (2010), and is modified, piloted and validated by the author. The verbal-linguistic intelligence, logical-mathematical intelligence, musical intelligence, spatial-visual intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence dimensions that were measured by the questionnaire were: studying, problem- solving, equipment functioning, subject choosing, and telling a story. Meanwhile, visual, auditory, and kinesthetic were the dimensions of learning styles. The questionnaire was piloted in about 20% of the respondents (N= 25) of the same study population. Alfa Cronbach's values of questionnaire scales vary from .085 to .093 confirming a very good value of reliability, as follows.

Table 1: Cronbach's alpha values

N0.	Variables	Alpha Cronbach value	Evaluation
1	Verbal-linguistic intelligence	.89	Good
2	Logical-mathematical intelligence	.91	Excellent
3	Musical intelligence	.88	Good
4	Assessment impact	.85	Good
5	Spatial-visual intelligence	.83	Good
6	Bodily-kinesthetic intelligence	.85	Good
7	Interpersonal intelligence	.87	Good
8	Intrapersonal intelligence	.89	Good
9	Naturalist intelligence	.95	Excellent
10	Visual learning style	.93	Excellent
11	Auditory learning style	.89	Good
12	Kinesthetic learning style	.91	Excellent

Analysis

Central tendency values, as well as frequency values, were used to describe the verbal-linguistic intelligence, logical-mathematical intelligence, musical intelligence, spatial-visual intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence, as well as visual, auditory, and kinesthetic learning styles. Chi-square test for independence is used to explore the relationship between multiple intelligences and learning styles ‘categorical variables. This test compares the observed frequencies or proportions of cases that occur in each of the categories, with the values that would be expected if there was no association between the two variables being measured. It is based on a crosstabulation table, with cases classified according to the categories in each variable (Pallant, 2013). Preliminary assumption testing was conducted to check for

normality, linearity, outliers, homogeneity of variance-covariance matrices, multicollinearity, and the lowest expected frequency in any cell (5 or more), with no violations noted.

4. Results

Descriptive analyses

Table 2 below shows the frequencies' scores of multiple intelligences in percentages. The multiple intelligences' scores are based on five level measurement scale: very low, low, average, high, and very high.

Table 2: Multiple intelligences frequencies

Multiple Intelligences Frequencies Percentages Part I

		Verbal-Linguistic knowledge	Logical-Mathematical knowledge	Spatial-Visual knowledge	Musical knowledge
Valid	Very low	8.2	3.7	10.1	10.1
	Low	29.1	29.9	6.7	4.1
	Average		16.0	8.6	28.0
	High	34.0	15.3	31.0	8.6
	Very high	28.4	34.7	43.3	48.9
	Total	99.6	99.6	99.6	99.6
Missing	System	.4	.4	.4	.4
Total		100.0	100.0	100.0	100.0

Multiple Intelligences Frequencies Percentages Part II

		Bodily-Kinesthetic knowledge	Interpersonal knowledge	Intrapersonal knowledge	Naturalist knowledge
Valid	Very low		27.6		25.7
	Low	24.6	6.0	5.6	21.6
	Average	15.3	28.7	4.5	26.9
	High	22.0	4.9	8.2	7.1
	Very high	37.7	32.5	81.3	18.3
	Total	99.6	99.6	99.6	99.6
Missing	System	.4	.4	.4	.4
Total		100.0	100.0	100.0	100.0

Table 3 below shows the frequencies' scores of learning styles in percentages. The learning styles' scores are based in three-level measurement categories: visual, auditory, and kinesthetic.

Table 3: Learning style frequencies

Learning Styles Frequencies Percentage

		Studying	Problem-solving	Equipment functioning	Subject choosing	Telling a story
Valid	Visual	46.6	99.6	27.2	20.9	5.6
	Auditory	5.6		5.6	11.9	52.2
	Kinesthetic	47.4		66.8	66.8	41.8
	Total	99.6		99.6	99.6	99.6
Missing	System	.4	.4	.4	.4	.4
Total		268	100.0	100.0	100.0	100.0

As shown in table 3, 46.6% of respondents preferred visual, 5.6% auditory, and 47.4% kinesthetic learning style related to studying dimension. 99, 6% of respondents preferred visual related to problem-solving dimension. 27.2% of respondents preferred visual, 5.6% auditory, and 47.4% kinesthetic learning style related to equipment functioning dimension. 5.6% of respondents preferred visual, 52.2% auditory, and 41.8% kinesthetic learning style related to telling a story dimension. Central tendency values (Mean, Median, Mode, Std. Deviation) support the frequencies (see table 13 in the appendices).

Inferential analyses

Test of Hypothesis

H # 1: *There is an association between verbal-linguistic intelligence and visual, auditory and kinesthetic learning styles.*

Table 4. Chi-square results of the association between verbal-linguistic intelligence and learning styles

Verbal-linguistic intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	201.33	<.005
	Auditory	267	5.6	201.33	<.005
	Kinesthetic	267	47.6	201.33	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	212.73	<.005
	Auditory	267	5.6	212.73	<.005
	Kinesthetic	267	67.0	212.73	<.005
Subject choosing	Visual	267	21.0	114.26	<.005
	Auditory	267	12.0	114.26	<.005
	Kinesthetic	267	67.0	114.26	<.005
Telling a story	Visual	267	5.6	202.07	<.005
	Auditory	267	52.4	202.07	<.005
	Kinesthetic	267	41.9	202.07	<.005

For verbal-linguistic intelligence-learning styles crosstabs outputs, as shown in table 4, it has resulted that visual learning style has achieved highest value in problem-solving dimension, and lowest in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and lowest in problem-solving. In conclusion, there appears to be an association between verbal-linguistic intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Pearson Chi-Square values (studying: 201.33; equipment functioning: 212.73; subject choosing: 114.26; telling a story: 202.07) for verbal-linguistic intelligence-learning styles, as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on verbal-linguistic intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .61; equipment functioning: .63; subject choosing: .46; telling a story: .61) support the strong association between verbal-linguistic intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case.

Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between verbal-linguistic intelligence and learning styles. Therefore, the hypothesis *H # 1: there is an association between verbal-linguistic intelligence and visual, auditory and kinesthetic learning styles*, is been supported.

H # 2: *Higher scores of logical-mathematical intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.*

Logical-mathematical intelligence -learning styles crosstabs outputs, as shown in table 5, showed that visual learning style has achieved highest value in problem-solving dimension, and lowest in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and lowest in problem-solving. In conclusion, there appears to be an association between logical-mathematical intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 5. Chi-square results of the association between logical-mathematical intelligence and learning styles

Logical-Mathematical intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	116.61	<.005
	Auditory	267	5.6	116.61	<.005
	Kinesthetic	267	47.6	116.61	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	63.62	<.005
	Auditory	267	5.6	63.62	<.005
	Kinesthetic	267	67.0	63.62	<.005
Subject choosing	Visual	267	21.0	124.22	<.005
	Auditory	267	12.0	124.22	<.005
	Kinesthetic	267	67.0	124.22	<.005
Telling a story	Visual	267	5.6	90.02	<.005
	Auditory	267	52.4	90.02	<.005
	Kinesthetic	267	41.9	90.02	<.005

For logical-mathematical intelligence -learning styles' Pearson Chi-Square values (studying: 116.62; equipment functioning: 63.62; subject choosing: 124.22; telling a story: 90.02), as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on logical-mathematical intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .47; equipment functioning: .34; subject choosing: .48; telling a story: .41) support the strong association between logical-mathematical intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Therefore, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between logical-mathematical intelligence and learning styles. Therefore, hypothesis *H # 2: Higher scores of logical-mathematical intelligence associate with higher scores of visual, auditory and kinesthetic learning styles,* is been supported.

H # 3: *There is an association between higher scores of spatial-visual intelligence and higher scores of visual, auditory and kinesthetic learning styles.*

Spatial-visual intelligence-learning styles crosstabs outputs, as shown in table 6, revealed that visual learning style has achieved highest value in problem-solving dimension, and the lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, meanwhile kinesthetic learning style has achieved highest value in subject choosing, and lowest value in problem-solving. In conclusion, there appears to be an association between spatial-visual intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 6. Chi-square results of the association between spatial-visual intelligence and learning styles

Spatial-visual intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	57.78	<.005
	Auditory	267	5.6	57.78	<.005
	Kinesthetic	267	47.6	57.78	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	25.3	99.43	<.005
	Auditory	267	12.7	99.43	<.005
	Kinesthetic	267	62.0	99.43	<.005
Subject choosing	Visual	267	21.0	112.00	<.005
	Auditory	267	12.0	112.00	<.005
	Kinesthetic	267	67.0	112.00	<.005
Telling a story	Visual	267	15.6	83.71	<.005
	Auditory	267	44.5	83.71	<.005
	Kinesthetic	267	39.9	83.71	<.005

For spatial-visual intelligence-learning styles' Pearson Chi-Square values (studying: 57.78; equipment functioning: 99.43; subject choosing: 112.00; telling a story: 83.71), as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on spatial-visual intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .32; equipment functioning: .43; subject choosing: .46; telling a story: .39) support the strong association between spatial-visual intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between spatial-visual intelligence and learning styles. Therefore, the hypothesis *H # 3: There is an association between higher scores of spatial-visual intelligence and higher scores of visual, auditory and kinesthetic learning styles*, is been supported.

H # 4: *There is an association between musical intelligence and visual, auditory and kinesthetic learning styles.*

For musical intelligence-learning styles crosstabs outputs, as shown in table 7, it has resulted that visual learning style has achieved highest value in problem-solving dimension, and the lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving and studying, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and lowest value in problem-solving.

Table 7. Chi-square results of the association between musical intelligence and learning styles

Musical intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	133.24	<.005
	Auditory	267	5.6	133.24	<.005
	Kinesthetic	267	47.6	133.24	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	38.92	<.005
	Auditory	267	5.6	38.92	<.005
	Kinesthetic	267	67.0	38.92	<.005
Subject choosing	Visual	267	21.0	118.73	<.005
	Auditory	267	12.0	118.73	<.005
	Kinesthetic	267	67.0	118.73	<.005
Telling a story	Visual	267	5.6	52.39	<.005
	Auditory	267	52.4	52.39	<.005
	Kinesthetic	267	41.9	52.39	<.005

In conclusion, there appears to be an association between musical intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Pearson Chi-Square values (studying: 133.24; equipment functioning: 38.92; subject choosing: 118.73; telling a story: 52.39) for musical intelligence-learning styles, as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on musical intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .50; equipment functioning: .27; subject choosing: .47; telling a story: .31) support the strong association between musical intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between musical intelligence and learning styles. Therefore, the hypothesis *H # 4: There is an association between musical intelligence and visual, auditory and kinesthetic learning styles*, is been supported.

H # 5: *Higher scores of bodily-kinesthetic intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.*

Bodily-kinesthetic intelligence -learning styles crosstabs outputs, as shown in table 8, revealed that visual learning style has achieved highest value in problem-solving dimension, and the lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, studying and equipment functioning, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and the lowest value in problem-solving. In conclusion, there appears to be an association

between bodily-kinesthetic intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 8. Chi-square results of the association between bodily-kinesthetic intelligence and learning styles

Bodily-kinesthetic intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	69.10	<.005
	Auditory	267	5.6	69.10	<.005
	Kinesthetic	267	47.6	69.10	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	70.91	<.005
	Auditory	267	5.6	70.91	<.005
	Kinesthetic	267	67.0	70.91	<.005
Subject choosing	Visual	267	21.0	47.79	<.005
	Auditory	267	12.0	47.79	<.005
	Kinesthetic	267	67.0	47.79	<.005
Telling a story	Visual	267	5.6	128.15	<.005
	Auditory	267	52.4	128.15	<.005
	Kinesthetic	267	41.9	128.15	<.005

For bodily-kinesthetic intelligence-learning styles' Pearson Chi-Square values (studying: 69.10; equipment functioning: 70.91; subject choosing: 47.79; telling a story: 128.15), as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on bodily-kinesthetic intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .360; equipment functioning: .36; subject choosing: .29; telling a story: .49) support the strong association between bodily-kinesthetic intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between bodily-kinesthetic intelligence and learning styles. Therefore, hypothesis *H # 5: Higher scores of bodily-kinesthetic intelligence associate with higher scores of visual, auditory and kinesthetic learning styles*, is been supported.

H # 6: *There is an association between higher scores of interpersonal intelligence and higher scores of visual, auditory and kinesthetic learning styles.*

For interpersonal intelligence-learning styles crosstabs outputs, as shown in table 9, it has resulted that visual learning style has achieved highest value in problem-solving dimension, and lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, studying and equipment functioning, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and

the lowest value in problem-solving. In conclusion, there appears to be an association between interpersonal intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 9. Chi-square results of the association between interpersonal intelligence and learning styles

Interpersonal intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	129.11	<.005
	Auditory	267	5.6	129.11	<.005
	Kinesthetic	267	47.6	129.11	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	125.00	<.005
	Auditory	267	5.6	125.00	<.005
	Kinesthetic	267	67.0	125.00	<.005
Subject choosing	Visual	267	21.0	174.10	<.005
	Auditory	267	12.0	174.10	<.005
	Kinesthetic	267	67.0	174.10	<.005
Telling a story	Visual	267	5.6	88.92	<.005
	Auditory	267	52.4	88.92	<.005
	Kinesthetic	267	41.9	88.92	<.005

Pearson Chi-Square values (studying: 129.11; equipment functioning: 125.00; subject choosing: 174.10; telling a story: 88.92) for interpersonal intelligence -learning styles, as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on interpersonal intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .49; equipment functioning: .48; subject choosing: .57; telling a story: .40) support the strong association between interpersonal intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case.

Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there appears to be an association between interpersonal intelligence and learning styles. Therefore, the hypothesis *H # 6: There is an association between interpersonal intelligence and visual, auditory and kinesthetic learning styles*, is been supported.

H # 7: *There is an association between intrapersonal intelligence and visual, auditory and kinesthetic learning styles.*

Intrapersonal intelligence-learning styles crosstabs outputs, as shown in table 10, pointed out that visual learning style has achieved highest value in problem-solving dimension, and

lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, studying and equipment functioning, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and the lowest value in problem-solving. In conclusion, there appears to be an association between intrapersonal intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 10. Chi-square results of the association between intrapersonal intelligence and learning styles

Intrapersonal intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	299.13	<.005
	Auditory	267	5.6	299.13	<.005
	Kinesthetic	267	47.6	299.13	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	305.16	<.005
	Auditory	267	5.6	305.16	<.005
	Kinesthetic	267	67.0	305.16	<.005
Subject choosing	Visual	267	21.0	129.24	<.005
	Auditory	267	12.0	129.24	<.005
	Kinesthetic	267	67.0	129.24	<.005
Telling a story	Visual	267	5.6	301.73	<.005
	Auditory	267	52.4	301.73	<.005
	Kinesthetic	267	41.9	301.73	<.005

For intrapersonal intelligence -learning styles' Pearson Chi-Square values (studying: 299.13; equipment functioning: 305.16; subject choosing: 129.24; telling a story: 301.73), as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on interpersonal intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .75; equipment functioning: .75; subject choosing: .49; telling a story: .75) support the strong association between intrapersonal intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between intrapersonal intelligence and learning styles. Therefore, the hypothesis *H # 7: There is an association between intrapersonal intelligence and visual, auditory and kinesthetic learning styles*, is been supported.

H # 8: *Higher scores of naturalist intelligence associate with higher scores of visual, auditory and kinesthetic learning styles.*

Naturalist intelligence-learning styles crosstabs outputs, as shown in table 11, showed that visual learning style has achieved highest value in problem-solving dimension, and lowest value in telling a story, auditory has achieved highest value in telling a story and lowest in problem-solving, studying and equipment functioning, meanwhile kinesthetic learning style has achieved highest value in equipment functioning and subject choosing, and the lowest value in problem-solving. In conclusion, there appears to be an association between naturalist intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Table 11. Chi-square results of the association between naturalist intelligence and learning styles

Naturalist intelligence	Learning styles	N	%	χ^2	p
Studying	Visual	267	46.8	150.18	<.005
	Auditory	267	5.6	150.18	<.005
	Kinesthetic	267	47.6	150.18	<.005
Problem-solving	Visual	267	100	C	<.005
	Auditory	267	0.0	C	<.005
	Kinesthetic	267	0.0	C	<.005
Equipment functioning	Visual	267	27.3	146.17	<.005
	Auditory	267	5.6	146.17	<.005
	Kinesthetic	267	67.0	146.17	<.005
Subject choosing	Visual	267	21.0	100.70	<.005
	Auditory	267	12.0	100.70	<.005
	Kinesthetic	267	67.0	100.70	<.005
Telling a story	Visual	267	5.6	108.26	<.005
	Auditory	267	52.4	108.26	<.005
	Kinesthetic	267	41.9	108.26	<.005

For naturalist intelligence-learning styles' Pearson Chi-Square values (studying: 150.18; equipment functioning: 146.17; subject choosing: 100.70; telling a story: 108.26), as well as associated significance level Asymp. Sig. 2-sided (.000) in all cases means that the proportion of respondents on interpersonal intelligence related to visual style is significantly different from the proportion of auditory or kinesthetic respondents. Values of Cramer's V (studying: .53; equipment functioning: .52; subject choosing: .43; telling a story: .45) support the strong association between naturalist intelligence and learning styles. Since problem-solving is constant no statistics are computed in this case. Thus, based on Pearson Chi-Square values as well as on values of Cramer's V there is an association between naturalist intelligence and learning styles. Therefore, hypothesis *H # 8: Higher scores of naturalist intelligence associate with higher scores of visual, auditory and kinesthetic learning styles*, is been supported.

5. Discussion and implications

According to frequencies as well as central tendency values it is found that 62.4% of respondents indicated high or very high level of verbal-linguistic intelligence, 50% of logical-mathematical intelligence, 74.3% of spatial-visual intelligence, 57.5% of musical intelligence, 59.7% of bodily-kinesthetic intelligence, 37.4% of interpersonal intelligence, 89.5% of intrapersonal intelligence, and 25.4% of naturalist intelligence. According to frequencies as well as central tendency values the study found that 46.6% of respondents preferred visual, 5.6% auditory, and 47.4% kinesthetic learning style related to studying dimension; 99, 6% of respondents preferred visual learning style related to problem-solving dimension; 27.2% of respondents preferred visual, 5.6% auditory, and 47.4% kinesthetic learning style related to equipment functioning dimension; 5.6% of respondents preferred visual, 52.2% auditory, and 41.8% kinesthetic learning style related to telling a story dimension. Therefore, faculties and departments, as well as lecturers should promote multiple intelligences development as important variables of learning styles.

Based on verbal-linguistic intelligence-learning styles crosstabs outputs, the study found an association between verbal-linguistic intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. Referring to Pearson Chi-Square values as well as on values of Cramer's V there is an association between verbal-linguistic intelligence and learning styles.

Based on logical-mathematical intelligence -learning styles crosstabs outputs, the study found an association between logical-mathematical intelligence dimensions: studying, problem-solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. Referring to Pearson Chi-Square values as well as on values of Cramer's V there is an association between logical-mathematical intelligence and learning styles.

According to spatial-visual intelligence-learning styles crosstabs outputs, the study found an association between spatial-visual intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. According to Pearson Chi-Square values as well as on values of Cramer's V there is an association between spatial-visual intelligence and learning styles.

Based on musical intelligence-learning styles crosstabs outputs, it is found an association between musical intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

Referring to Pearson Chi-Square values as well as on values of Cramer's V there is an association between musical intelligence and learning styles.

Based on bodily-kinesthetic intelligence -learning styles crosstabs outputs, the study found an association between bodily-kinesthetic intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. According to Pearson Chi-Square values as well as on values of Cramer's V it is found an association between bodily-kinesthetic intelligence and learning styles.

Referring to interpersonal intelligence-learning styles crosstabs outputs, the study found an association between interpersonal intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. According to Pearson Chi-Square values as well as on values of Cramer's V there is an association between interpersonal intelligence and learning styles.

Based on intrapersonal intelligence-learning styles crosstabs outputs, there is an association between intrapersonal intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles. According to Pearson Chi-Square values as well as on values of Cramer's V there is an association between intrapersonal intelligence and learning styles.

Referring to naturalist intelligence-learning styles crosstabs outputs, there is an association between naturalist intelligence dimensions: studying, problem- solving, equipment functioning, subject choosing, and telling a story and visual, auditory, and kinesthetic learning styles.

According to Pearson Chi-Square values as well as on values of Cramer's V there is an association between naturalist intelligence and learning styles.

Therefore, the main hypothesis, *higher scores of multiple intelligences associate with higher scores of learning styles*, is been supported. This conclusion is supported by previous research as well (Leasa, Corebima, & Ibrohim, 2017; Dolati & Tahriri, 2017; Sánchez-Martín, Álvarez-Gragera, Dávila-Acedo, & Mellado, 2017; Sadiq, 2019; Davis, 2017; Geetha, 2015; Madkour & Mohamed, 2016; Siphai, Supandee, Raksapuk, Poopayang, & Kratoorerk, 2017;

Yaumi, Sirate, & Patak, 2018; Sistani & Hashemian, 2016; Alqarni, 2018; David, 2005; Sener & Çokçaliskan, 2018; Narli, Ozgen, & Alkan, 2011). Therefore, faculties and departments, as well as lecturers should increase the development of multiple intelligences in teaching and learning as important predicting variables of learning styles.

6. Conclusion

One main limitation of the study should be acknowledged as part of the conclusions. The measurement of the multiple intelligences and learning styles variables is been made based on self- reported instruments. The purpose of the study was to investigate the relationships between the multiple intelligences and learning styles. The prior assumption was that there is an association between the multiple intelligences and learning styles.

The study found that there is an association between verbal-linguistic intelligence and learning styles. It is found that there is an association between logical-mathematical intelligence and learning styles. The study revealed that there is an association between spatial-visual intelligence and learning styles. It is found that there is an association between musical intelligence and learning styles. It is found an association between bodily-kinesthetic intelligence and learning styles. The study found that there is an association between interpersonal intelligence and learning styles. It is revealed that there is an association between intrapersonal intelligence and learning styles. The study revealed that there is an association between naturalist intelligence and learning styles. Therefore, the main conclusion of the research is that there is an association between multiple intelligences and learning styles.

The results of this study also have important implications for practice. The important programs should be designed to develop and to support students because it is confirmed by this study that there is an association between multiple intelligences and learning styles. Overall the findings of this study enhanced theoretical and practical understanding as the multiple intelligences are important variables that influence learning styles.

7. References

Alqarni, T. (2018). Teachers' Awareness and Practices of Multiple Intelligences Theory toward Students with Learning Disabilities in Saudi Schools. *ProQuest LLC*, Ph.D. Dissertation, Saint Louis University, 2018. ISBN: 978-0-4383-6143-0.

Alrabah, S., Wu, S., & Alotaibi, A. M. (2018). The Learning Styles and Multiple Intelligences of EFL College Students in Kuwait. *International Education Studies*, 11(3), pp. 38-47.

Anbarasi, M., Rajkumar, G., Krishnakumar, S., Rajendran, P., Venkatesan, R., Dinesh, T., Mohan, J., & Venkidusamy, S. (2015). Learning Style-Based Teaching Harvests a Superior Comprehension of Respiratory Physiology. *Advances in Physiology Education*, 39(3), pp. 214-217.

Angela M. L. (2007). Assessing learning styles of adults with intellectual difficulties. *Journal of Intellectual Disabilities*, 11(1), pp. 23-45. https://doi.org/10.1177/1744629507073997.

Arulselvi, E. (2018). Incorporating Multiple Intelligences in the English Classroom. *Excellence in Education Journal*, 7(2), pp. 101-121.

Azid, N. H., Yaacob, A., & Shaik-Abdullah, S. (2016). The Multiple Intelligence Based Enrichment Module on the Development of Human Potential: Examining Its Impact and the Views of Teachers. *Malaysian Journal of Learning and Instruction*, 13(2), pp. 175-200.

Çeliköz, M. (2017). Multiple Intelligence Distribution of Prospective Teachers: The Case at Yildiz Technical University. *Journal of Education and Practice*, 8(2), pp. 206-215.

Cheema, J., & Kitsantas, A. (2016). Predicting High School Student Use of Learning Strategies: The Role of Preferred Learning Styles and Classroom Climate. *Educational Psychology*, 36(5), pp. 845-862.

Chen, C., Jones, K. T., & Xu, S. (2018). The Association between Students' Style of Learning Preferences, Social Presence, Collaborative Learning, and Learning Outcomes. *Journal of Educators Online*, 15(1).

Christodoulou, J. (2009). Multiple Intelligences Defined. *School Administrator*, 66(2), pp. 23.

David W. C. (2005). Perceived Multiple Intelligences and Learning Preferences among Chinese Gifted Students in Hong Kong. *Journal for the Education of the Gifted*, 29(2), pp.187-212. https://doi.org/10.1177/016235320502900204.

Davis, C. Y. (2017). All Students Are Not Equal: A Case Study of Geometry Teachers' Instructional Strategies When Trained in Multiple-Intelligence-Based Practices in Secondary Classrooms. *ProQuest LLC*, Ed.D. Dissertation, Nova Southeastern University, 2017. ISBN: 978-0-3550-9202-8.

Dolati, Z., & Tahriri, A. (2017). EFL Teachers' Multiple Intelligences and Their Classroom Practice. *SAGE Open*, 7(3).

Dueñas M., & Fredy A. (2013). Development of the Distinct Multiple Intelligences in Primary Students through Interest Centers. *HOW*, 20(1), pp. 90-115.

Ebadi, S., & Beigzadeh, M. (2016). Investigating the Representation of Multiple Intelligences Theory in TPSOL Textbooks. *Journal on English Language Teaching*, 6(2), pp. 18-28.

Eissa, M. A., & Mostafa, A. A. (2013). Integrating Multiple Intelligences and Learning Styles on Solving Problems, Achievement in, and Attitudes towards Math in Six Graders with Learning Disabilities in Cooperative Groups. *Online Submission*, International Journal of Psycho-Educational Sciences 2(2), pp. 32-45.

Elban, M. (2018). Learning Styles as the Predictor of Academic Success of the Pre-Service History Teachers. *European Journal of Educational Research*, 7(3), pp. 659-665.

Fraenkel, J., Norman Wallen, N., Helen Hyun, H. (2017). *How to Design and Evaluate Research in Education*. 9th Edition. McGraw-Hill Education.

Garmen, P., Rodríguez, C., García-Redondo, P., & San-Pedro-Veledo, J. C. (2019). Multiple Intelligences and Video Games: Assessment and Intervention with TOI Software. *Comunicar: Media Education Research Journal*, 27(58), pp. 95-104.

Ghamrawi, N. (2014). Multiple Intelligences and ESL Teaching and Learning: An Investigation in KG II Classrooms in One Private School in Beirut, Lebanon. *Journal of Advanced Academics*, 25(1), pp. 25-46.

Hall, G. E., Quinn, L. F., & Gollnick, D. M. (2017). *Introduction to teaching: Making a difference in student learning*. Los Angeles, CA SAGE.

Hong-Ren C., Chih-Hao C., & Wen-Shan L. (2013). Learning Effects of Interactive Whiteboard Pedagogy for Students in Taiwan from the Perspective of Multiple Intelligences. *Journal of Educational Computing Research,* 49(2), pp.173-187. https://doi.org/10.2190/EC.49.2.c.

Intan A. M., Shaheen M., & Schubert F. (2008). Teaching information literacy through learning styles: The application of Gardner's multiple intelligences. *Journal of Librarianship and Information Science*, 40(2), pp. 93-109. https://doi.org/10.1177/0961000608089345.

Irmscher, M. (2019). The Interface Function of Thinking Styles between Personality and Intelligence. *World Journal of Education*, 9(1), pp. 79-91.

Kandeel, R. A. A. (2016). Multiple Intelligences Patterns of Students at King Saud University and Its Relationship with Mathematics' Achievement. *Journal of Education and Learning*, 5(3), pp. 94-106.

Kim, I. S. (2009). The Relevance of Multiple Intelligences to CALL Instruction. *Reading Matrix: An International Online Journal*, 9(1), pp. 1-21.

Leasa, M., Corebima, A. D., & Ibrohim, S. H. (2017). Emotional Intelligence among Auditory, Reading, and Kinesthetic Learning Styles of Elementary School Students in Ambon-Indonesia. *International Electronic Journal of Elementary Education*, 10(1), pp. 83-91.

Lee, B. (2015). EFL Learners' Perspectives on ELT Materials Evaluation Relative to Learning Styles. *RELC Journal: A Journal of Language Teaching and Research*, 46(2), pp. 147-163.

Madkour, M., & Mohamed, R. A. A. M. (2016). Identifying College Students' Multiple Intelligences to Enhance Motivation and Language Proficiency. *English Language Teaching*, 9(6), pp. 92-107.

Medeiros V., Leandro M., Ferasso, M., & Schröeder, C. da S. (2014). Connecting Multiple Intelligences through Open and Distance Learning: Going towards a Collective Intelligence? *European Journal of Open, Distance and E-Learning*, 17(1), pp. 108-117.

Milad, M. (2018). Incorporating Brain Colour into the Multiple Intelligences to Create a Blended Learning Context: Homogeneous and Heterogeneous Groups. *IAFOR Journal of Language Learning*, 4(1), pp. 41-55.

Moafian, F., & Ebrahimi, M. R. (2015). An Empirical Examination of the Association between Multiple Intelligences and Language Learning Self-Efficacy among TEFL University Students. *Iranian Journal of Language Teaching Research*, 3(1), pp. 19-36.

Narli, S., Ozgen, K., & Alkan, H. (2011). In the Context of Multiple Intelligences Theory, Intelligent Data Analysis of Learning Styles Was Based on Rough Set Theory. *Learning and Individual Differences*, 21(5), pp. 613-618.

Ozgen, K., Tataroglu, B., Alkan, H. (2011). An Examination of Multiple Intelligence Domains and Learning Styles of Pre-Service Mathematics Teachers: Their Reflections on Mathematics Education. *Educational Research and Reviews*, 6(2), pp. 168-181.

Pallant, J. (2013). *SPSS Survival Manual. A step by step guide to data analysis using IBM SPSS*. 5th Edition. Open University Press.

Pallant, J. (2013). *SPSS Survival Manual. A step by step guide to data analysis using IBM SPSS*. 5th Edition. Open University Press.

Perveen, A. (2018). Facilitating Multiple Intelligences through Multimodal Learning Analytics. *Turkish Online Journal of Distance Education*, 19(1), pp. 18-30.

Rorie N. H., William O. D., & Frank C. L. (2003). Are Learning Styles Relevant in Web-Based Instruction? *Journal of Educational Computing Research*, 29(1), pp. 13-28. https://doi.org/10.2190/YHL4-UP7P-K0GD-N5LJ.

Rusli, M., & Negara, I. K. R. Y. (2017). The Effect of Animation in Multimedia Computer-Based Learning and Learning Style to the Learning Results. *Turkish Online Journal of Distance Education*, 18(4), pp. 177-190.

Sadiq, B. J. (2019). The Analytic Domain of Multiple-Intelligence and Its Relation to English Objective Test. *English Language Teaching*, 12(5), pp. 161-169.

Samarakou, M., Tsaganou, G., & Papadakis, A. (2018). An e-Learning System for Extracting Text Comprehension and Learning Style Characteristics. *Educational Technology & Society*, 21 (1), pp. 126-136.

Sánchez-Martín, J., Álvarez-Gragera, G. J., Dávila-Acedo, M. A., & Mellado, V. (2017). What Do K-12 Students Feel When Dealing with Technology and Engineering Issues? Gardner's Multiple Intelligence Theory Implications in Technology Lessons for Motivating Engineering Vocations at Spanish Secondary School. *European Journal of Engineering Education*, 42(6), pp. 1330-1343.

Sanchez-Martin, J., Alvarez-Gragera, G. J., Davila-Acedo, M. A., & Mellado, V. (2017). Teaching Technology: From Knowing to Feeling Enhancing Emotional and Content Acquisition Performance through Gardner's Multiple Intelligences Theory in Technology and Design Lessons. *Journal of Technology and Science Education*, 7(1), pp. 58-79.

Savas, P. (2012). Pre-Service English as a Foreign Language Teachers' Perceptions of the Relationship between Multiple Intelligences and Foreign Language Learning. *Learning and Individual Differences*, 22(6), pp. 850-855.

School of educators (2008). *Multiple intelligence test*: Accessed from http://schoolofeducators.com/tag/multiple-intelligence-test-printable/.

Schools on wheels (2010). Learning style questionnaire: What's your learning style? Accessed from: https://www.schoolonwheels.org/pdfs/3121/Learning-Styles.pdf.

Sener, S., & Çokçaliskan, A. (2018). An Investigation between Multiple Intelligences and Learning Styles. *Journal of Education and Training Studies*, 6(2), pp. 125-132.

Siphai, S., Supandee, T., Raksapuk, C., Poopayang, P., & Kratoorerk, S. (2017). The Development of Multiple Intelligence Capabilities for Early Childhood Development Center, Local Administration Organization in Chaiyaphum Province. *Educational Research and Reviews*, 12(2), pp. 94-100.

Sistani, M., & Hashemian, M. (2016). Investigating the Role of Multiple Intelligences in Determining Vocabulary Learning Strategies for L2 Learners. *English Language Teaching*, 9(6), pp. 242-251.

Storek, J., & Furnham, A. (2013). Gender, "g", and Fixed versus Growth Intelligence Mindsets as Predictors of Self-Estimated Domain Masculine Intelligence (DMIQ). *Learning and Individual Differences*, 25, pp. 93-98.

Tabari, M. A., & Tabari, I. A. (2015). Links between Bloom's Taxonomy and Gardener's Multiple Intelligences: The Issue of Textbook Analysis. *Advances in Language and Literary Studies*, 6(1), pp. 94-101.

Tamilselvi, B., & Geetha, D. (2015). Efficacy in Teaching through "Multiple Intelligence" Instructional Strategies. *Journal on School Educational Technology*, 11(2), pp. 1-10.

Tan, L. M., & Laswad, F. (2015). Academic Performance in Introductory Accounting: Do Learning Styles Matter? *Accounting Education*, 24(5), pp. 383-402.

Ünsal, G. (2018). A Study on the Importance of Learning Styles in Foreign Language Teaching. *Online Submission*, International Journal of Languages' Education and Teaching 6(2), pp. 184-191.

Ürgüp, S., & Aslan, S. (2015). Investigation of Students' Multiple Intelligence Domains in Three Different Departments of the School of Physical Education and Sports. *Educational Research and Reviews*, 10(15), pp. 2068-2075.

Widiana, I. W., & Jampel, I. N. (2016). Improving Students' Creative Thinking and Achievement through the Implementation of Multiple Intelligence Approach with Mind Mapping. *International Journal of Evaluation and Research in Education*, 5(3), pp. 246-254.

Wilson, S. D. (2018). Implementing Co-Creation and Multiple Intelligence Practices to Transform the Classroom Experience. *Contemporary Issues in Education Research*, 11(4), pp. 127-132.

Winarti, A., Yuanita, L., & Nur, M. (2019). The Effectiveness of Multiple Intelligences Based Teaching Strategy in Enhancing the Multiple Intelligences and Science Process Skills of Junior High School Students. *Journal of Technology and Science Education*, 9(2), pp. 122-135.

Yaumi, M., Sirate, S. F. S., & Patak, A. A. (2018). Investigating Multiple Intelligence-Based Instructions Approach on Performance Improvement of Indonesian Elementary Madrasah Teachers. *SAGE Open*, 8(4).

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Appendices

Appendix A

Table 12: Central tendency values of multiple intelligences

Statistics

		Verbal-Linguistic Knowledge	Logical-Mathematical knowledge	Spatial-Visual knowledge	Musical knowledge	Bodily-Kinesthetic knowledge	Interpersonal knowledge	Intrapersonal knowledge	Naturalist knowledge
N	Valid	267	267	267	267	267	267	267	267
	Missing	1	1	1	1	1	1	1	1
Mean		3.45	3.45	3.91	3.82	3.73	3.09	4.66	2.70
Median		4.00	4.00	4.00	4.00	4.00	3.00	5.00	3.00
Mode		4	4	5	5	5	5	5	3
Std. Deviation		1.379	1.379	1.303	1.350	1.206	1.588	.809	1.406
Skewness		-.387	-.387	-1.126	-.775	-.324	-.069	-2.395	.374
Kurtosis		-1.348	-1.348	.105	-.575	-1.457	-1.463	4.588	-1.053
Minimum		1	1	1	1	2	1	2	1
Maximum		5	5	5	5	5	5	5	5

Appendix B

Table 13: Central tendency values of learning styles dimensions

Statistics

		Studying	Problem-solving	Equipments functioning	Subject choosing	Telling a story
N	Valid	267	267	267	267	267
	Missing	1	1	1	1	1
Mean		2.01	1.00	2.40	2.46	2.36
Median		2.00	1.00	3.00	3.00	2.00
Mode		3	1	3	3	2
Std. Deviation		.973	.000	.888	.819	.587
Skewness		-.015		-.868	-1.032	-.296
Kurtosis		-1.954		-1.169	-.712	-.686
Minimum		1	1	1	1	1
Maximum		3	1	3	3	3