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Exploration Of The Description And Relationship Of Each Learning Style And Multiple Intelligences Of High School Students

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Abstract

The purpose of this study was to examine the average frequency of learning styles and multiple intelligences of male and female students and to explore the relationship between the two with the learning style theory of Sheryl Wetter Riechmann & Anthony F. Grasha which is not widely used in Indonesia. The sample in this study was (n=981) with men (n=340, 34.65%) and women (n=641, 65.34%) taken from high school in Medan city, North Sumatra province. The results that can be reported are that there are only two learning styles in this study that are reported to have an average difference between women and men, namely independent and avoidant learning styles. Then for the average multiple intelligences, it is reported that there are 7 regions with different averages between men and women, while for the other 2 intelligence areas the averages are not much difference between men and women. Meanwhile, the correlation analysis of learning styles and multiple intelligences has varied correlations, but it can be concluded that there are three negative relationships but the values are not large and insignificant. Then there are 10 weak correlations but 6 are reported to be significant with p-value = < 0.050. then there are 97 relationships of learning styles and multiple intelligences that are reported to be significant with p-value = <0.001, for a full report can be seen in the results in this article.

1. Introduction

Multiple intelligences is one of the many theories about learning, but this theory focuses on the strengths of each individual because every human being has unique differences since they were born. This theory was introduced by Howard Gardner in his book Frames of Mind The Theory of Multiple Intelligences (Gardner, 1983) . Broadly speaking, he explained that there are 9 human intelligences, namely Logical-Mathematical, Linguistic, Interpersonal, Intrapersonal, Musical, Visual-Spatial, Bodily-Kinaesthetic, Naturalist, Existential intelligence. Each of these intelligences has its own characteristics and is a sign that each of these intelligences cannot be compared. For example, someone who has logical intelligence is not right when compared to someone with linguistic intelligence, meaning that in an education the assessment of individuals is not appropriate when it is decided by total value because everyone has their own strength value.

However, previous research has often looked at it based on the gender of each individual, whether women and men have differences in each of their intelligence (Bowles, 2008; Furnham et al., 1999, 2002; Furnham & Shagabutdinova, 2012; Furnham & Ward, 2001; Loori , 2005) research using adolescents as a sample is quite common, because the focus is intelligence both to predict and to describe (Alavinia & Farhady, 2012; Baş & Beyhab, 2010; Fadloli et al., 2021; Loori, 2005; Maker et al., 1996; Snyder, 1999; Ucak et al., 2006) and it is not only teenagers who need to be seen for their intelligence but children in educational settings have also done a lot of research (Cason, 2001; Niswatin et al., 2020) and not only children in general, children with disabilities also participate in describing their intelligence (Hearne & Stone, 1995; Rettig, 2005; Stevens, 2020) . Administratively, it is easier to

measure multiple intelligences with the help of technology (Ferreira & Jr., 2018; Garmen et al., 2019; Hilyana & Khotimah, 2021; McCoog, 2007; McLellan, 1994; Osciak & Milheim, 2001) and not always with a quantitative approach but some have done it with a qualitative approach (Acocella, 2021; Husnaini et al., 2021; Thambu et al., 2021) .

Several studies have explained that multiple intelligences are related to technical skills in one's education such as writing skills (Ahmadian & Hosseini, 2012; Lunenburg & Lunenburg, 2014) as well as language skills which are closely related to intelligence (Drakhshan & Faribi, 2015; Ghamrawi, 2014; Liu & Chen, 2013; Maftoon & Sarem, 2012) in line with that reading ability can also be predicted through intelligence (McMahon et al., 2004) as well as creative thinking (Luthfiana et al., 2019) and diverse learning styles (Klein, 2003). ; Manner, 2001; Sener & okçaliskan, 2018) how students' learning strategies (Eberle, 2011) reach one's academic achievement (Ekinci, 2014; Nard & Rani, 2018) . intelligence does not only explain a special part of education but also outside it such as being able to predict musical abilities (Wijayanti & Rukiyati, 2021) deepening a tone (Helding, 2009, 2010) how to communicate (Judith, 2019) one's personality (Subia et al., 2022) and religious (Karbono & Retnawati, 2021) .

Looking at the results of previous studies, multiple intelligences pretty much predict the field of education and other studies, both within the scope of learning and outside of it such as personality and of course it will be very useful in future research. Some people may misinterpret the terms intelligence and style so that at the beginning of the introduction of this theory Howard Gardner has stated that multiple intelligences and learning styles are different things (Gardner, 1983, p. xv) . So that early detection of multiple intelligences together with learning styles will be a force to determine education because everyone is naturally different.

Many learning styles were introduced by previous researchers because the learning settings were different and the focus they wanted to see was also different. However, of the many theories of learning styles that can be observed directly is the theory of Sheryl Wetter Riechmann & Anthony F. Grasha, where they explain learning styles consist of 6 areas, namely; First there is the independent style , where independent students prefer independent study, independent instruction, and working alone in certain jobs than with other students. They like to think for themselves and are confident in their learning abilities; and they prefer to study content they feel is important. They are confident learners who have no need to confer with others. Second, there is the dependent style, dependent learners view teachers and peers as sources of structure and guidance, and prefer authority figures to tell them what to do. They show little intellectual curiosity and only learn what is necessary.

Then the third is Competitive style, students who compete in learning tend to want to perform better than their peers. They see the class as a win-lose situation where they have to win. They love to be the center of attention and receive recognition for their achievements in class. Fourth, there is Collaborative style, Collaborative learners will learn through sharing and collaborating with teachers and their peers in small group discussions and group projects.

Fifth, there is Avoidant style, it can be seen from students who avoid various learning things who seem not enthusiastic about studying content and attending classes. They are reluctant to learn and are not interested in participating in class activities with teachers and their peers. They do not enjoy learning and generally try to avoid it at all costs. They are disinterested and overwhelmed by what is happening in class. They may not even want to attend class. And the sixth is the Participatory style, where students are eager to learn and enjoy class activities and discussions. They take responsibility for their learning, and are passionate about doing as much class work as possible. They are highly motivated to meet teacher expectations, enjoy going to class and taking part in as many course activities as possible, both mandatory and optional.

Because learning styles have several areas, learning styles based on gender are quite often reviewed by previous researchers (Baneshi et al.,

2014) and learning styles can predict a person's academic ability (Ilçin et al., 2018) . Therefore, the aim of this study is to examine the correlation of multiple intelligences with learning styles from Riechmann & Grasha's point of view, because nothing has been done so far in our literature and the most frequently reported learning styles are visual, auditory, reading and writing, and kinesthetic learning styles. This is also one of the reasons why conducting this research besides wanting to see how the mapping of students in public and private schools has recently implemented a student-centered learning system. Some have identified the learning styles of Riechmann & Grasha by conducting comparative studies based on age and gender (Corbin, 2017; Yearwood & Brathwaite, 2021) .

2. Method

a. Procedure

Data was collected during the preparation of the exam so as to create comfortable conditions, as well as the arrangement of the location in the classroom and each student was on their own bench and desk. Data retrieval is carried out after obtaining permission for conformity with the procedures and rules that apply at the Medan Area University. The data were analyzed using the JASP program.

a. Participant

The sample is grade 11 students who were taken randomly in Medan city, totaling 981 consisting of men (n=340, 34.65%) and women (n=641, 65.34%). Class 11 is taken because students have not made preparations for the final graduation exam as high school students in class 12, so that the final high school class usually cannot be disturbed due to preparation for the national final exam and the difficulty of obtaining permission at school for data collection. However, several studies in Indonesia have conducted analysis on grades 7 to 9 (Munir et al., 2021) , so that taking grade 11 is considered appropriate because it has not been carried out in Indonesia.

b. Measurement learning style

To measure learning style we use theory and measuring tools from (Riechmann & Grasha, 1974) developed a scale of 60 items with six subscales (independent (10 items), dependent (10 items), avoidant (10 items), participative (10 items).), competitive (10 items), and collaborative (10 items)) to identify the learning styles of the students. The answers were on a 5-degree Likert scale from strongly agree to strongly disagree.

c. Multiple intelligences

The multiple Intelligences measuring instrument used in this study is based on Howard Gardner's theory of Multiple Intelligences (Gardner, 1983, 1993) which includes verbal/linguistic intelligence, logical/mathematical intelligence, visual-spatial intelligence , bodily-kinesthetic intelligence, musical intelligence/intelligence rhythmic, interpersonal intelligence, intrapersonal intelligence, and naturalistic intelligence. The instrument has response responses with a range of 5 on a scale of 1 = "strongly disagree" and 5 = "strongly agree" and the total number of questions is 63 items.

3. Result

Demographic results showed that more women than men were sampled in this study with the composition of men (n=340, 34.65%) and women (n=641, 65.34%). Then the results of the reliability of the scale are reported based on the McDonald's and Cronbach's techniques which can be reported that the good reliability measures of the two are not significantly different and each scale has good reliability and it appears that there are only 2 scales that are in the sufficient range and are still within tolerance (> 0.5) as in the independent learning style with a value (= 0.571, = 0.547) and collaborative learning style with a value (= 0.651, = 0.623). Overall, the learning style and multiple intelligences scales have good consistency scores.

Table 2. Frequentist Scale Reliability Statistics

	□	□		□	□
Learning styles	0.905	0.921	**Multiple Intelligence**	0.953	0.952
Independent	0.571	0.547	Logical-Mathematical	0.819	0.814
Dependent	0.709	0.711	Linguistics	0.797	0.801
Collaborative	0.651	0.623	interpersonal	0.757	0.758
Competitive	0.672	0.711	intrapersonal	0.849	0.847
Participant	0.737	0.718	Visual-Spatial	0.844	0.832
avoidant	0.753	0.762	Body-Kinaesthetic	0.776	0.786
			Musical	0.842	0.84
			Naturalist	0.813	0.808
			Existential	0.793	0.788

= McDonald's, = Cronbach's

Looking at the descriptive data, it can be reported that the average learning style that has the largest distance between men and women is in the avoidant learning style which is around 1,580 points and the smallest distance is in the dependent learning style which is around 0.214 points. Then when viewed from the interval plot, there are two averages with a distance that does not intersect, namely independent and avoidant learning styles. Then for learning styles with a value above moderate that have been determined by Grasha are dependent, collaborative, competitive learning styles, both male and female. Meanwhile, for multiple intelligences, it can be reported that there are only two multiple intelligences that are not far apart and at the same time are stated to have close average differences, namely natural and existential intelligence. As for the intelligence that has the largest average distance, there is visual and kinesthetic intelligence.

Table 2. Descriptive Statistics

Learning styles	sex	GRN	M	SD	Multiple intelligence	sex	M	SD
independent	Men	2.8–3.8 (Moderate)	36,774	5.522	Logical-mathematical	Men	25,991	4,543
independent	women		35,610	5.013	Logical-mathematical	women	24,919	3.786
dependent	Men	3.0–4.0 (Moderate)	40,300	4.461	Linguistic-verbal	Men	26,365	4.682
dependent	women		40,086	3,672	Linguistic-verbal	women	25.165	4.164
Collaborative	Men	2.8–3.49 (Moderate)	40,774	5.679	Interpersonal	Men	27,268	4.404
Collaborative	women		40,153	4.207	Interpersonal	women	26,487	3,500
competitive	Men	1.8–2.8 (Moderate)	37,344	5.685	Intrapersonal	Men	28,553	4.262
competitive	women		36,328	5.109	Intrapersonal	women	27,669	3,707
participant	Men	3.1–4.1 (Moderate)	39,953	5.435	Visual-spatial	Men	25,750	4.698
participant	women		40,443	4.285	Visual-spatial	women	23,220	4,631
avoidant	Men	1.9–3.1 (Moderate)	30,344	7,814	Body-kinesthetic	Men	25,629	4,805
avoidant	women		28,764	6.925	Body-kinesthetic	women	23,423	4.727
					Musical and harmonic	Men	24,224	5,961
					Musical and harmonic	women	22,594	5.410
					naturalistic	Men	25,847	4.868
					naturalistic	women	25,170	4.411

Existential	Men	29,250	3,931
Existential	women	29,526	2,934

M= Mean, SD= Standard deviation, GRN= Grasha rating norm.

Furthermore, there is a correlation analysis of each section of multiple intelligences and students' learning styles. Correlation analysis with the spearman rho technique has been carried out in this study and overall there are 105 relationships that have been analyzed and there are 6 relationships that are not significant or p = > 0.050 then there are 2 significant relationships p = <0.010 and there are 97 significant relationships with values p= <0.001.

Furthermore, it was reported that there were three that had a negative relationship, namely participant learning style with avoidant with a value (r= -0.091, p=0.004), secondly, avoidant learning style with intrapersonal intelligence with a value (r= -0.014, p=0.672) and Lastly, there is an avoidant learning style with existential intelligence with a value of (r= -0.021, p=0.509).

Then there is a positive relationship that is considered weak because the value is close to zero but some are reported to be significant and some are not, overall there are 10 relationships with 6 relationships reported to be significant.

Table 4. weak relationship

			n	r		p
LS. dependent	-	LS.Avoidant	981	0.100	**	0.002
LS. Collaborative	-	LS.Avoidant	981	0.036		0.255
LS.Avoidant	-	Logical-mathematical	981	0.013		0.674
LS.Avoidant	-	Linguistic-verbal	981	0.052		0.101
LS.Avoidant	-	Interpersonal	981	0.055		0.085
LS.Avoidant	-	Visual-spatial	981	0.192	***	< .001
LS.Avoidant	-	naturalistic	981	0.133	***	< .001
Visual-spatial	-	Existential	981	0.195	***	< .001
Body-kinesthetic	-	Existential	981	0.195	***	< .001
Musical-rhythmic and harmonic	-	Existential	981	0.109	***	< .001

4. Discussion

Empirical results from the average learning style found that the differences in learning styles of men and women were only seen in independent and avoidant, however, this value did not show much difference between men and women. This means that overall there is no significant difference between men and women in dependent learning styles, collaboration, competition and participation. These results also explain that students have the same dependence between men and women in each faculty explaining the same results. Likewise with collaboration, each gender has the same collaborative learning style, in other words students are aware of the importance of cooperation besides they must be responsible for themselves in doing the tasks given by their teacher. While the competition between men and women is also not much different, meaning that the opportunity to be the best is wide open for men and women and there are no restrictions or gender inequalities in terms of competition, every student who struggles will get a value commensurate with what he does. Finally, the participation described in this result is equal between men and women, they both participate in every learning, and realize that learning needs to participate in every activity in their respective study programs.

Then for multiple intelligences, they report different results with learning styles, where men and women have quite different intelligence characters in 7 intelligence areas and it is reported that there are 2 that are not much different. In

existential intelligence, the difference does not really exist because the allude to the error value is quite large when viewed from the plot interval, which means that students have a fairly balanced awareness of them as students. Meanwhile, in natural intelligence, the error tangent is not as large as it is in existential intelligence, but even so, judging by the average value of men and women, it does not explain a significant average difference. This means that the ability of students to show empathy, be aware of and understand nature is quite balanced even for students with fields of study that are not directly involved with the study of nature such as biology, the environment, and others.

In the data section of the negative correlation between learning styles and multiple intelligences, there is only one significant relationship but simultaneously has a not strong relationship, while the other two negative relationships are not significant and also do not have a strong relationship. This means that from the three reports the relationship cannot be the basis for establishing a negative relationship or the meaning of the negative relationship, because the relationship is not strong and meaningless when viewed from empirical data.

5. Conclusion

Overall, only two learning styles in this study were reported to have an average difference between women and men, namely independent and avoidant learning styles. Then for the average multiple intelligences, it is reported that there are 7 regions with different averages between men and women, while for the other 2 intelligence areas the averages are not much different between men and women.

As for the analysis of the relationship between learning styles and multiple intelligences, the correlations vary, but it can be concluded that there are three negative relationships but the values are not large and insignificant. Then there are 10 weak correlations but 6 are reported to be significant with p value = < 0.050. then there are 97 relationships of learning styles and multiple intelligences which are reported to be significant with p value = <0.001.

Suggestions for further research is that it is necessary to conduct specific research related to the negative relationship with avoidant learning styles based on gender, age or with different levels of education. Then sampling based on non-probability is needed to see specific learning styles in certain samples. Data analysis with ANOVA also needs to be done to see differences in variance.

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