Dominant Learning Styles among Junior High School Students in Aceh and their Relationship with the Final Score in Social Sciences

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ABSTRACT

Learning style determines how student processes and recalls new information and skills. The learning styles often related to students' learning performance. This study aims to identify the learning styles of Junior High School students from 5 different schools in Aceh Province, Indonesia and investigate the relationship between a specific subject matter of Social Science final marks and learning style subscale scores. The social sciences subject is taught at 7-9 grade in Indonesia. The social sciences subject covers various matters including culture, history, economic and so forth. The learning styles of 170 junior high school students were determined using the (Indonesian version) Grasha-Riechmann Student Learning Style Scales. Students' cumulative scores of Social Science subject were used as an independent variable. The data obtained from the admission office of each school. Non-parametric statistical analysis was performed using the Kruskal-Wallis test to compare the social science cumulative scores among the six learning style groups. The most common learning style among students at 5 different schools was Dependent (24.7%). The students' scores of social sciences were correlated significantly with collaborative style group (r=0.427, P=0.016), but not significantly correlated with other learning style groups; Independent (r = -0.417, P = 0.137), Avoidant (r = -0.128, P = 0.722), dependent (r = -0.182, P= 0.248), competitive (r = -0.244, P = 0.178), and participant (r = -0.107, P = 0.504). Kruskal Wallis test shows significant differences between the collaborative group and their scores of social science subject (χ2 = 9.645, P = 0.008). Despite of being dependent learners, only students with collaborative learning style associated with significantly higher scores of social sciences subjects. Encouraging students to learn collaboratively may be effective in elevating academic performance among Acehnese junior high school students.

Keywords: Learning style, social science, junior high school.

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INTRODUCTION

Learning style is a conceptual structure which implicates learners' characteristics based on individual differences in comprehending the task or learning matterial. The personal differences of students such as personality, perception, ability, and intelligence determine their learning activities(Kazu, 2009). It is populer among aducators that what students learn are not actually

concerns of learning styles, but students' learning preferences also a key factor for students' academic achievement(Gokalp, 2013). Some students prefer and able to deal with abstract concepts like theoretical and symbolic informations, while some of them are attracted to more realistic matter (facts and data of experiments).

In addition to internal factors of students' in academic performance, student success in learning is often associated with the quality of teaching of the teacher(Ojeh, Sobers-Grannum, Gaur, Udupa, & Majumder, 2017). The statement is in line with the general thinking that to produce quality students, teachers as teaching staff must also carry out quality teaching activities. Therefore, the interactive and conducive atmosphere of teaching and learning can be realized if the teacher is aware of differences in the character of students.

In this case, the teacher plays an important role to determine the atmosphere of learning and motivate students to learn(Esmaeili, Mohamadrezai, & Mohamadrezai, 2015). The learning style prefered by students is related to the approach used by the teacher, the tasks received the form of assessment, time allocation, motivation, and the level of error(Lap & J, 2015). This opinion was strengthened by a study of (Ramsden, 1993) which showed that there was a connection between perceptions of the learning environment and student learning approaches. Students would seriously learn if they consider that the assessment of learning outcomes is memorization. Whereas (Kember & Gow, 1994) stated that students' achievement of learning outcomes are also influenced by too heavy workloads, knowledge-based assessment, lack of motivation, and learning situations in accordance with student desires.

There are various forms of learning styles suggested by educational experts, including David Kolp's Model (Sucan, Turan, Pepe, Karaoglu, & Dogan, 2016), which consists of Accommodation, Converger, Diverger, and Assimilator. This model was developed by David based on his teaching experience.

Another popular model is the learning modalities developed by Walter where one's learning style can be divided based on visualizing modalities, auditory modalities, and kinetic modality(Baig & Ahmad, 2016). There are also other models such as the Munford model, the Anthony Gregorc model, the NASSP model and the Grasha Model. In this study, we adopted a cognitive approach model developed by Grasha consisting of 6 styles, namely independent, avoidant, dependent, collaborative, competitive, and participative.

The study of learning styles is usually conducted at the tertiary level with university student respondents at various fields of study. (Pellón, Nome, & Arán, 2013) for example have investigated the relationship between learning styles and academic performance of 4 grader medical students in Chile. The most recent study by (Khanal, Giri, Shah, Koirala, & Rimal, 2019) investigated the influence of learning styles on the academic performance of preclinical medical students. We found the very limited study regarding the relationship between learning styles and academic performance or specific subject matter at primary education. Students at primary level in Indonesia start to learn social sciences from 7th grade to 9th grade. 9th graders aged 14-16 Years participated in this study because according to Jean Peaget, students at this ages are able to think logically and conprehend the abstract concepts.

Therefore, this article examines the relationship between students' learning styles and their scores in the subject of Social Sciences. This research was conducted in junior high school because in general, social studies subjects are only taught at this level of Indonesian primary education system.

MATERIALS AND METHODS
Research sample and population
The number of samples in this work was determined by using Slovin technique (Sevilla, Ochave, Punsalan, Regala, & Uriarte, 2007)

$$n = \frac{N}{1 + N \times e^2}$$

where

n = number of samples
N = number of populations
e = degree of error

170 secondary school students from 5 different schools with a mean ± SD age of 15.15 ± .99 years participated in this study. All students are at the second year of their study at five different junior high schools in Aceh Province, Indonesia, and two schools are located in the capital of Aceh province, Banda Aceh (School number 1 and 2), while other schools located in the district of Nagan Raya (School no. 3), District of Bireun (School no. 4), and District of Lhokseumawe (School no. 5). These 5 different schools were selected to represent the western part of Aceh, eastern part of Aceh, and central part, and capital of Banda Aceh.

Questionnaires
Data about student learning styles were collected by a questionnaire which was designed by Grasha-Reichmann learning style scale (GRLSS) without modification. Questions related to learning styles were made of each of the ten items arranged five intervals, as shown by Table 1. The questionnaire was generated using Google form, in addition to containing 60 questions about learning styles, the questionnaire also contained questions related to data from respondents, including names, date of birth, and gender.

Table 1. The six-learning style description as developed by Anthony Grasha and Sheryl Reichmann

Learning styles	Question number	Description
Independent	1,7,13,19,25,31,37,43,49,55	Students prefer to study independently rather than collaboratively
Avoidant	2,8,14,20,26,32,38,44,50,56	Students tend to avoid and are not interested to attend the class and learning activities
Collaborative	3,9,15,21,27,33,39,45,51,57	students enjoy learning and working harmoniously with their peers
Dependent	4,10,16,22,28,34,40,46,52,58	Students learn as instructed by teachers, show less intellectuality and curiosity in learning
Competitive	5,11,17,23,29,35,41,47,53,59	students are suspicious of their peers leading to competition for rewards and recognition from both teacher and peers
Participant	6,12,18,24,30,36,42,48,54,60	students have a strong will to take responsibility for independent learning as well as relate to their peers

Data collection technique

Data were collected from 20 April 2019 to 18 December 2019. a Google questionnaire link was given to students, and they were allowed to complete all questions between 100 and 150 minutes. Participants were kindly educated about the purpose of this study and the survey that would be carried out. Research assistants were ready to guide the respondents during data collection. Demographic characteristics (age, gender, and parents' education background) were collected at the first part of the questionnaire before the Grasha-Reichmann Learning Style Scale (GRLSS) to assess learning style was recorded. All student answer items obtained from online questionnaires were then downloaded for data processing.

The original GRLSS was translated and used without modification. Due to language change, the questionnaires were revalidated ($r = 0.71$, $p < 0.05$) and the internal consistency or reliability of the instrument were reevaluated using Cronbach alpha test. Table 2. shows the alpha value of each subscale items of the learning style questionnaires. The alpha value is often referred by researchers to determine the internal consistency of an instrument. The alpha obtained for all items (60) and each item (min. 0.795, max. 0.828) indicate the acceptable criteria ($\alpha > 0.7$). (Wieland, Durach, Kembro, & Treiblmaier, 2017) stated that the assessment of scale purification by several methods like internal consistency, and reliability is a vital part of the process of measuring theoretical constructs in empirical research. Because if this step failed, the corresponding set of items could not sufficiently represent the questionnaires construct, hence might severely impact the conceptual foundation of any research project. Furthermore, the initiator of Cronbach test (Cronbach, 1951) stated that any measurement-based research must take the accuracy or dependability or reliability of measurement into account. A reliability coefficient determined whether the test is interpreting the statements about individual differences correctly. Therefore, the reliability assessment of any instrument used in all research, especially in the field of social sciences is crucial to be performed prior to the use of the instruments in real measurements.

Table 2. Cronbach Alpha reliability coefficients of the Indonesian version of Grasha-Riechmann Student Learning Style Scales

Learning Style	Number of students (N)	Number of items	alpha
Independent	170	10	0.811
Avoidant	170	10	0.795
Collaborative	170	10	0.811
Dependent	170	10	0.826
Competitive	170	10	0.828
Participant	170	10	0.821
Total	170	60	0.815

Table 2. shows the number of students participated in the survey, the number of questions for each learning style, and the Cronbach alpha value. A total of 174 junior high school students from 5 different schools in Aceh Province were invited to participate in this study, but four surveys were excluded due to responses missing. As a result, data obtained from 170 students (male = 87, female = 83, with overall response rate of 97.7%) were used for further analyses.

Statistical analysis

Data obtained from the questionnaire was recapitulated, and students' answers were converted into numbers according to the Likert scale and as can be seen in Table 3. Furthermore, students were grouped into six different groups based on the dominant learning style. Each sub-score of learning style was calculated and correlated with students' social science subject cumulative scores using Spearman rho test as described later in this article.

Table 3. Likert's Scale Score for each question

Description	Score
Completely suitable for me	**7**
very suitable for me	6
suitable for me	5
less suitable for me	4
Not suitable for me	3
very unsuitable for me	2
Completely unsuitable for me	1

The Likert questionnaires score adapted from Grasha.

Statistical analyses were performed to compare social science cumulative scores among the learning style groups, significance of pairwise differences, and internal validity assessment of the questionnaires. The SPSS software version 22 for Windows (IBM corporation) was used to perform all data analyses. For categorical variables, the descriptive statistics were displayed as frequencies and percentages. The continuous variables were presented as mean and standard. The variables were investigated using visual probability plots and Kolmogorov-Smirnov test to ensure normal distribution. Since the parameters were not normally distributed, Spearman rho test was performed to calculate the correlation coefficients and their significance ($P<0.05$).

RESULTS

The number of students from each school and preferred learning styles are depicted in figure 1.

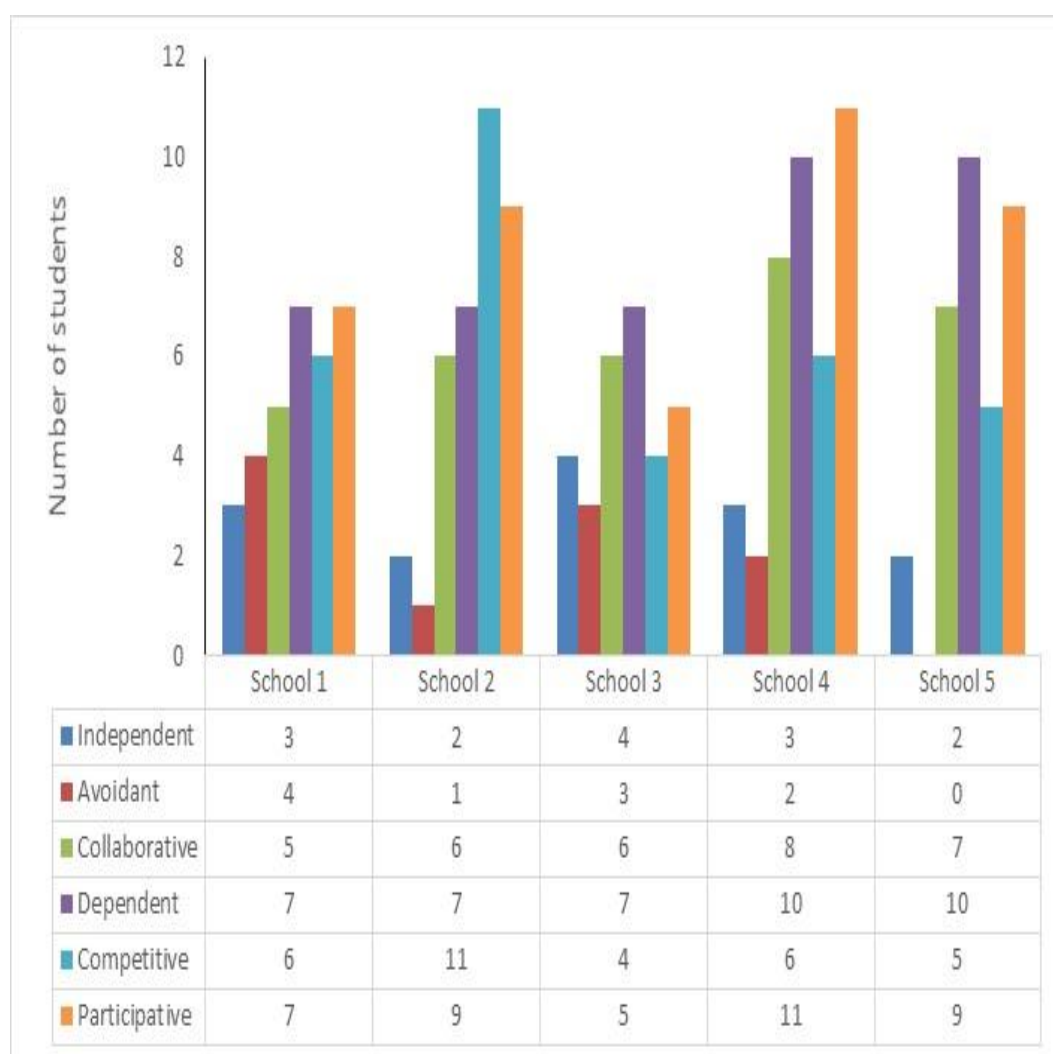|	School 1	School 2	School 3	School 4	School 5
■ Independent	3	2	4	3	2
■ Avoidant	4	1	3	2	0
■ Collaborative	5	6	6	8	7
■ Dependent	7	7	7	10	10
■ Competitive	6	11	4	6	5
■ Participative	7	9	5	11	9

Figure 1. Student learning styles of students from five junior high schools in Aceh. Participative, competitive, and dependent learning style is dominant in most schools, but avoidant, and independent learning styles are less dominant among students at all junior high schools.

Figure 1 illustrates that independent and collaborative learning styles were dominant at the school no. 1, 4, and 5, whereas students at school no. 3 preferred collaborative, and dependent learning styles and competitive and participative learning styles were popular among the students at school no. 2. The data also indicates that a small number of students from school 1 to 4 were determined as avoidant learners, but there was no student in school no. 5 prefer avoidant learning style.

This comparative study revealed that dependent learning style is popular among students from five junior high schools in Aceh province, Indonesia, as depicted by figure 2.
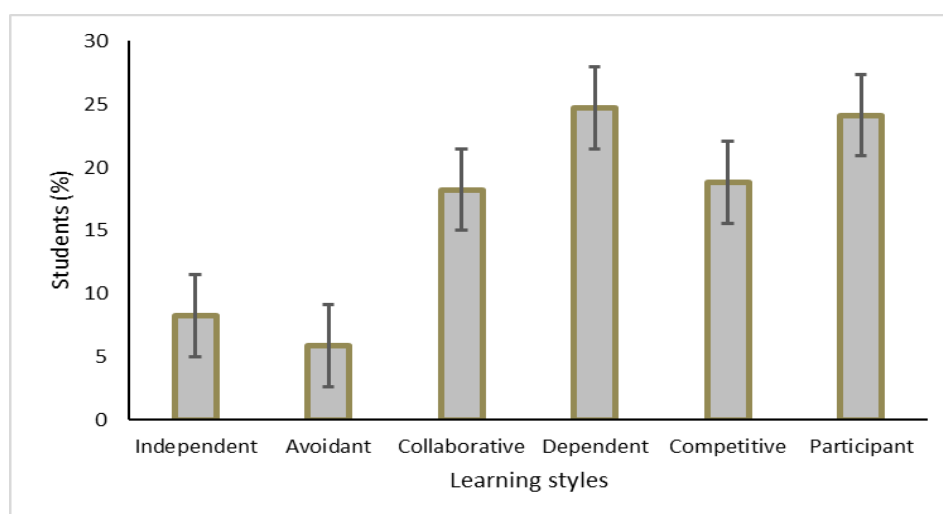

Figure 2. Dominant learning styles among junior high schools. Dependent style and participative style are dominant among junior high school students, while independent and avoidant style is less dominant.

Figure 2 shows that the two dominant learning styles among junior high school students are the dependent and participative styles. The data also shows that only about 5% of students preferred the Avoidant learning style. This finding is consistent with what was reported by (Suryaman, Iriani, & Handoyo, 2015) whose study results show that the avoidant learning style has the lowest value among vocational students. (Ilçin, Tomruk, Yeşilyaprak, Karadibak, & Savcl, 2018) also reported that the students with a dominant avoidant style did not correlate positively to their academic performance.

The most common learning styles among the junior high school students were Dependent (24.7%) and Participative (24.1%) as given in Figure 2. Even though most students at junior high schools preferred dependent and participative learning styles, the sub score of GRLSS for Participant learning style gained the highest sub score. The subscale scores of each learning style were given in Table 4. The highest subscale score was Participant (Mean ± SD = 5.07±1.7), while Avoidant score was the lowest (Mean ± SD = 3.78±1.8). However, when each group scores compared to the social sciences scores obtained by students using Kruskal-Wallis test (P<0.01), only Collaborative style group shows the significant difference (χ^2 = 9.645, P = 0.008), no other groups show a significant difference (Table 5). Spearman test also indicated a positive and significant correlation between collaborative learning scores and social science subject cumulative scores (r=0.427, P=0.016) while with other learning style groups there wasn't significantly correlated (Table 6)

Table 4. Learning style sub-scale scores of the junior high school students

N=170	Mean ± SD	Minimum	Maximum
Independent	4.70±1.7	4.39	5.33
Avoidant	3.78±1.8	2.97	4.66
Collaborative	4.93±1.6	4.18	5.39
Dependent	5.04±1.6	3.98	5.47
Competitive	4.95±1.7	3.91	5.56
Participant	5.07±1.7	4.59	5.42

Table 5. Kruskal Wallis Test of Learning style subscale scores correlated with social sciences students' scores.

Learning styles	χ^2	P
Independent	5.823	0.213
Avoidant	2.795	0.247
Collaborative	9.649	0.008

Dependent	1.063	0.900
Competitive	5.040	0.080
Participant	2.610	0.625

Table 6. Spearman correlation matrix among variables

	Dependent	Avoidant	Collaborative	Competitive	Participant
Social Science Cumulative Scores	r = -0.182 P = 0.248	r = -0.128 P = 0.722	r = 0.427 P = 0.016	r = -0.244, P = 0.178	r = 0.107 P = 0.504

Spearman correlation analysis, P<0.05

DISCUSSION

Learning style is a unique way of a student in accepting, processing and acquiring knowledge received during the learning process. The learning styles preferred by students usually determined by several factors like intelligence, aptitude and personality(Mangalalakshmi, 2008). Furthermore, (Abante, Almendral, Manansala, & Manibo, 2014) argued that the learning styles preferences among students might be influenced by several factors such as level of mastery of taught materials in the classroom, nutrition and physical development, and students-teachers relationships during teaching and learning process. Teachers' role in a classroom is very crucial to encourage students to learn effectively and achieve better learning outcomes, especially for students who preferred dependent learning style.

This study revealed that most students at junior high schools preferred dependent learning style. Dependent students tend to learn as instructed by teachers, show less intellectuality and curiosity in learning. (Sahoo & Chandra, 2014) stated that students with dependent learning style consider their teachers and peers as a source of learning and guidance, therefore, the students prefer to be fully guided in their learning activities. Dependent learners show less intellectual curiosity and afraid to do something new and challenging. Most students who participated in this study come from outlying areas of Aceh with less infrastructure, lack of learning resources such as book and internet access. Providing students with independent tasks either on the school with a proper guide or off school would significantly promote independent learning style among students (Luke & Hogarth, 2011).

Figure 1 depicted the learning styles of students from five schools located in four different districts. The pattern indicates a slight difference of students learning style. Most students were not quite independent nor avoidant in the learning, while other four styles are significantly dominant among students. The students at junior high schools tend to rely on their teachers to doing task and finishing the study process. This study implicates that most students are dependent learners as depicted by figure 2. Dependent learners tend to be less attracted to learn without teachers' support. (El-Koumy, 2019) explained the characteristics of dependent learners as students who rely heavily on their teachers, unable to make any decision regarding their learning, fail to connect what they learn with real world, and feel that teachers are responsible for their learning.

Although the dependent learning style was common and dominant, the students of this style group did not show significantly higher score in social science subject. On the other hand, only collaborative learning style group shows significantly higher scores in social science (r = 0.427, P = 0.016). (Fakomogbon & Bolaji, 2017) reported that Collaborative learning style was able to give positive impact on students' academic performance.

In Collaborative learning, two or more students are able to work together to solve a problem or task in learning this learning style also promotes social interaction during learning processes which involved three inherent characteristics includes scales of participation, learning context and collaboration method. Students with collaborative style of learning can mutually work with other students in the classroom so that the learning process would be more interactive and active.

CONCLUSION

This study shows that the junior high school students in Aceh prefer to study under teachers' guidance. However, the students who preferred Collaborative learning style had significantly higher scores in social sciences subject compared to other learning style groups. Among six learning styles, Dependent style and Participant style are highly dominant among the students. While Independent and Avoidant style are less dominant.

Limitation and Study Forward

This study covers a limited number of schools which is not represent all junior high school's entire province of Aceh. The learning style utilized in this study was based on Grasha-Reichmann model, other models of learning styles should also be a consideration of further study.

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