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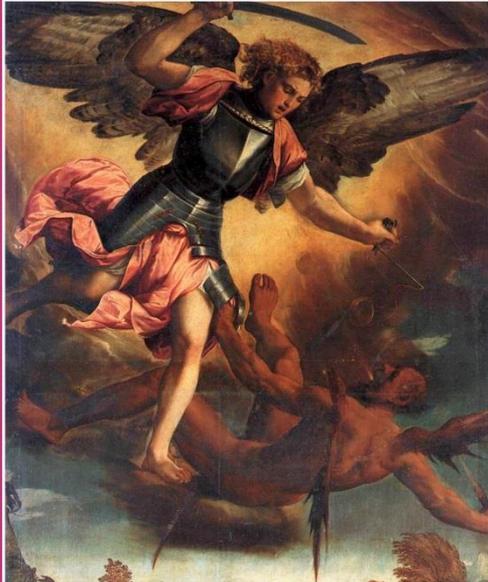
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Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
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Model of students' learning styles at Elementary School

Fahrurrozi¹, Desy Safitri², Arita Marini³, Apri Wahyudi⁴

**Universitas Negeri Jakarta, Indonesia. ¹fahrurrozi@unj.ac.id
²desysafitri@unj.ac.id, ³arita marini@unj.ac.id, ⁴apriwahyudistit-
pringsewu@gmail.com**

Abstract

The aim of this study is to offer a model of students' learning styles at elementary schools in West Jakarta in Indonesia. This model suggests that students' learning styles can be predicted by visual, auditory, and kinesthetic learning style. Data were collected from 276 students at grade three from elementary schools in West Jakarta in Jakarta Province in Indonesia. Structural Equation Modeling (SEM) was used to analyse the data in this study. The result of this study found that visual, auditory, and kinesthetic learning styles estimate students' learning styles. Other finding also confirmed that students preferring remember what they see to what they hear, students interested in symbol, picture, and colors, and students interested in reading predict student visual learning style. Another finding suggested that students learning by listening, students reading loudly, and students judging people by the sound of their voices influence auditory learning style. Students expressing emotion physically, students enjoying using body language, and students remembering well what they have done encourage kinesthetic learning style.

Keywords: students' learning styles, visual, auditory, and kinesthetic learning style

Modelo de estilos de aprendizaje de los alumnos en la escuela primaria

Resumen

El objetivo de este estudio es ofrecer un modelo de estilos de aprendizaje de los estudiantes en las escuelas primarias de West Jakarta en Indonesia. Este modelo sugiere que los estilos de aprendizaje de los estudiantes pueden predecirse mediante el estilo de aprendizaje visual, auditivo y kinestésico. Se recopilaron datos de 276 estudiantes de tercer grado de escuelas primarias en el oeste de Yakarta en la provincia de Yakarta en Indonesia. El modelo de ecuaciones estructurales (SEM) se utilizó para analizar los datos en este estudio. El resultado de este estudio encontró que los estilos de aprendizaje visual, auditivo y kinestésico estiman los estilos de aprendizaje de los estudiantes. Otro hallazgo también confirmó que los estudiantes que prefieren recordar lo que ven a lo que oyen, los estudiantes interesados en símbolos, imágenes y colores, y los estudiantes interesados en leer predicen el estilo de aprendizaje visual de los estudiantes. Otro hallazgo sugirió que los estudiantes que aprenden escuchando, los estudiantes que leen en voz alta y los estudiantes que juzgan a las personas por el sonido de sus voces influyen en el estilo de aprendizaje auditivo. Los estudiantes que expresan emociones físicamente, los estudiantes que disfrutan usando el lenguaje corporal y los estudiantes que recuerdan bien lo que han hecho fomentan el estilo de aprendizaje kinestésico.

Palabras clave: estilos de aprendizaje de los estudiantes, estilo de aprendizaje visual, auditivo y kinestésico.

Introduction

Gantasala & Gantasala (2009) found that dimensions of students' learning styles are visual, auditory, and kinesthetic learning styles as the three sensory receivers. Alkathiri, Alshreef, Alajmi, Alsowayan, & Alahmad (2018); Polat, Peker, Ozpeynirci, & Duman (2015); Niculescu, & Usaci (2015); Magdalena (2015); Rezaeinejad, Azizifar, & Gowhary (2015); Yee, Yunos, Othman, Hassan, Tee, Mohamad (2015); Omar, Mohamad, Paimin, (2015); Gogus, & Ertek (2016) found that there is association between student learning style and student achievement. Pasina, Bayram, Labib, Abdelhadi, & Nurunnabi (2019) presented that the students could

be grouped on the basis of the similarities of their learning style preferences. Yazicilar, & Guven (2009); Maric, Penger, Todorovic, Djurica, & Pintar (2015) found that the teaching approach was more effective by considering students' learning styles. However, there are less researches discussing about a model of students' learning styles at elementary school. Indonesian Ministry of Education and Culture on 10 May 2018 provided those 148,856 elementary schools, 1,480,710 teachers, 25,395,436 students, 117,314 educational staff, and 1,114,408 learning groups exist in Indonesia. This data shows that 1,537 state and 914 private elementary schools, 10,747 male and 27,903 female teachers, 420,539 male and 392,327 female students, 2,130 male and 1,536 female educational staff, and 29,116 learning groups exist in Jakarta. This source also presents that 176 state and 197 private elementary schools exist in the north Jakarta region, 352 state and 179 private elementary schools in the south Jakarta region, 445 state and 197 private elementary schools in the east Jakarta region, 360 state and 241 private elementary schools in the west Jakarta region, and 190 state and 100 private elementary schools in the central Jakarta region.

Based on Indonesian Minister of Education and Culture Regulation Number 36 in 2018, one of the perfection of thinking pattern developed through the 2013 curriculum is that enforcement of student centered learning pattern has to provide students the choices of their learning styles to have the standard competences and pay attention to development of special potencies belonged by the students. In fact, this kind of enforcement has not been shown optimally at elementary schools in Jakarta. This study was carried out for 276 students at grade three from elementary schools in West Jakarta in DKI Jakarta province in Indonesia.

Literature review

Diverse learning environment allowed the students with different learning style preferences to improve their coping skills, behaviors, and learning strategies (Gantasala & Gantasala, 2009). This study found that the students aware of different learning strategies could choose the appropriate style for an assignment given. Alkathiri, Alshreef, Alajmi, Alsowayan, & Alahmad (2018); Polat, Peker, Ozpeynirci, & Duman (2015); Niculescu, & Usaci (2015); Magdalena (2015); Rezaeinejad, Azizifar, & Gowhary (2015); Yee, Yunos, Othman, Hassan, Tee, Mohamad (2015); Omar, Mohamad, Paimin, (2015); Gogus, & Ertek (2016) found that there is a need for students to learn with their mainly preferred style of learning to have

effective achievement reached. On the basis of individual differences, different students apply different learning styles in their learning. The student learning style compatibility made them comfortable in the course of learning. The students' success was associated directly with the right learning style. Identification of students' learning styles served as initial guide to develop more effective and conducive environment to improve student Higher Order Thinking Skills. The study of Pasina, Bayram, Labib, Abdelhadi, & Nurunnabi (2019) stated that teaching approach can be used suitable with the students' learning style preferences in order to improve the student learning outcomes. This study also presented that the students having the same learning styles can be grouped together in doing assignments. Yazicilar, & Guven (2009); Maric, Penger, Todorovic, Djurica, & Pintar (2015) found that application of teaching activities taking into account the students' learning styles enhance the student proficiency. Therefore, the educators should understand about the learning styles prevailing in their students. However, there is less detail explanation about the measurement of students' learning styles at elementary school.

Theoretical framework

This study proposes the model of students' learning styles. Visual, auditory, and kinesthetic learning style are predictive variables for learning style (Gantasala & Gantasala, 2009). The hypothesized relationship is described in the model, which can be seen in Figure 1.

Research design

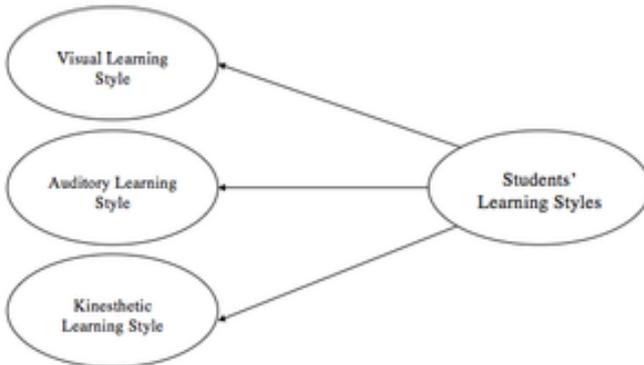
The questionnaires in this survey study were used in data collection from 276 grade three students at elementary schools in West Jakarta in DKI Jakarta province in Indonesia. Data collected were related to students' learning styles as the endogenous variable and visual, auditory, and kinesthetic learning styles as the exogenous variables in this research.

Content analysis of the literature for learning style was conducted in this study on the basis of Gantasala & Gantasala (2009) finding that the model of students' learning styles based on three sensory receivers involving visual, auditory, and kinesthetic learning styles. These ideals were altered into the questionnaires provided to 276 participants.

The questions related to students' learning styles consisted of three dimensions: visual, auditory, and kinesthetic learning styles. Visual learning style is composed of three indicators (students preferring remember what they see to what they hear, students interested in symbol, picture, and colors,

and students interested in reading). Auditory learning style includes three indicators (students learning by listening, students reading loudly, and students judging people by the sound of their voices). Kinesthetic learning style consists of three indicators (students expressing emotion physically, students enjoying using body language, and students remembering well what they have done).

Figure 1. Theoretical framework of the study



This study used the Structural Equation Modeling (SEM) with IBM SPSS Statistics 24 and SPSS AMOS 24 in 2017 Edition to analyze data. It was utilized to examine the set of relationship between students' learning styles as the endogenous variable and visual, auditory, and kinesthetic learning styles as exogenous variables. Data was entered with Excel by putting the scores of each item responded by 276 participants with strongly agree, agree, neutral, disagree, and strongly disagree (scored 5, 4, 3, 2, and 1, respectively, for positive questions and 1, 2, 3, 4, and 5, respectively, for negative questions).

Findings

Table 1 shows about the results of goodness-of-fit statistical analysis. It can be seen in Table 1 that Normed Fit Index (NFI) value achieved 0.576 pointing out that the model suggested is good fit. The Comparative Fit Index (CFI) value attained 0.610 showing that the model presented is good fit. Incremental Fit Index (IFI) value arrived at 0.628 indicating that the model is good fit. Relative Fit Index (RFI) value reached 0.364 suggesting that the model proposed is good fit. Goodness of Fit Index (GFI) value got 0.913 showing that the model considered is good fit. Adjusted Goodness

of Fit Index (AGFI) value gained 0.837 indicating that the model hypothesized in this study is good fit. SEM measurement pointing out that the model proposed in this study is a fit model.

Table I. Model Fit Summary

Fit measurement	Fit Value		
	Cut-Off Limitation	Value	Decision
NFI	$0 < \text{NFI} < 1$; $\text{NFI} \geq 0.90 = \text{good fit}$	0.576	Good Fit
CFI	$0 < \text{CFI} < 1$; $\text{CFI} \geq 0.90 = \text{good fit}$	0.610	Good Fit
IFI	$0 < \text{IFI} < 1$; $\text{IFI} \geq 0.90 = \text{good fit}$	0.628	Good Fit
RFI	$0 < \text{RFI} < 1$; $\text{RFI} \geq 0.90 = \text{good fit}$	0.364	Good Fit
GFI	$0 < \text{GFI} < 1$; $\text{GFI} \geq 0.90 = \text{good fit}$	0.913	Good Fit
AGFI	$0 < \text{AGFI} < 1$; $\text{AGFI} \geq 0.90 = \text{good fit}$	0.837	Good Fit

Table II showed a measurement model test of the observed variables that visual, auditory, and kinesthetic learning style were statistically significantly connected with learning style of 0.732, 1.207, and 0.960, respectively. Students preferring remember what they see to what they hear, students interested in symbol, picture, and colors, and students interested in reading was significantly correlated with visual learning style of 0.234, 0.460, and 0.605, respectively. Students learning by listening, students reading loudly, and students judging people by the sound of their voice as observed variables were significantly associated with auditory learning style of 0.375, 0.505, and 0.382, respectively. Students expressing emotion physically, students enjoying using body language, and students remembering well what they have done as observed variables were significantly correlated with kinesthetic learning style of 0.476, 0.333, and 0.235, respectively. The structural model can be seen in Figure 2.

Table II. Measurement model test

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
VLS	<---	LRST	2.071	0.734	2.822	0.005	
ALS	<---	LRST	1.837	0.723	2.543	0.011	
KLS	<---	LRST	1.000				
LS3	<---	VLS	1.000				
LS2	<---	VLS	0.663	0.152	4.355	***	
LS1	<---	VLS	0.369	0.135	2.745	0.006	
LS6	<---	ALS	1.000				
LS5	<---	ALS	1.732	0.382	4.530	***	
LS4	<---	ALS	1.071	0.273	3.930	***	
LS9	<---	KLS	1.000				
LS8	<---	KLS	1.630	0.618	2.636	0.008	
LS7	<---	KLS	2.311	0.800	2.888	0.004	

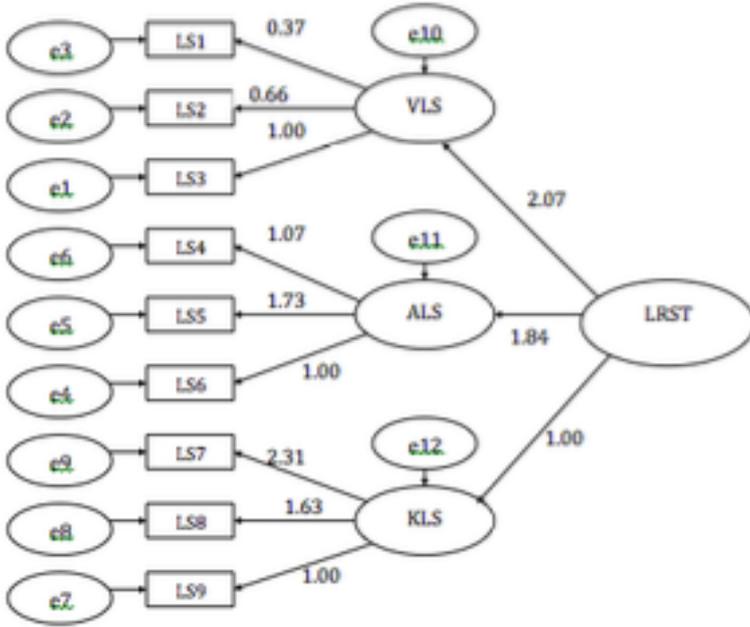
**Standardized Regression Weights:
(Group number 1 - Default model)**

			Estimate
VLS	<---	LRST	0.732
ALS	<---	LRST	1.207
KLS	<---	LRST	0.960
LS3	<---	VLS	0.605
LS2	<---	VLS	0.460
LS1	<---	VLS	0.234
LS6	<---	ALS	0.382
LS5	<---	ALS	0.505
LS4	<---	ALS	0.375
LS9	<---	KLS	0.235
LS8	<---	KLS	0.333
LS7	<---	KLS	0.476

Notes:

- LRST = Learning style
- VLS = Visual learning style
- ALS = Auditory learning style
- KLS = Kinesthetic learning style
- LS1 = Students preferring remember what they see to what they hear
- LS2 = Students interested in symbol, picture, and colors
- LS3 = Students interested in reading
- LS4 = Students learning by listening
- LS5 = Students reading loudly
- LS6 = Students judging people by the sound of their voices
- LS7 = Students expressing emotion physically
- LS8 = Students enjoying using body language
- LS9 = Students remembering well what they have done

Figure 2. The structural model



Discussions

It can be seen in Table I that the NFI value achieved 0.576, which was more than 0 and less than 1 showing that the model suggested in this study was already fit. Table 1 showed that the CFI value arrived at 0.610, which was a value more than 0 and less than 1 indicating that the model proposed was fit. The IFI value came to 0.628, which was more than 0 and less than 1 pointing out that the model offered was already fit. The RFI value reached 0.364, which was more than 0 and less than 1 showing that the model presented was already fit. The GFI was 0.913, which was greater than 0.9 indicating that the considered model was already fit. The AGFI was 0.837, which was more than 0 and less than 1 pointing out that the hypothesized model was a good fit for the data.

Table II showed a measurement model test of the observed variables that visual, auditory, and kinesthetic learning style had significant correlation with students' learning styles of 0.732, 1.207, and 0.960, respectively. This result is similar to the study of Gantasala & Gantasala (2009) presenting

that the learning style model on the basis of three sensory receivers, visual, auditory, and kinesthetic.

Students preferring remember what they see to what they hear, students interested in symbol, picture, and colors, and students interested in reading had significant association with visual learning style of 0.234, 0.460, and 0.605, respectively. This is in line with the study of Gantasala & Gantasala (2009) recommending that the characteristics of the student visual learning style consist of mind straying during verbal activities, observing rather than talking or acting, organizing in approach to tasks, and memorizing by creating mental images.

Students learning by listening, students reading loudly, and students judging people by the sound of their voice as observed variables had significant correlation with auditory learning style of 0.375, 0.505, and 0.382, respectively. This is in line with the study of Gantasala & Gantasala (2009) stating that the description of student auditory learning style consisted of talking to self aloud, whispering to self while reading, being aware of rhythm, enjoying music and the sound of words, enjoying talking and listening, and assessing the situation as it sounds to them.

Students expressing emotion physically, students enjoying using body language, and students remembering well what they have done as observed variables had significant association with kinesthetic learning style of 0.476, 0.333, and 0.235, respectively. This is similar with the study of Gantasala & Gantasala (2009) stating that the characteristics student kinesthetic learning style involved tapping pencil with objects while studying, remembering what they have done rather than seen/heard, preferring to utilize gestures and touch people while talking to them, solving the problems by physically working through them, and having very good body control.

Conclusion

A model on the basis of empirical evidences to predict students' learning styles is proposed by this research. Visual, auditory, and kinesthetic learning style can estimate students' learning styles. Students preferring remember what they see to what they hear, students interested in symbol, picture, and colors, and students interested in reading predict student visual learning style. Students learning by listening, students reading loudly, and students judging people by the sound of their voices predict auditory learning style. Students expressing emotion physically, students enjoying using body language, and students remembering well what they have done en-

courage kinesthetic learning style.

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