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Construct Validity and Reliability of the Learning Motivation Questionnaire

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Abstract **– This study aims to determine the construct validity and reliability of the learning motivation questionnaire. Data was collected and documented from 306 respondents and analyzed through confirmatory factor analysis (CFA) using the Lisrel 8.50 program. The results showed that motivation in learning was due to the following factors, namely interest, motivation, commitment, optimism, and an adequate learning environment. Furthermore, the instruments used were declared valid, reliable and also fulfilled the model requirements because they had a loading factor > 0.40, a t-value > 1.96 and a construct reliability coefficient of 0.902.**

Keywords **– construct validity, construct reliability, learning motivation.**

1. Introduction

Motivation is a psychological construct that plays an important role in students' learning, achievement, and academic success [1].

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It is the overall driving force that causes the occurrence, ensures continuity, and directs learning activities in students in order to achieve a desired goal [2]. This phenomenon can be observed in disciplines such as general learning, science, and mathematics, where results show that students' motivation, influences, strategies, and beliefs affect their learning and performance [3]. Several definitions from experts regarding motivation broadly contain almost the same meaning. Motivation comes from the word motive which can be interpreted as the power contained within the individual, which causes the individual to act [4]. Motivation is a change in the energy contained in students that encourages students to want to do what they want to achieve, something that makes the student want to do it and complete academic tasks [5], [6], [7].

Studies also showed that highly motivated students are more involved in activities that enhance their academic achievements [8], [9], [10], which in turn increases their creativity, learning style, and academic achievements [11]. Therefore, without sufficient motivation on the part of the students, even the most accomplished individuals cannot achieve long-term goals and ensure student achievement using the appropriate curriculum and teaching processes [12].

Motivation in learning is essential as it provides both internal and external motivation to students who are learning to make changes to their behavior in general. This can be carried out by promoting their desire to succeed, persuading them to learn, building their expectations and aspirations for the future, appreciating them during learning processes, and providing a conducive learning environment [13]. Many experts categorize motivation into two, namely intrinsic which from within the individual and extrinsic which from outside [14].

Intrinsic motivation arises from students' attitudes towards learning, their goals, ambitions, and more. Students who are intrinsically motivated during learning are most likely to succeed [12]. Moreover, this type of motivation arises from the individual's

own volition without any coercion from others. For example, some students enjoy reading, writing, and carrying out other activities without coercion from others [2]. A person who is already intrinsically motivated will consciously carry out an activity that does not require external motivation. Therefore, in learning, intrinsic motivation is needed, specifically while studying alone, as it leads to progress [15].

The aspects of intrinsic motivation according to M. S. Lemos and L. Verissimo [16] includes interest, challenge, and curiosity, while H. B. Uno [13] stated that they included the desire to succeed, motivation, the need for learning, as well as expectations and aspirations for the future. However, A. Pujadi [17] gave only one aspect of motivation and its usefulness in learning, while M. K. Gowing [18] claimed that there were four aspects, namely motivation, commitment, initiative, and optimism.

Extrinsic motivation is the opposite of intrinsic, this type is caused by specific reasons and external stimuli [2] such as money, gifts, grades, positive feedback, students' desire to please their parents, desire to succeed in exams, and peer group influence [9]. According to S. B. Djaramah [15], learning motivation is believed to be extrinsic when students set their goals as a result of external factors. This means students learn because they want to achieve goals that are beyond what they are studying such as getting high marks, degrees, honors, etc. Furthermore, according Santrock [20] pointed out that extrinsic motivation meant performing something to get something else (a way to reach a goal). Factors that influence extrinsic motivation include the quality of teachers, the subject matter, teaching methods, conditions and atmosphere of study rooms, and student accessible learning facilities such as libraries [17].

The role of motivation in learning is a major concern for teachers and they need an instrument capable of measuring students' learning motivation. Therefore, this study aims to develop and provide such an instrument that is both valid and reliable using a combination of intrinsic and extrinsic factors proposed by experts. These factors include interest, motivation, commitment, optimism, and an adequate learning environment.

2. Methods

This is an exploratory descriptive study that uses a quantitative approach. The data was in the form of questionnaires containing students' learning motivation scores. Furthermore, data was collected using the documentation method, with 306 respondents from universities in East Java, Yogyakarta, Central Java, Lampung, Palembang, and South Kalimantan with a male and female percentage of 17% and 83%, respectively.

The questionnaire comprised of 5 aspects, namely interest, motivation, commitment, optimism, and learning environment with a total of 17 points as seen in Table 1. Furthermore, a Likert scale with five categories was used in carrying out the measurement.

Table 1. Learning Motivation Questionnaire Grid

Aspect	Indicator	No Item
Interest (A)	• There is a sense of interest	1, 2
	• Give greater attention	3
	• There is an awareness to learn	4, 5
Encouragement (B)	• Desire to succeed	6, 7
	• There is a need for learning	8
Commitment (C)	• Persevere and work hard in learning	9, 10
	• Do the assigned task	11, 12
Optimism (D)	• Not easy to give up in pursuit of goals	13
	• Believe that everyone has the potential to grow	14
Learning Environment (E)	• Learning Facilities	15, 16
	• Learning atmosphere	17

Data was collected using a learning motivation questionnaire in which students were utilized as the respondents and was analyzed using the Lisrel 8.50 Second-Order Confirmatory Factor Analysis (CFA) program. CFA is a multivariate analysis method that is used to ensure that variables are understood in an appropriate and consistent measurement model, meaning it ensures that the measurement model designed is the same as the hypothesis [21]. However, the Second-order confirmatory is used if a latent factor has several indicators which cannot be measured independently but rather require more indicators [22]. Determination of the validity of the instruments was based on the standard value of the loading factor which showed ≥ 0.40 [23][24], while several studies utilize a loading factor > 0.3 [25], [26], [27].

To analyze the validity of the instruments, the Lisrel program was used to test the fit of the measurement model (fit model). A model is believed

to be fit if the theoretical or hypothetical model developed is suitably (fit) supported by empirical data [22]. Moreover, it is considered to be under field data if it satisfies two of the three criteria which are a measure of fit [28], hence, the Root Mean Square Error of Approximation (RMSEA) must be < 0.08 with a p-value > 0.05, and the Goodness of Fit Index. (GFI) must be > 0.90. In this study, several criteria were used to evaluate the model fit including the normed chi-square (χ^2/df), RMR (Root Mean-square Residual), GFI (Goodness-of-Fit Index), NFI (Normed Fit Index), Non-Normed Fit Index (NNFI), and CFI (Comparative Fit Index). Cronbach's Alpha formula was also used to determine the reliability of the construct with a value not less than 0.7.

3. Results and Discussion

The first stages of the analysis aimed to determine the general degree of fit or Goodness-of-Fit (GOF) between the data obtained and the measurement model developed. This was carried out using CFA and based on 8 criteria, namely p-value, normed χ^2, RMSEA, RMR, GFI, NFI, NNFI, and CFI. The results are shown in Figure 1.

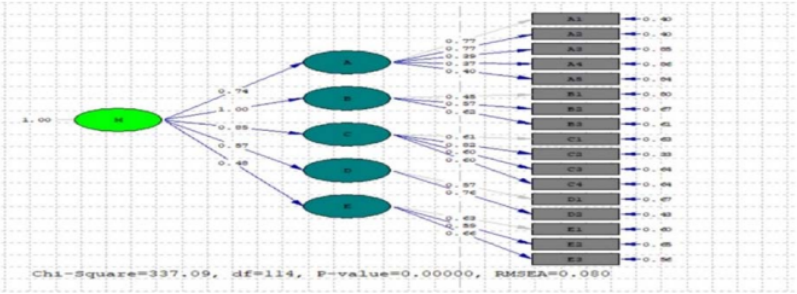

Figure 1. Standardized Solution

Based on Figure 1 and the results of the Lisrel output, the matching results are described in Table 2 below.

Table 2. Model Fit

No.	GOF size	Estimated Results	Fit Criteria	Match Rate
1	p-value	0,00	> 0,05	Not fit
2	normed χ^2	337,09	< 2df	Not fit
3	RMSEA	0,080	< 0,08	Not fit
4	RMR	0,062	≤ 0,10	Fit
5	GFI	0,88	≥ 0,90	Not fit
6	NFI	0,79	≥ 0,90	Not fit
7	NNF	0,82	≥ 0,90	Not fit
8	CFI	0,85	≥ 0,90	Not fit

From the results obtained in Table 2, it was observed that out of the 8 criteria tested, only RMR was discovered to be fit, therefore, adjustments were made on the instrument model based on the suggestions from Lisrel. After modification, further calculations were carried out on the Standard Solution and t-value of the model fit as shown in Figures 2 and 3, respectively.

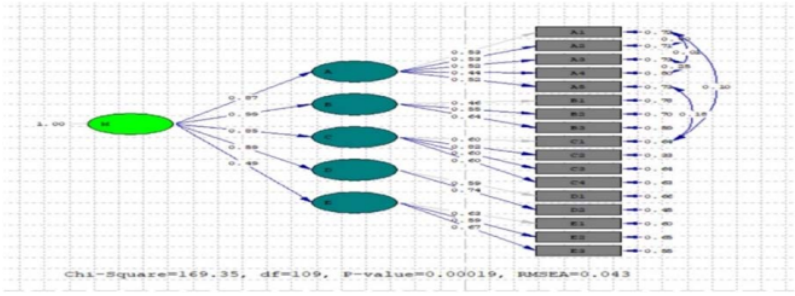

Figure 2. Modified Standardized Solution Model

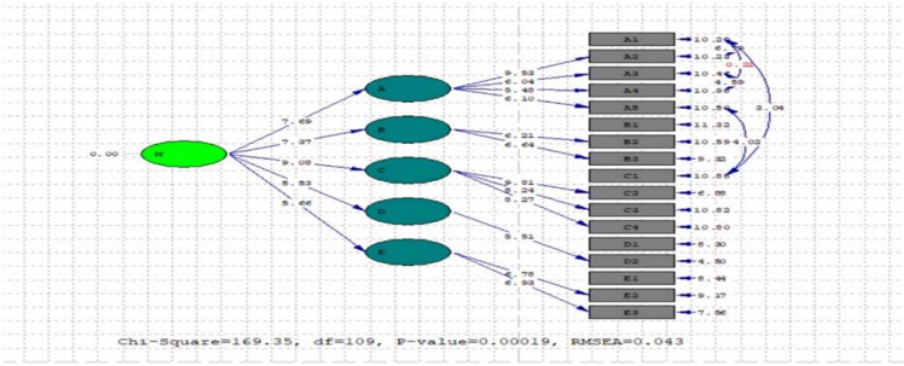

Figure 3. Modified T-values Model

The matching results from Figure 2 and the Lisrel output are described in Table 3.

Table 3. Modified Model Fit

No.	GOF size	Estimated Results	Fit Criteria	Match Rate
1	p-value	0,00019	> 0,05	Not fit
2	normed χ^2	169,35	< 2df	Fit
3	RMSEA	0,043	< 0,08	Fit
4	RMR,	0,038	≤ 0,10	Fit
5	GFI	0,94	≥ 0,90	Fit
6	NFI	0,88	≥ 0,90	Not fit
7	NNF	0,94	≥ 0,90	Fit
8	CFI	0,95	≥ 0,90	Fit

From Table 3, it can be observed that 6 out of the 8 criteria were discovered to be fit, hence, the instrument model was considered fit.

This was supported by the study conducted [28] which stated that an instrument model developed was to be declared suitable with field data if two of the three criteria used as a measure of suitability were fulfilled, which in this case was p-value, RMSEA, and GFI.

After determining the model fit of the instrument, its ability to measure construct validity was evaluated.

This was carried out by observing the value of the standard loading factor (SLF) of each aspect or indicator to determine the magnitude of the factor load on each item. Furthermore, the output of the second-order CFA was used to determine if each item fulfilled the requirements necessary to calculate its construct validity. An indicator or aspect was considered valid only when the value of the standard loading factor was greater than 0.40 [23][24].

The results of the construct validity and reliability test from Figures 2 and 3 are shown in Table 4.

Table 4. Construct Validity and Reliability

Aspect	Item	Second-Order CFA		Description	Reliability per aspect	Total Reliability
		SLF	T-Value			
Interest (A)	1	0,53	***	Valid	0,64	0,902
	2	0,53	9,52	Valid		
	3	0,52	6,04	Valid		
	4	0,44	5,48	Valid		
	5	0,52	6,10	Valid		
Encouragement (B)	6	0,46	***	Valid	0,57	
	7	0,55	6,21	Valid		
	8	0,64	6,64	Valid		
Commitment(C)	9	0,6	***	Valid	0,75	
	10	0,82	9,81	Valid		

	11	0,6	8,24	Valid	
	12	0,6	8,27	Valid	
Optimism(D)	13	0,59	***	Valid	0,61
	14	0,74	5,51	Valid	
	15	0,63	***	Valid	
Learning Environment (E)	16	0,59	6,78	Valid	0,66
	17	0,67	6,93	Valid	

Table 4 shows a summary of the validity and reliability of the constructs carried out with the Lisrel 8.50 program. The results obtained from the construct validity tests show that the total number of statements were 5, 3, 4, 2 and 3 for the interest, motivation, commitment, optimism, and learning environment aspects, respectively. In addition, the value of the load factor was greater than 0.4 and the t-value was > 1.96 for the 17 items, therefore, the learning motivation questionnaire fulfilled the conditions necessary for construct validity, therefore, considered valid in describing the motivaton model.

When the reliability of each aspect was observed, only commitment was declared reliable because it had a construct reliability value > 0.7, showing 0.75. However, a total reliability > 0.7, showing 0.902 was obtained. As a result, the 17 items on the learning motivation questionnaire were declared valid and reliable and can be used to measure learning motivation.

4. Conclusion

From the study carried out, it was observed that the components of learning motivation include interest, motivation, commitment, optimism and an adequate learning environment. Moreover, the results of the instrument analysis carried out using a total of 306 student respondents showed that as many as 17 items had a loading factor and t-value greater than 0.3 and 1.96, respectively, hence, they were all declared valid. The reliability of the construct also gave a value > 0.7, showing 0.902, and was declared reliable and fit as a model. Therefore, it can be seen that a learning motivation questionnaire can be used as a construct to measure students' motivation in learning.

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III.B.1 TEM

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