Motivation Measurement model to Learn Basic Buliding Construction and Survey Engineering using Confirmatory Factor Analysis

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Abstract

The purpose of this study was to produce an instrument of learning motivation in the subject of Basic Building Construction and Survey Engineering (DKBT) using factor analysis. Conceptually, the learning motivation instrument developed has two factors, specifically intrinsic and extrinsic. The subjects of the research were the 11th grade students of SMKN 3 Jombang second semester 2018/2019 totaling 62 people. Data were analyzed using SPSS 24, including instrument reliability indicators (Cronbach Alpha), Kaiser-Meyer-Olkin (KMO), percentage of construction variance, and item validity (loading factor). The results showed that the Cronbach Alpha value in the classification was higher than 0.70 that was 0.93, the KMO price was 0.681, the construction variance percentage was 68.39%, and the factor load was all items ≥ 0.3. Thus the measurement model is suitable for measuring the learning motivation of DKBT students in the Modeling Design and Building Information.

Keywords: learning motivation; basic building construction and survey engineering; factor analysis

Abstrak

Tujuan dari penelitian ini adalah untuk menghasilkan instrumen motivasi belajar dalam mata pelajaran Konstruksi Bangunan Dasar dan Teknik Survei (DKBT) menggunakan analisis faktor. Secara konseptual, instrumen motivasi belajar yang dikembangkan memiliki dua faktor, khususnya intrinsik dan ekstrinsik. Subjek penelitian adalah siswa kelas XI SMKN 3 Jombang semester II 2018/2019 yang berjumlah 62 orang. Data dianalisis menggunakan SPSS 24, termasuk indikator reliabilitas instrumen (Cronbach Alpha), Kaiser-Meyer-Olkin (KMO), persentase varians konstruksi, dan validitas item (loading factor). Hasil penelitian menunjukkan bahwa nilai Cronbach Alpha dalam klasifikasi lebih tinggi dari 0,70 yaitu 0,93, harga KMO 0,681, persentase varians konstruksi adalah 68,39%, dan beban faktor semua item $\geq 0,3$. Dengan demikian model pengukuran ini cocok untuk mengukur motivasi belajar siswa DKBT dalam Desain Modeling dan Membangun Informasi.

Kata kunci: motivasi belajar; konstruksi bangunan dasar dan teknik survei; analisis faktor

Introduction

Armstrong (2008) has been distinguishes about motive and motivation. The meaning of motive in generally is interpreted as a tendency of a person. It is seen as still potential. Actualization of motives is called motivation which is generally manifested in real life. Bigge & Hunt (1980); Siagian (2004), motivation is an impulse of curiosity that causes someone to make an effort or achieve their desires. Nolker & Schoenfelft (1983) defines motivation as something that drives of behavior. Wexley (1984) says that motivation is a process that causes a person's behavior to be stronger and

more directed at something that is being done. McDonald opinion about motivation is a energy of change in the people who is characterized by the emergence of affective, and reactions to achieve goals, as well as encouragement from within oneself and this impulse is a driving force (Hamalik, 2005). Armstrong (2008) defines motivation as something that makes people act or behave in certain ways. So, motivation is encouragement, something that moves a person to act or behave to achieve his goals or desires.

The concept of motivation is often used in the context of learning to become learning motivation. According to McCombs (1991) learning motivation is a naturally formed internal ability that can be improved or nurtured through activities that provide support, provide opportunities to choose activities, give responsibilities to control the learning process, and provide learning tasks that are useful and in accordance with individual needs. According to Alderfer, learning motifvation is the tendency of students to do all learning activities that are driven by a desire to achieve the best achievement or learning outcomes (Miner, 2002).

Learning motivation in the school can be divided into two forms, intrinsic motivation and extrinsic motivation Winkel (2009). Intrinsic motivation is the desire to do something for him/her self (Huffman, Vernoy, & Vernoy: 1997). Someone or students who have intrinsic motivation not need a rewards or penalties to make them studying because learning activities have been already usefull. They enjoy the task or the feeling of achievement (Woolfolk, 2006). While extrinsic motivation is the desire to do something because of external rewards or avoidance of punishment.

The characteristic of extrinsic motivation in learning activities at school are started of learning activities or continuing based on needs, and encouragement that are not absolutely related to learning activities themselves (Winkel, 2009). Someone with extrinsic motivation is not too interested in the activity but only cares about what can be obtained (profits) from the activity (Woolfolk, 2006). According to Winkel, extrinsic motivation can be classified (1) learning to avoid of punishment, (2) learning to get reward, (3) learning to increase social prestige, (4) learning to get praise from important people, and (5) learning to demands of the position that you want to hold or to promotion qualify. For students who have reached secondary level, extrinsic motivation can be more dominant than before, because at this stage of development students realize the importance of learning for their own development and progress.

According to McClelland, et al (1987) motivational indicators are: (1) full of spirit to achieving success, (2) responsibility, (3) doing challenging tasks; (4) have self-confidence, (5) show the efort and and diligent in achieving goals, (7) superior desire from the others, and (8) creative and always determine realistic goals. Sadiman, et al. argues (2012) motivational indicators consist of: (1) persevering in facing tasks, (2) resilient in facing difficulties, (3) showing interest in various problems; (4) prefers to work independently, (5) gets tired of routine tasks, and (6) can defend opinions.

Curriculum 2013 (K-13) for Vocational High School, Field of Technology and Engineering, Construction and Property Engineering Skills Program, Building Modeling and Information Design Skills Competencies, subjects Building Construction Basics and Survey Engineering are basic subjects expertise program (C2) (Kemendikbud, 2017). It means that must be mastered basic subject, before studying subjects in the expertise

competency group (C3). So, the subject of Building Construction Basics and Survey Engineering has an important position as a basic subject in the Construction and Property Engineering expertise program.

Method

This research was conducted at the State Vocational High School 3 in Jombang, East Java, Indonesia. The research subjects of class XI are 62 people. The research time is second semester 2018/2019. The instrument of learning motivation towards the subject of Modeling Design and Building Information (DPIB) was developed through the definition of constructs of learning motivation in DPIB subjects using the Liker scale with four choices, namely strongly agree, agree, disagree, and disagree. Learning motivation factors consist of two factors namely intrinsic and extrinsic factors. Data were analyzed using SPSS 24 and AMOS Conceptual framework of learning motivation instrument in DPIB subjects can be seen in Figure 1.
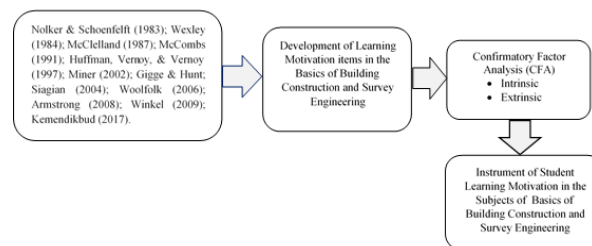

Figure 1. Conseptual Framework

In this study the instrument reliability test was conducted on all attributes to assess the internal consistency of the variables. According to Babbie (1992), the Cronbach Alfa value is classified based on the reliability index, which is 0.90-1.00 very high, 0.70-0.89 high, 0.30-0.69 moderate, and 0.00-0, 30 low. Then the data is evaluated to find out the unidimensionality of items and factors through Confirmatory Factor Analysis (CFA) using the SPSS 24 program (Arbuckle & Wothke, 1999). The Kaiser-Meyer-Olkin (KMO) value according to Kim & Muller (1978) must be greater than 0.5 or the cumulative percentage of the skonstruct variant> 50% as well as the loading factor ≥0.3.

Results and Discussion

Reliability

Reliability instrument of learning motivation using internal criteria, namely internal consistency. Based on the type of data that is non-dichotomy, the instrument reliability testing uses the Alpha Cronbach reliability formula. Because it uses internal criteria, instrument reliability testing is performed for each factor. Calculation of the combined reliability of all factors according to Nunnally (1978) used the combined reliability formula based on a linear combination system.

The analysis results obtained an Alpha value of 0.93 above the acceptable threshold of 0.70 as suggested by Babbie (1992). According to Babbie (1992) the Cronbach Alpha value is classified based on the classification of the reliability index where 0.90-1.00 is very high, 0.70-0.89 is high, 0.30-0.69 is moderate, and 0.00 is 0.30 low. Analysis shows the Cronbach Alpha value of 0.93 above 0.70 and included in the classification is very high. Thus the learning motivation instrument has a very high reliability to measure students' motivation to study in the subject of Basic Building Construction and Survey Engineering (DKBT).

In discussion, it is the most important section of your article. Here you get the chance to sell your data. Make the discussion corresponding to the results, but do not reiterate the results. Often should begin with a

brief summary of the main scientific findings (not experimental results). The following components should be covered in discussion: How do your results relate to the original question or objectives outlined in the Introduction section (what)? Do you provide interpretation scientifically for each of your results or findings presented (why)? Are your results consistent with what other investigators have reported (what else)? Or are there any differences?

Item Validity and Load Factor

To interpret to determine whether an item is fall or not, then it is taken through the following three steps. First, by looking at relation or correlations between grains that are relevant to each other in the formation of factors through product moment correlation. Second, extraction to arrange the initial factors using principal component analysis. Third, rotating the factors to be interpreted using orthogonal methods with the varimax system. The results of the rotation of the factor matrix along with the interpretation, labeling, and meaning of the factors of the learning motivation instrument can be seen in.

Table 1. Test Results For Item Validity and Factor Loadings

Factor	Indicator	Item Number	Load Factor	Explanation
Instrinsik	Have a high enthusiasm for success in DKBT subjects	X1	0.706	Valid
	The desire of students to explore DKBT subjects	X2	0.717	Valid
	Have responsibility for the tasks given by subject teachers of DKBT	X3	0.819	Valid
	Carry out tasks with tenacity when facing difficult DKBT subjects	X4	0.763	Valid
	Have confidence in participating in learning subject DKBT	X5	0.740	Valid
	Kemadirian acted in following the DKBT subject	X6	0.946	Valid
	Demonstrating hard and diligent efforts in following the DKBT subject	X9	0.913	Valid
	Courage to face failure	X7	0.650	Valid
	Want to be superior in following DKBT subjects	X8	0.879	Valid
Ektrinsik	Encouragement from the teacher for the spirit of learning DKBT subject	X10	0.562	Valid
	Learning models and media used by teachers when delivering DKBT learning materials	X11	0.840	Valid

Factor	Indicator	Item Number	Load Factor	Explanation	
	Encouragement from parents and family to attend DKBT subjects	X12	0.847	Valid	5-6
	Collaboration between friends when completing group assignments on DKBT subjects	X13	0.619	Valid	
	Complete infrastructure of the school	X14	0.655	Valid	
	Competency Test Competencies in the field of Modeling Design and Building Information	X16	0.586	Valid	
	The suitability of the subject matter of DKBT with the implementation in the Prakerin field	X15	0.896	Valid	

Model Relations and Item Factors

Based on the factor analysis on the matrix component shows that of the 20 items as many as 4 items have a factor load of ≤0.30, so the items are declared fall. Valid items are 16 items. Furthermore, a factor analysis is carried out again by not involving invalid items. From the matrix component, it can be arranged a model of the relationship of items with factors as shown in Figure 2.
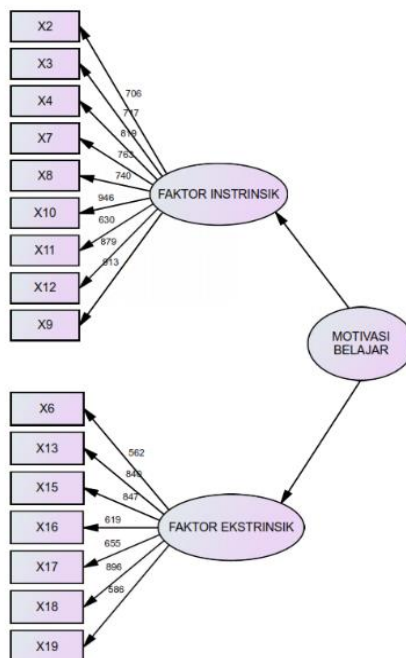

Figure 2. Model Relationships of Items and Factors

Conclusion

The theoretical concept of learning motivation instruments for DKBT subjects consists of two factors, namely intrinsic and extrinsic. The fit-model indicator is characterized by reliability (Cronbach Alpha), Kaiser-Meyer-Olkin (KMO), percentage of construction variance, and item validity (loading factor). The analysis shows Cronbach Alpha value of 0.93, KMO value of 0.681, percentage value of construction variance of 68.39%, and item factor load (16 valid items) $\geq$ 0.3. Thereby, fit-model theoretical model so that the DKBT learning motivation instrument can be used..

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