Development of Student Pancasila Character Instruments : A Evidence of The EFA, CFA and RASCH Models

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Abstract: This study aims to compile and validate Pancasila character instruments using three methods: Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and the RASCH model. This research is a survey involving 681 students from universities throughout Indonesia. The study consisted of three stages, namely (1) item preparation, (2) construct validation through EFA and CFA, and (3) item validation using the RASCH model. The preparation of Pancasila character instrument items was carried out through a literature review and 44 statement items covering six aspects of Pancasila character. After EFA was conducted, 44 items were eliminated into 33 items which were divided into five constructs or factors, namely factor 1 = Ethics, Nationalism, Independent and Critical, factor 2 = Self Efficacy, factor 3 = Empathy, factor 4 = Creativity, and Global Knowledge, and factor 5 = Discipline. This result is reinforced by the CFA, which shows that the factors formed are in accordance with the model and have items that can describe the character of Pancasila (loading factor 0.3). Further analysis using RASCH shows that the instrument developed has good validity and reliability and can be used to measure students' Pancasila character.

Introduction

Character is behaviour in the form of morality and is part of human nature (Pradhan, 2009; Sari et al., 2021). A character must be formed (Muharlisiani et al., 2019) through virtues, mindsets and actions (Rahman et al., 2020). Characters need to be accustomed to example and learning (Rahmawati et al., 2020) to have good morals and be aware of their behaviour (Maisardi, 2017; Asrial et al., 2021). Character is needed in everyday life to prevent moral crises that have recently happened, especially in Indonesia (Iriany, 2017). Moral degradation is currently infecting the youth of the Indonesian nation, such as crime, narcotics, liquor and so on (Nuradhawati, 2022). The Pancasila character has a role in overcoming the current moral crisis (Iriany, 2017).

Pancasila is the ideology of the Indonesian nation, which consists of five precepts, namely (1) belief in the one and only God, (2) just and civilized humanity, (3) unity of Indonesian, (4) democracy, led by the wisdom of the representative of the people, and (5) social justice for all Indonesian people (Widiatmaka, 2021). The Pancasila character is an attitude reflected in behaviour based on Pancasila values (Yuliatin, 2023). This is in accordance with the function of Pancasila as a way of life that provides direction and foundation for the development of the character of the Indonesian nation (Sulistyarini, 2015). The character of Pancasila is needed by the Indonesian nation, which has a very complex

socio-cultural and geographical environment. Indonesia consists of multi-ethnic, cultural and religious groups (Lestari, 2015), which can trigger conflict and division (Pursika, 2009). Not only these conditions currently, but the Indonesian nation is also experiencing moral degradation such as flexing (Khayati et al., 2022), juvenile delinquency (Rismawati et al., 2019), crime and violence (Hernawati, 2019). Therefore, the implementation of Pancasila values is necessary for overcoming moral degradation and overcoming conflicts and divisions (Nafisah et al., 2022).

Instruments for measuring student Pancasila's character are still difficult to find. Uyun et al. (2023) conducted previous research and developed a special Pancasila character instrument for elementary school students. In addition, other studies have not comprehensively revealed all aspects of Pancasila's character and only measured one aspect, such as having a noble character (Sa'idah et al., 2023) and critical reasoning (Rosmalah et al., 2022). The only research that developed the Pancasila instrument was conducted by Sabon et al. (2022), and it focused on student self-assessment. This research is very important because it is a pioneer research that develops Pancasila character instruments for college students. This research aims to develop a Pancasila character instrument that has been validated so that it can be widely used in measuring Pancasila character, especially for college students. This article describes the results of developing and validating Pancasila character instruments using three methods, namely the EFA, CFA and RASCH models.

Research Method

This research is survey research (Ponto, 2015). Instrument development was conducted through three stages, namely (1) item preparation, (2) construct validation using the Exploratory Factor Analysis (EFA) method and Confirmatory Factor Analysis (CFA), and (3) item validation using the RASCH model (Sukri et al. ., 2022). The research sample was taken randomly (Endo et al., 2016). This study used 681 students from 25 universities in Indonesia. Respondents comprised 500 women (73.42%) and 181 men (26.58%). Respondents came from various regions in Indonesia, including social science, science, science education, engineering, humanities and business majors. This sample size meets the requirements for factor analysis and RASCH (Tabachnick & Fidell, 2014; Hagell & Westergren, 2016).

The preparation of student Pancasila character instrument items was carried out through a literature review adopting guidelines for developing Pancasila student profiles published by the Ministry of Education and Culture, Republic of Indonesia (Sufyadi et al., 2021). The character of Pancasila consists of six dimensions, namely (1) belief, fear and noble character, (2) global diversity, (3) coorperative, (4) independence, (5) critical thinking, and (6) creativity. Compiling the Pancasila character instrument, an analysis of reference sources in national and international journals was carried out to complement each dimension. The dimensions of belief, fear and noble character consist of five aspects and 16 statement items; the global diversity dimension consists of three aspects and 5 statement items; the cooperation dimension consists of three aspects and 4 statement items; the independent dimension consists of two aspects and 4 statement items (Rusnaini et al., 2021), the critical thinking dimension consists of four aspects and 10 statement items (Ardi et al., 2023), finally the creative dimension consists of two aspects and 5 statement items (Carson et al., 2005; Widiastuti & Indrana, 2019). The total number of statement items is 44 items. Responses for each statement item were given a score of 1 = disagree, 2 = undecided, and 3 = agree for positive statements, while for negative statements, the opposite applies.

EFA reveals the number of factors formed (Williams et al., 2010). The number of factors is determined by the Eigenvalue > 1 and the loading factor with a minimum value of 0.3 (Yong & Pearce, 2013; Prasetyo et al., 2019). CFA further strengthened the EFA results to test the model formed. The criteria for acceptance of the model in CFA are based on the value of X2/df < 3.00, Root mean square error of approximation (0.06), Comparative fit index (0.95), Goodness of fit index (0.95), and Tucker-Lewis Index (0.95) (Sun, 2005). Models that meet the criteria are used as the final model in grouping factors. To test the consistency of the EFA and CFA, a RASCH analysis was performed to measure the content aspects of the instrument (Susongko, 2016). The criteria for model fit are seen from the point-measure correlation coefficient ($0.3 < PTMC < 0.7$), outfit mean-square ($0.5 < MNSQ < 1.5$), and outfit ZSTD ($-2.00 < ZSTD < +2.00$) (Sumintono & Widhiarso, 2015; Linacre, 2018). Items that meet one of the criteria are valid items, while items that do not meet all the criteria will be considered for deletion from the instrument (Sumintono & Widhiarso, 2015).

Results and Discussion
Construct validation results through EFA

The EFA prerequisite test using the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity (BTS) values showed that both analyses met the established criteria (Table 1). Table 1 reveals that the KMO value is 0.867 (> 0.05), and the BTS value is <0.001. These results indicate that the number of samples used in EFA is sufficient (Hair et al., 2010), and there is a correlation in factors (Matore et al., 2019). The EFA analysis can be carried out because the two assumptions have been fulfilled. The results of the EFA analysis are shown in Table 2.

Table 1. KMO and BTS test results

Kaiser-Meyer-Olkin	Bartlett's Test of Sphericity		
Overall MSA	X^2	df	p
0.867	6196.241	946.000	<.001

EFA was carried out on 44 statement items (P1-P44) to determine the grouping and number of factors formed. EFA uses the parallel analysis method (Çokluk & Koçak, 2016) and varimax rotation (Osborne, 2015). In this study, item factor loading values that were less than 0.3 were eliminated from the factors. Therefore, the accepted factor loading value is 0.3. The EFA results show that the 44 statement items form five factors, namely factors 1 to 5. The results in Table 2 also show that of the 44 statement items, 33 items remain, and the rest are eliminated because they have a loading factor <0.3 (Prasetyo et al., 2019). The five factors formed were then given names based on the similarity of the characteristics of each item, namely factor 1 = Ethics, Nationalism, Independent and Critical, factor 2 = Self Efficacy, factor 3 = Empathy, factor 4 = Creativity, and Global Knowledge, and factor 5 = Discipline. The characteristics of the factors formed are shown in Table 3.

Table 2. Factor loading and variance formed from factor analysis

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
P1	0.315				
P2	0.421				
P12	0.476				
P17	0.430				
P20	0.303				
P23	0.381				
P26	0.573				
P27	0.460				
P28	0.371				

P29	0.460			
P31	0.450			
P32	0.464			
P22		0.322		
P30		0.409		
P34		0.628		
P35		0.646		
P36		0.461		
P37		0.631		
P38		0.365		
P43		0.574		
P7			0.437	
P9			0.411	
P14			0.604	
P25			0.500	
P18				0.412
P29				0.312
P31				0.389
P40				0.517
P41				0.309
P42				0.314
P4				0.631
P5				0.517
P6				0.607

Eigenvalues for all factors range from 1,463 to 3,380. An Eigenvalue > 1 indicates that the construct formed from this model is acceptable (Yong & Pearce, 2013). Table 3 also shows that the highest cumulative variance value is 22.1%. This result is thought to be caused by the extraction method, namely the maximum likelihood method. However, the variance and cumulative variance values are still acceptable because they meet the established criteria. The formed factors also show Specificity. This is indicated by the average inter-item correlation value, which is higher than the average inter-factor correlation. The average value of the inter-item correlation ranges from 0.22 to 0.41. This value is in a fairly good range because the value received for the fit model is 0.3 (Tabachnick & Fidell, 2014). Overall, the factors have good Specificity.

Table 3. Factor characteristics of EFA results

Construct	Initial Eigen values	% of var.	Cumula-tive %	Spesificity	
				Average inter-item correlation	Average inter-factor correlation
Factor 1	3.380	7.7	7.7	0.22	0.02
Factor 2	2.930	6.7	14.3	0.32	0.08
Factor 3	1.805	4.1	18.4	0.27	0.01
Factor 4	1.617	3.7	22.1	0.40	0.02
Facor 5	1.463	3.3	25.4	0.41	0.09

Construct validity results using CFA

CFA was carried out to test the consistency of the model formed from EFA (Tomé-Fernández et al., 2020). The five factors formed in EFA include factor 1 = Ethics, Nationalism, Independent and Critical, factor 2 = Self Efficacy, factor 3 = Empathy, factor 4 = Creativity and Global Knowledge, and factor 5 = Discipline will be tested again to see whether consistency is constant. The fit model for CFA follows predefined criteria. The results of the CFA analysis are shown in Table 4.

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Table 4. Model fit CFA results

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Index	Value	Cut off value	Criteria
X^2/df	1.110	<3.00	Good
Root mean square error of approximation (RMSEA)	0.013	0.06	Good
Goodness of fit index (GFI)	0.988	0.95	Good
Comparative Fit Index (CFI)	0.992	0.95	Good
Tucker-Lewis Index (TLI)	0.991	0.95	Good

Table 4 shows all the criteria for model acceptance (RMSEA, GFI, CFI, TLI and X2/df) have met the cut-off value that has been set (Prudon, 2014). These results indicate that the model formed is well received (Hidayat et al., 2018). The final results show that factor 1 consists of 12 statement items, factor 2 consists of 8 statement items, factor 3 consists of 4 statement items, factor 4 consists of 6 statement items, and factor 5 consists of 3 statement items. The total number of CFA result items is 33 statement items. All factors and items formed by the CFA results are shown in Figure 1.
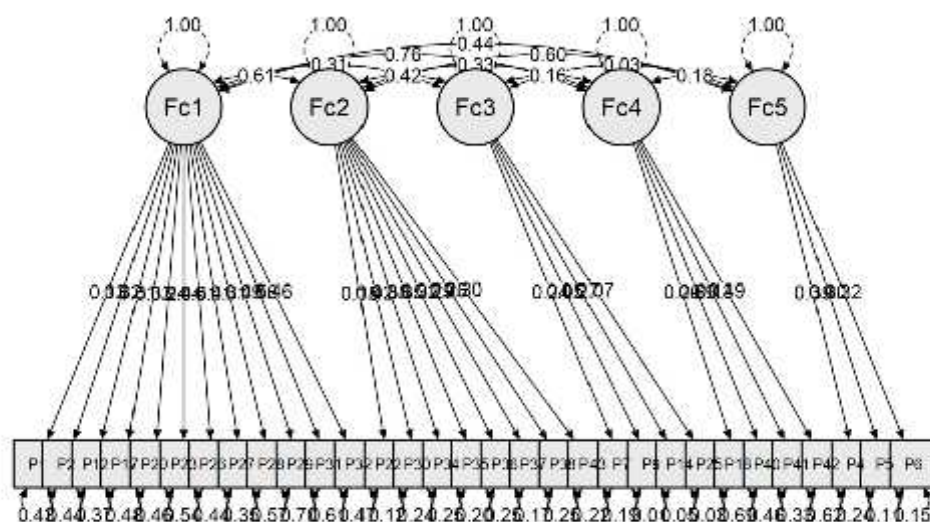

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Figure 1. Factors and factor loading formed from CFA

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Item validation results Using RASCH

RASCH analysis is used to review the content aspects of instrument items (Susongko, 2016) and to strengthen the EFA and CFA results. Content analysis using RASCH includes reliability analysis and statistical fit of instrument items (Scoulas et al., 2021).

Pancasila Character

Instrument reliability was measured using the Pearson correlation value. The results of the instrument reliability analysis are shown in Table 5. All factors in the instrument have a high-reliability value of> 0.85. This range of values is in a good category, and overall the instrument has good reliability (Saefi et al., 2020). In addition to reliability, separation item analysis for each factor was also carried out. Separation item values for all factors range from 2.82 to 11.03. The item separation value indicates that the instrument can differentiate the respondent's ability to answer statements (Ismail et al., 2020). The value of the separation item has fulfilled the cut-off value with a value range between 1 and > 2 (Sumintono & Widhiarso, 2015).

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Table 5. The value of the reliability and separation of the Pancasila character instrument index

Construct	Item Measure	
	Reliability	Separation
Factor 1 (Ethics-morals, Nationalism, Independent and Critical)	0.98	7.01
Factor 2 (Self-Efficacy)	0.89	2.82
Factor 3 (Empaty)	0.95	4.16
Factor 4 (Creativity and Global Knowledge)	0.99	11.03
Factor 5 (Discipline)	0.93	3.68

Fit Statistical Analysis of Pancasila Character Instruments

Item fit analysis was carried out to determine the model's accuracy with items (Scoulas et al., 2021). Model fit was measured based on three criteria, namely point-measure correlation coefficient ($0.3<PTMC<0.7$), outfit mean-square ($0.5<MNSQ<1.5$), and outfit ZSTD ($-2.00<ZSTD<+2.00$) (Sumintono & Widhiarso, 2015). PTMC differentiates respondents according to their responses (Saefi et al., 2020). Meanwhile, the MNSQ indicates item mismatch based on the RASCH model (Ismail et al., 2020). The results of the fit statistical item analysis are shown in Table 6.

Table 6. Fit item analysis of the Pancasila character instrument

Construct	Items	Outfit MNSQ	Outfit ZSTD	PTMC
Ethics, Nationalism, Independent and Critical	I carry out my worship on time (P1)	1.20	1.1	0.28
	I am used to doing homework without being asked by my parents (P2)	0.83	-1.1	0.44
	I always throw garbage in its place (P12)	0.76	-1.4	0.44
	I take part in celebrating local traditions to preserve cultural heritage (P17)	0.85	-1.0	0.44
	I have good communication with friends from other areas (P20)	1.15	1.0	0.40
	I am always present when there is a discussion forum with friends (P23)	0.86	-1.2	0.50
	I have developed a study strategy since the beginning of college to get good grades (P26)	0.64	-3.4	0.58
	I study hard to be able to understand lecture material that I don't understand (P27)	0.63	-2.5	0.51
	I can decide for myself what is best for me (P28)	1.04	0.4	0.41
	I volunteered to do assignments or answer questions before being appointed by the lecturer (P29)	0.86	-2.1	0.59
	I observe and follow the development of global issues, especially in Indonesia (P31)	0.80	-3.0	0.61
	I asked the lecturer about lecture material that was not understood (P32)	0.80	-1.7	0.52
Self Efficacy	I do group assignments in accordance with the mutual agreement (P22)	0.52	-1.6	0.32
	I think carefully about the assignment given by the lecturer (P30)	0.71	-1.6	0.46

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	I double-checked the work I was working on to correct mistakes I wasn't aware of (P34)	0.74	-1.3	0.44
	I looked for other appropriate sources to perfect the conclusions I made (P35)	0.89	-0.4	0.41
	I consider all alternatives in solving the problem (P36)	0.81	-0.9	0.40
	I rechecked the exam answer sheet to check for things that could still be improved (P37)	0.54	-2.0	0.40
	I consider the opinions of other friends during group discussions (P38)	0.91	-0.3	0.40
	I double-checked my work to make sure it was correct (P43)	0.80	-0.8	0.40
Empathy	I respect the opinions of others (P7)	1.82	2.5	0.22
	I respect friends of different ethnicities, religions, races and cultures (P9)	0.54	-0.7	0.16
	I respect the opinions of others in deliberations (P14)	0.60	-1.1	0.29
	I feel happy if I can be useful to others (P25)	0.59	-0.6	0.16
Creativity and Global Knowledge	I prefer modern pop songs to folk songs (P18)	1.51	6.5	0.29
	I find ideas quickly when given assignments by the lecturer (P40)	0.86	-2.1	0.59
	I experience difficulties when the lecturer conveys abstract material (P41)	2.37	7.9	0.09
	I have a different way of thinking than other people (P42)	1.08	0.9	0.45
Discipline	I complete college assignments in accordance with the allotted time (P4)	0.92	-0.3	0.40
	I carry out the duties and obligations as agreed in the learning contract (P5)	0.66	-1.2	0.34
	I do and collect assignments given by the lecturer on time (P6)	0.75	-0.9	0.34

Based on the model fit cut-off value, all items meet the MNSQ outfit value criteria (Table 6). However, for the ZSTD outfit values, several items, such as P26, P27, P7, P18, and P41, did not meet the cut-off value. Likewise, with the PTMC score, several items did not meet the value criteria, such as P1, P22, P7, P9, P14, P25, P18, P41, P5 and P6. In this study, if an item meets one of the cut-off values of the three specified criteria, then the item can be accepted and not eliminated from the model (Sumintono & Widhiarso, 2015). Overall the items met all the criteria so that all fit items based on RASCH could be accepted.

Factor analysis was carried out to determine the grouping of items based on their similarity to the factors or constructs (Williams et al., 2010). The 44 Pancasila character items are compiled based on a literature review which consists of 6 aspects, namely (1) belief, fear and noble character, (2) global diversity, (3) coorperative, (4) independence, (5) critical thinking, and (6) creativity. The EFA results show that the 44 question items are reduced to 33 items, which are spread over five constructs or factors, namely factor 1 = Ethics, Nationalism, Independent and Critical, factor 2 = Self Efficacy, factor 3 = Empathy, factor 4 = Creativity, and Global Knowledge, and factor 5 = Discipline. All of the factors that are formed form new factors that are different from aspects of the character of Pancasila

based on previous literature reviews. Nonetheless, the five factors formed from EFA are part of the Pancasila character. The EFA results also show that several items from different aspects form new factors, for example, factor 1, which consists of ethics, nationalism, independence and criticality. The grouping of these items is thought to be due to the similarities and the same characteristics between these items (Williams et al., 2010), likewise with other factors, such as factor 4, which consists of items from different aspects, namely creativity and global knowledge.

The model formed in EFA is strengthened through CFA. The CFA results show that the model formed in EFA is consistent and has not changed. Therefore, all the factors and items that are formed are the final model of the student Pancasila character instrument. Each item has a good loading factor (Figure 1) and is reinforced by a fit model that meets all the cut-off value criteria (Table 4). These results are consistent with those obtained by Uyun et al. (2023), who reported that each instrument item on the EFA and CFA results had a good factor loading value so that it could well describe the profile of Pancasila students. Reliability and item fit analysis using RASCH was conducted to strengthen the EFA and CFA results.

The results of the reliability analysis of the Pancasila character instrument show that the items have good reliability (Table 5). This indicates that the instrument has good constancy and consistency in measuring student Pancasila character. In addition, the item separation index is in a good category, indicating that the instrument can differentiate respondents. This means that this instrument can be used on all respondents who have both high and low levels of cognition. The results of the item fit analysis (Table 6) show that all items meet the cut-off value criteria. This indicates that all items are still grouped into the same factor according to the results of the EFA and CFA. The developed Pancasila character instruments meet valid and reliable criteria based on the EFA, CFA and RASCH models. Therefore, this instrument can be used to measure student Pancasila character.

Conclusion
The development of student Pancasila character instruments was carried out through literature review analysis and validation using the EFA, CFA and RASCH Models. EFA results reveal that the 44 items of Pancasila character instrument statements form five constructs or factors, namely factor 1 = Ethics, Nationalism, Independence and Critical, factor 2 = Self Efficacy, factor 3 = Empathy, factor 4 = Creativity and Global Knowledge, and factor 5 = Discipline. The five factors formed are then seen for their consistency using CFA. CFA results show that the factors formed are in accordance with the model and have items that can describe the character of Pancasila (loading factor 0.3). Further analysis using RASCH shows that the instrument developed has good validity and reliability and can be used to measure students' Pancasila character.

Recommendation
This research is limited to 44 statement items, which are considered to represent six aspects of the Pancasila character. Other researchers can carry out the same study by adding statements from the six aspects to be more comprehensive and representative. In addition, to increase the accuracy of the results of this study, the instrument needs to be implemented to reveal the Pancasila character of students.

Acknowledgements

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